SESSIONAL PAPERS.

VOL. XXXII.—PART VII.

THIRD SESSION, NINTH LEGISLATURE

OF THE

PROVINCE OF ONTARIO.

SESSION 1900.

TORONTO;
PRINTED AND PUBLISHED BY L. K. CAMERON.
Printer to the Queen's Most Excellent Majesty.
1900.

WARWICK BRO'S & RUTTER, Printers.

TORONTO.

LIST OF SESSIONAL PAPERS.

PRESENTED TO THE HOUSE DURING THE SESSION.

TITLE.	No.	REMARKS.
Accounts (*Dom. and the Provinces*), Awards	51	*Printed.*
" Financial Commission	47	"
" Report of Commission	4	"
" Public	1	"
Agricultural College, Report	14	"
" and Experimental Union, Report	15	"
" and Horticultural Societies, Report	65	*Not printed.*
Amherstburg, Audit of Accounts	59	"
Asylums, Report	34	*Printed.*
Barron, Judge, O. in C	64	*Not printed.*
Bee Keepers' Association, Report	20	*Printed.*
Binder Twine sold in 1899	72	*Not printed.*
Births, Marriages and Deaths, Report	9	*Printed.*
Blanche River Pulp Company	49	"
Blind Institute, Report	37	"
Bonuses and Exemptions, Municipal	69	*Not printed.*
Boys and Girls reprieved	71	"
Cheese and Butter Associations, Report	22	*Printed.*
Children Neglected, Report	39	"
Courts, moneys in	55	*Not printed.*
Courts, Sittings of the	81	"
Crown Lands, Report	3	*Printed.*
Deaf and Dumb Institute, Report	38	*Printed.*
Division Courts, Report	29	"
Doyle, Judge, O. in C	58	*Not printed.*
Education, Report	12	*Printed.*
Elections, Returns	42	"
Elgin West, Commission	46	"
Entomological Society, Report	19	"
Estimates	2	"
Factories, Report	8	*Printed.*
Factories, Employes in	77	*Not printed.*
Farmers' Institutes, Report	24	*Printed.*
Financial Commission, Report	4	"
Fruit Experiment Stations, Report	17	"
Fruit Growers' Association, Report	16	"
Fumigation Appliances, Report	44	"

TITLE.	No.	REMARKS.
Game and Fish, Report	27	*Printed.*
Gaols, Prisons, etc., Report	35	"
Guarantee Policies	63	*Not printed.*
Health, Report	32	*Printed.*
Hoskin, John, salary	75	*Not printed.*
Hospitals and Charities, Report	36	*Printed.*
Immigration, Report	28	*Printed.*
Imperial Institute, Canadian Section	74	*Not printed.*
Infants, Moneys of, in Court	53	"
Industries, Report	26	*Printed.*
Insurance, Report	10	"
Insurance Company's, Guarantee Policies	63	*Not printed.*
Judicature Act, Judges fees under	58, 61, 62, 64	*Not printed.*
Judicature, Court of, money in, or under control of	55	"
Legal Offices, Report	30	*Printed.*
Leeds and Grenville, claim of	82	*Not printed.*
Library, Report on	45	"
License Inspectors, names of, etc.	67	"
Liquor Licenses, Report	40	*Printed.*
Live Stock Associations, Report	23	"
Live Stock, Registrar of, Report	73	"
Loan Corporations, Report	11	"
McNiven, Donald, appointment of	54	*Not printed.*
Manufacturing Industries, Bonuses to	69	"
Mayor's Report	40	*Printed.*
Mines, Report	5	"
Mines Act, regulations	56	"
Moneys in the Courts	55	*Not printed.*
Morson, Judge, O. in C	61	"
Municipal Auditor, Report	41	*Printed.*
Municipal Bonuses and Exemptions	69	*Not printed.*
Nepigon Pulp Company	80	*Printed.*
North Augusta License	60	*Not printed.*
Ontario Power Company, agreement	79	*Not printed.*
Poultry Associations, Report	21	*Printed.*
Printing and Binding, Tenders	57	"
Prisons and Reformatories, Report	35	"
Provincial Municipal Auditor, Report	41	"
Public Accounts	1	"
" Commission	47	"
" Report of Commission	4	"
Public Works, Report	7	"

Title.	No.	Remarks.
Pulp Company, Spanish River	50	*Printed.*
" Blanche River	49	"
" Nepigon River	80	"
Queen *vs.* Bole and Cahill	70	*Not printed.*
Queen Victoria Niagara Falls Park, Report	6	*Printed.*
" " agreement with Ontario Power Company	79	*Not printed.*
Registry Offices, Report of Inspector	31	*Printed.*
Revenue received in 1899	76	*Not printed.*
Road-making, Report	25	*Printed.*
San José Scale, Report	43	*Printed.*
Secretary and Registrar, Report	33	"
Spanish River Pulp Company	50	"
Spraying, Report of Superintendent	18	"
Statutes, distribution, correspondence	78	*Not printed.*
" distribution	52	"
Tavern and Shop Licenses Act, Report	40	*Printed.*
Thedford License	84	*Not printed.*
Titles, Report of Master	68	"
Toronto University, Reports	13	*Printed.*
Upper Canada College, Report	83	*Printed.*
Warren, Frederick, appointment of	66	*Not printed*
West Elgin Commission	46	*Printed,*
Workmen's Compensation, Mavor's Report	40	"

LIST OF SESSIONAL PAPERS.

Arranged in Numerical Order with their titles at full length; the dates when Ordered and when presented to the Legislature; the name of the Member who moved the same, and whether Ordered to be Printed or not.

CONTENTS PART I.

No. 1.. Public Accounts of the Province for the year 1899. Presented to the Legislature, 6th March, 1900. *Printed.*

No. 2.. Estimates (Vote of Credit) for the year 1900. Presented to the Legislature, 15th February, 1900. *Not Printed.* Estimates for the year 1900. Presented to the Legislature, 6th March, 1900. *Printed.* Estimates (Supplementary). Presented to the Legislature, 25th April, 1900. *Printed.*

No. 3.. Report of the Commissioner of Crown Lands for the year 1899. Presented to the Legislature, 29th March, 1900. *Printed.*

No. 4.. Report of the Royal Commission, on the Financial position of the Province. Presented to the Legislature, 6th March, 1900. *Printed.*

CONTENTS PART II.

No. 5.. Report of the Bureau of Mines for the year 1899. Presented to the Legislature, 25th April, 1900. *Printed.*

No. 6.. Report of the Commissioners for the Queen Victoria Niagara Falls Park for the year 1899. Presented to the Legislature 23rd April, 1900. *Printed.*

No. 7. Report of the Commissioner of Public Works for the year 1899. Presented to the Legislature, 13th March, 1900. *Printed.*

No. 8.. Report of the Inspectors of Factories for the year 1899. Presented to the Legislature, 6th April, 1900. *Printed.*

No. 9.. Report upon the Registration of Births, Marriages and Deaths in the Province for the year 1899. Presented to the Legislature, 9th March, 1900. *Printed.*

CONTENTS PART III.

No. 10.. Report of the Inspector of Insurance and Registrar of Friendly Societies for the year 1899. Presented to the Legislature, 6th April, 1900. *Printed.*

CONTENTS PART IV.

No. 11.. Report of the Financial Statements made by Loan Corporations for the year 1899. Presented to the Legislature, 6th April, 1900. *Printed.*

CONTENTS PART V.

No. 12.. Report of the Minister of Education for the year 1899, with the Statistics of 189-. Presented to the Legislature, 8th March 1900. *Printed.*

No. 13.. Reports of Auditor and Standing Committee on Finance for 1899-1900, of the University of Toronto. Presented to the Legislature, 10th April, 1900. *Printed.*

No. 14 Report of the Ontario Agricultural College and Experimental Farm for the year 1899. Presented to the Legislature, 17th April, 1900. *Printed.*

CONTENTS PART VI.

No. 15.. Report of the Agricultural and Experimental Union of Ontario for the year 1899. Presented to the Legislature, 26th March, 1900. *Printed.*

No. 16.. Report of the Fruit Growers' Association of Ontario for the year 1899 Presented to the Legislature, 23rd April, 1900. *Printed.*

No. 17.. Report of the Fruit Experiment Stations of Ontario for the year 1899. Presented to the Legislature, 23rd April, 1900. *Printed.*

No. 18.. Report of the Superintendent of Spraying for the year 1899. Presented to the Legislature, 12th March, 1900. *Printed*

No. 19.. Report of the Entomological Society of Ontario for the year 1899. Presented to the Legislature, 21st March, 1900. *Printed.*

No. 20. Report of the Bee Keepers' Association for the Province for the year 1899. Presented to the Legislature, 6th April, 1900. *Printed.*

No. 21.. Report of the Poultry Associations of the Province for the year 1899. Presented to the Legislature, 23rd April, 1900. *Printed.*

CONTENTS PART VII.

No. 22.. Report of the Cheese and Butter Associations of the Province for the year 1899. Presented to the Legislature, 23rd April, 1900 *Printed.*

No. 23.. Report of the Live Stock Associations of the Province for the year 1899, Presented to the Legislature, 23rd April, 1900. *Printed.*

No. 24.. Report of the Superintendent of Farmers' Institutes of the Province for the year 1899. Presented to the Legislature, 23rd April, 1900. *Printed.*

No. 25.. Report of the Provincial Instructor in Road Making in Ontario for the year 1899. Presented to the Legislature, 23rd April, 1900. *Printed.*

CONTENTS PART VIII.

No. 26.. Report of the Bureau of Industries for the year 1899. Presented to the Legislature, 23rd April, 1900. *Printed.*

No. 27.. Report of the Ontario Game and Fish Commissioners for the year 1899. Presented to the Legislature, 6th April, 1900. *Printed.*

No. 28.. Report of the Department of Immigration for the year 1899. Presented to the Legislature, 28th March, 1900. *Printed.*

No. 29.. Report of the Inspector of Division Courts for the year 1899. Presented to the Legislature, 12th March, 1900. *Printed.*

No. 30.. Report of the Inspector of Legal Offices for the year 1899. Presented to the Legislature, 9th March, 1900. *Printed.*

No 31.. Report of the Inspector of Registry Offices for the year 1899 with statement of fees and emoluments of Registrars. Presented to the Legislature, 23rd April, 1900. *Printed.*

No 32.. Report of the Provincial Board of Health for the year 1899. Presented to the Legislature, 25th April, 1900. *Printed.*

CONTENTS PART IX.

No. 33.. Report of the Secretary and Registrar of the Province for the year 1899. Presented to the Legislature, 25th April, 1900. *Printed.*

No. 34.. Report upon the Lunatic and Idiot Asylums for the Province for the year ending 30th September, 1899. Presented to the Legislature, 6th March, 1900. *Printed.*

No. 35.. Report upon the Common Gaols, Prisons and Reformatories of the Province for the year ending 30th September, 1899. Presented to the Legislature, 13th March, 1900. *Printed.*

No. 36.. Report upon the Hospitals of the Province for the year ending the 30th September, 1899. Presented to the Legislature, 28th March, 1900. *Printed.*

No. 37.. Report upon the Institution for the Education of the Blind, Brantford, for the year ending 30th September, 1899. Presented to the Legislature, 13th March, 1900. *Printed.*

No. 38.. Report upon the Institution for the Education of the Deaf and Dumb, Belleville, for the year ending 30th September, 1899. Presented to the Legislature, 6th March, 1900. *Printed.*

CONTENTS PART X.

No. 39.. Report of the Work under the Children's Protection Act for the year 1899. Presented to the Legislature, 15th March, 1900. *Printed.*

No. 40.. Report on the working of the Tavern and Shop Licenses Acts for the year 1899. Presented to the Legislature, 6th March, 1900. *Printed.*

No. 41.. Report of the Provincial Municipal Auditor for the year 1899. Presented to the Legislature, 13th March, 1900. *Printed.*

No. 42.. Return from the Record of the several Elections of the Legislative Assembly in the Electoral Divisions of West Peterborough, South Renfrew, East Elgin, West Elgin, South Brant, and East Middlesex, since the General Election of March 1st, 1898, shewing:—(1) The number of Votes polled for each Candidate in the Electoral District in which there was a contest. (2) The majority whereby each successful Candidate was returned. (3) The total number of Votes polled in each District. (4) The number of Votes remaining unpolled (5) The number of names on the Voters' Lists in each District. (6) The population of each District as shewn by the last Census. Presented to the Legislature, 20th February, 1900. *Printed.*

No. 43.. Report of the Commission of Enquiry, concerning the operation of the San José Scale Act, 1899. Presented to the Legislature, 12th March, 1900. *Printed.*

No. 44.. Report of the Inspector of Fumigation Appliances for the year 1899. Presented to the Legislature, 12th March, 1900. *Printed.*

No. 45.. Report of the Librarian on the state of the Library. Presented to the Legislature, 14th February, 1900. *Not printed.*

No. 46.. Copy of an Order-in-Council, approved by His Honour the Lieutenant-Governor the thirty-first day of January, 1900, directing that a Commission be appointed to enquire into matters connected with the election for the West Riding of Elgin, and also a copy of the Commission issued thereunder. Presented to the Legislature, 15th February, 1900. *Printed.*

No. 47.. Copy of a Commission appointing Messieurs Hoskin, Walker and Kirkland, Commissioners to enquire into the Financial affairs of the Province of Ontario. Presented to the Legislature, 19th February, 1900. *Printed.*

No. 48.. Report by Prof. James Mavor on Workmen's Compensation for Injuries. Presented to the Legislature, 25th April, 1900. *Printed.*

No. 49.. Copy of Agreement between Her Majesty, represented by the Honourable the Commissioner of Crown Lands, of the one part, and the Blanche River Pulp and Paper Company, Limited, of the other part, and bearing date on the 14th April, 1900. Presented to the Legislature, 23rd April, 1900. *Printed.*

No. 50.. Copy of Agreement with the Spanish River Pulp and Paper Company Limited. Presented to the Legislature, 13th March, 1900. *Printed.*

No. 51.. Awards of the Arbitrators on the Unsettled Accounts between the Dominion of Canada and the Provinces of Ontario and Quebec. Presented to the Legislature, 13th March, 1900. *Printed.*

No. 52.. Statement as to distribution of the Statutes, Revised and Sessional, for the year, 1899. Presented to the Legislature, 7th March, 1900. *Not Printed.*

No. 53.. Return to an Order of the House of the Seventeenth day of March, 1899, for a Return shewing specificially the nature and amount of each investment now outstanding of the moneys or funds of infants and others in Court, the date when each such investment was made, the rate of interest the same bears, when and how payable, and the security held for each of such investments. Presented to the Legislature, 7th March, 1900. Mr. *Carscallen. Not Printed.*

No. 54.. Return to an Order of the House of the Sixth day of March, 1900, for a Return of copies of all correspondence in connection with the appointment of Donald McNiven, as a fishery officer for Lake Simcoe, together with copies of all reports made by him. Presented to the Legislature, 7th March, 1900. Mr. *Thompson. Not Printed.*

No. 55.. Return to an Order of the House of the Seventeenth day of March, 1899, for a Return shewing the total amount of moneys now on deposit in, or subject to the control and distribution of the Supreme Court of Judicature for Ontario, or either division thereof; the style of cause of each action or proceeding in which such moneys have been so paid in, and the County in which each action or proceedings was commenced, as far as practicable, together with the amount now standing to the credit of each such action or proceeding; the names of the persons by whom such payments were respectively made, and on what account, where practicable; the names of and last known addresses of the persons entitled thereto, in all cases in which no payment out of Court has been made within the last ten years, so far as appears by the books and papers in the office of the Accountant of the Supreme Court of Judicature for Ontario, and the amounts due to such persons respectively, so far as appears by the said books. Presented to the Legislature, 9th March, 1900. Mr. *Carscallen. Not printed.*

No. 56.. Regulations *in re* Staking out Locations under Mines Act, in the unsurveyed territory of Ontario. Presented to the Legislature, 12th March, 1900. *Printed.*

No 57.. Reported on Tenders for Departmental and Legislative Printing and Binding, and Contract with Warwick Bro's & Rutter. Presented to the Legislature, 15th March, 1900. *Printed.*

No. 58.. Copy of Order in Council directing the payment of Surplus Surrogate fees to His Honour Judge Doyle. Presented to the Legislature, 16th March, 1900. *Not Printed.*

No. 59.. Return to an Order of the House of the twenty-second day of March, 1899, for a Return of copies of all papers and correspondence between any member of the Government and any individual with respect to the audit asked for by citizens of the Town of Amherstburg, of the accounts of the local collector. Presented to the Legislature, 21st March, 1900. Mr. *Reid, (Addington.) Not Printed.*

No. 60.. Return to an Order of the House of the twenty-first day of March, 1900, for a Return of copies of all instructions issued by the Department to the inspector or commissioners of the County of Grenville, referring to application for hotel licenses in the Village of North Augusta in the County of Grenville, for the last four years, and all reports from the commissioners and inspector in relation thereto. Presented to the Legislature, 22nd March, 1900. Mr. *Joynt*. *Not Printed.*

No. 61.. Copy of an Order-in-Council commuting the Surrogate Court fees payable to His Honour Judge Morson. Presented to the Legislature, 22nd March, 1900. *Not Printed.*

No. 62.. Copy of an Order-in-Council respecting the payment to certain Judges mentioned therein of surplus Surrogate fees. Presented to the Legislature, 22nd March, 1900. *Not Printed.*

No. 63.. Copy of an Order-in-Council directing that the bonds or guarantee policies of certain insurance companies mentioned therein may be given and accepted as security under the Statutes of Ontario. Presented to the Legislature, 22nd March, 1900. *Not Printed.*

No. 64.. Copy of an Order-in-Council commuting the fees of His Honour Judge Barron as Local Master at Stratford. Presented to the Legislature, 22nd March, 1900. *Not Printed.*

No 65.. Analysis of Reports of District, Township, Agricultural and Horticultural Societies for the years 1887, 1888 and 1889. Presented to the Legislature, 28th March, 1900. *Not Printed.*

No. 66.. Return to an Order of the House of the sixteenth day of March, 1900 for a Return of copies of all correspondence in connection with the appointment of Frederick Warren as Division Court Clerk in the Township of Osnabruck in the County of Stormont. Presented to the Legislature, 28th March, 1900. Mr. *McLaughlin*. *Not Printed.*

No. 67.. Return to an Order of the House of the sixth day of March, 1900, for a Return shewing:—

1st. The name and salary of each License Inspector in the Province for the year 1899, and the County for which he was appointed.

2nd. The amount allowed each such Inspector for expenses.

3rd. The names of License Commissioners in each License District and the amount of expenses allowed to each in the year 1899. Presented to the Legislature, 29th March, 1900. Mr. *Marter*. *Not printed.*

No. 68.. Report of the Master of Titles for the year 1899. Presented to the Legislature, 4th April, 1900. *Not printed.*

No. 69.. Return to an Order of the House of the first day of March, 1899, for a Return giving information under the following heads, respecting bonuses and exemptions to manufacturing industries granted by each municipality in the Province since the year 1870:—1. Amount

of aid by way of absolute bonus and the names of firms or companies receiving same. 2. Amount of aid by way of loan, with names of firms or companies receiving same and the amount of such loan or loans repaid to each municipality. 3. Number of factories which have been granted exemptions from taxation in whole or in part, and approximately the amount of such exemption based on municipal assessors' estimate of the rateable property of each industry. 4. Number of firms or companies which have received municipal aid in any form, more than once 5. Number of such firms or companies which have failed or removed from the municipalities which gave them aid by way of bonus, loan or exemption. Presented to the Legislature, 4th April, 1900. Mr. *Pattullo. Not printed.*

No. 70.. Return to an Order of the House of the seventh day of March, 1900, for a Return of copies of all correspondence between the Government or any member thereof, or any official of the Government and the County Crown Attorney of Elgin, or any other person, in connection with the cases of Queen *vs.* Bole, and Queen *vs.* Cahill. Presented to the Legislature, 4th April, 1900. Mr. *McDiarmid. Not printed.*

No. 71.. Return to an Order of the House of the twenty sixth day of March, 1900, for a Return shewing names, or the official numbers, of Boys reprieved from the Penetanguishene Reformatory, and of Girls reprieved from the Industrial Refuge for Girls, Toronto, during the two years previous to the first February, 1900. The date when the reprieve was recommended by the Warden or Superintendent. The date when the reprieve was finally granted. Presented to the Legislature, 4th April, 1900. Mr. *Pyne. Not printed.*

No. 72.. Return to an Order of the House of the sixth day of April, 1900, for a Return, shewing the quantity of binder twine sold during the season of 1899. To whom sold, with names of purchasers and price *per* pound received. Shewing as well, the names of persons still indebted to the Government, and to what amount, in each case. Presented to the Legislature, 6th April, 1900. Mr. *Duff. Not printed.*

No. 73.. Report of the Registrar of Live Stock for the year 1899. Presented to the Legislature, 9th April, 1900. *Printed.*

No. 74.. Commercial Report of the Canadian Section of the Imperial Institute. Presented to the Legislature, 10th April, 1900. *Not printed.*

No. 75.. Return to an Order of the House of the seventh day of March, 1900, for a Return shewing the salary paid to Mr. John Hoskin as Official Guardian. The number and names of the clerks in his office with dates of appointment, and the salary paid by Government to each. Also shewing what other emoluments are received by Mr. Hoskin as such Official Guardian each year, and what amount of other emoulment, if any, was so received or earned by Mr. Hoskin for the year 1899 in his capacity as such official guardian. Presented to the Legislature, 10th April, 1900. Mr. *Whitney. Not Printed.*

No. 76.. Return to an Order of the House of the second day of April, 1900, for a Return shewing amount of Revenue received during the year 1899, by each of the Departments of Government as audited and passed by the Commission appointed to investigate and report as to the Finances of the Province. Presented to the Legislature, 10th April, 1900. Mr. *Miscampbell*. *Not printed.*

No. 77.. Return to an Order of the House of the sixteenth day of March, 1900, for a Return stating the number of hours female *employés* in factories have to work each day. Also the minimum amount of wages paid *per* day to any female *employé* under the Factory Act. Also, whether separate sanitary conveniences are supplied where male and female *employés* are working, under the Factory Act. And shewing as well what system of Government inspection the factories are now under. Presented to the Legislature, 11th April, 1900. Mr. *Pyne*. *Not printed.*

No. 78.. Return to an Order of the House of the nineteenth day of March, 1900, for a Return of copies of all correspondence between any member of the Government and any official thereof relating to the distribution of the Statutes. Presented to the Legislature, 18th April, 1900. Mr. *Carnegie*. *Not Printed.*

No. 79.. Agreement between the Commissioners of the Queen Victoria Niagara Falls Park and the Ontario Power Company of Niagara Falls, dated 11th day of April, 1900. Presented to the Legislature, 17th April, 1900. *Not printed.*

No. 80.. Agreement between Her Majesty, represented by the Honourable the Commissioner of Crown Lands of the first part and The Nepigon Pulp, Paper and Manufacturing Company, Limited, of the other part, bearing date on the 18th April, 1900. Presented to the Legislature, 20th April, 1900. *Printed.*

No. 81.. Return to an Order of the House of the fourteenth day of March, 1900 for a Return shewing the number of dates and places of sittings of the County and Districts Courts, and Courts of General Sessions of the Peace, Oyer and Terminer and General Gaol delivery and of the High Court of Justice, respectively, held in the various county and district towns of the Province, during the years 1895 to 1899, both inclusive:—

(*a*) At which there has been no business to be tried before the petit jury,—

(*b*) At which there has been no action, matter or other proceedings to be tried by a judge without a jury,—

(*c*) At which there have been no indictments laid before the Grand Jury, Presented to the Legislature, 23rd April, 1900. Mr. *Hoyle*. *Not printed.*

No. 82.. Return to an Order of the House of the fourth day of April, 1900, for a Return of copies of all correspondence and papers, between any member of the Government, or any official thereof, or any other person or persons, in reference to a claim made by the Counties of

Leeds and Grenville against the Government *re* Criminal Justice Account shewing as well, the balance due the Counties. Presented to the Legislature, 23rd April, 1900. Mr. *Joynt*. *Not printed.*

No. 83.. Report of Upper Canada College and Bursars Statement, for the year 1899. Presented to the Legislature, 26th April, 1900. *Printed.*

No. 84.. Return to an Order of the House of the ninth day of April, 1900, for a Return of copies of all correspondence between the License Commissioners or License Inspector for the East Riding of the County of Lambton, or any person, relating to the issuing of a Liquor License in the Village of Thedford for the year 1900. Presented to the Legislature, 26th April, 1900. Mr. *Marter*. *Not Printed.*

ANNUAL REPORTS

OF THE

CHEESE AND BUTTER ASSOCIATIONS

OF THE

PROVINCE OF ONTARIO.

1899

WITH AN APPENDIX GIVING THE REPORTS OF THE DAIRY SCHOOLS OF ONTARIO.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE.)

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:
WARWICK BRO'S & RUTTER, PRINTERS, 68 AND 70 FRONT STREET WEST.
1900.

By Secs. 5 and 6 of Chap. 17 of the Ontario Statutes for 1900, the names of the two Associations known as The Cheese and Butter Associations of Ontario are changed to, and will hereafter be known as, *The Dairymen's Association of Eastern Ontario* and *The Dairymen's Association of Western Ontario.*

CONTENTS.

CHEESE AND BUTTER ASSOCIATION OF EASTERN ONTARIO.

CHEESE AND BUTTER ASSOCIATION OF WESTERN ONTARIO.

DAIRY SCHOOLS OF ONTARIO.

MAKING WHITEWASH.

At dairy conventions and meetings the necessity of *perfect cleanliness* and the advantage of an *attractive appearance, inside and outside*, at cheese factories and creameries are constantly reiterated. The following recipe for making whitewash is highly recommended:

Take half a bushel of unslacked lime. Slake it with boiling water. Cover during the process to keep in steam. Strain the liquid through a fine seive or strainer. Then add to it a peck of salt previously dissolved in warm water; three pounds of ground rice boiled to a thin paste and stirred in while hot; half a pound of Spanish whiting, and one pound of clean glue, previously dissolved by soaking in cold water, and then by hanging over a slow fire in a small pot hung in a larger one filled with water. Add five gallons of hot water to the mixture, stir well, and let it stand a few days covered from dirt. It should be applied hot, for which purpose it can be kept in a kettle or portable furnace.

A pint of this whitewash mixture, if properly applied, will cover one square yard. It is almost as serviceable as paint for wood, brick, or stone; and is much cheaper than the cheapest paint.

Coloring matter may be added as desired. For cream color add yellow ochre; for pearl or lead color add lampblack or ivory black; for fawn color add proportionately four pounds of umber to one pound of Indian red and one pound of common lampblack; for common stone color add proportionately four pounds of raw umber to two pounds lampblack.

Cheesemakers might use a barrel and steam, instead of a furnace. The east end of the President's house at Washington is embellished by this brilliant whitewash. It is used by the government to whitewash lighthouses.

ANNUAL MEETING.

The Cheese and Butter Association of Eastern Ontario held its twenty-third annual meeting in the village of Madoc on the 10th, 11th and 12th January, 1900. The Reeve and Council of Madoc, assisted by a vigorous Citizens' Committee headed by Mr. A. F. Wood, ex-M.P.P., were active in welcoming the Association, and every effort was put forth by them to make the gathering the undoubted success it was. The meetings were held in the Opera House and were well attended, as many as seven or eight hundred persons being crowded into the evening assemblies. The place was decorated by numerous flags and mottoes. The complimentary banquet on the evening of the second day's proceedings was well planned, and proved to be a delightful time for both the guests and the citizens who acted as hosts.

THE PRESIDENT'S ADDRESS.

By D. Derbyshire, Brockville.

The very pleasant duty devolves upon me this morning to open this the twenty-third annual convention of the Butter and Cheese Association of Eastern Ontario, in the town of Madoc. We have been greatly pleased with our reception to-day, and particularly so, on account of the business-like way your leading citizens of both town and country have assisted us in the arrangements for holding this convention here, for which we thank you most heartily.

I have no doubt you feel proud of being the centre of immense mining interests—gold, copper, iron, etc., being found in abundance in this vicinity, and you have only touched the fringe in its development. Yet, I want to draw your attention to-day to your leading industry in this section and throughout this Empire Province, and capable of great improvement; I mean the dairy industry. We all feel proud of the great advancement we have made in the past; still, we are looking forward to greater extension and vastly improved goods after this convention, on account of the practical men of high standing whom you will have the pleasure of hearing before we leave you.

Another year has passed into history, the best we have ever had, and I am proud of the very excellent work this Association has accomplished. With our selected staff of instructors visiting as they have all our butter and cheese factories, giving exactly the right information at the proper time, and enabling our makers to turn out a finer article of both butter and cheese than ever in our history, we certainly have done more and better work in 1899 than in any year before.

Cheaper Production.—Probably the greatest problem before us at the present time is cheaper production, and if our patrons are to make money this problem must be studied. Manufacturers and all business men are studying this subject most earnestly, and our dairymen must. If we could only get our patrons to do as well as two or three of the best patrons sending milk to each factory in our country are doing, it would add millions of dollars to our dairymen. Or if we could by any way get our patrons to grade up all their cows to give as much milk as one or two of the best they now have, what an advancement it would make! It is all-important that we increase the quantity of milk furnished to each factory in our whole country, and improve the quality as well. I believe the patrons should be brought together at least once a month, have a large blackboard, with each patron's name on it, and put opposite each name the quantity and quality of milk furnished by each, how each herd was fed, etc., and have the matter discussed fully; and I think you would soon see that you patrons will go to work as they never did before. Discuss cheaper production — improving the stables, building silos, and every matter pertaining to the business, and you will be rewarded. We must get at the man who makes the milk, and encourage him, and you will see 1900 the greatest season in the history of our dairy business in this Province.

Our Creamery Butter.—We are making rapid strides in our creamery business, and beginning to take our proper place among the best butter producers in the world. We exported in 1899, from the 1st of May till the 1st of November, 451,050 packages, which is 171,000 more than we exported in the same period in 1898, and received therefor $2,500,000 more money, showing that we not only made a very large quantity more than any previous year, but we made a finer quality, that brought us this vast sum more. This is very gratifying indeed, and I ask all your hearty co-operation in perfecting and extending this very important part of our work, which we can safely do.

Our Cheese.—Our cheese has attained such a high standing that very little requires to be said. Our shipments were about the same in 1899 as in 1898, but our quality was greatly improved, and the market good, so we received $2,000,000 more money for cheese than in 1898, which makes $4,500,000 more for butter and cheese than the previous year, showing 1899 the banner year for our great dairy industry. If we can only get all our butter and cheese factories improved, so that we can control the temperature, and turn out an even quality of fancy goods, having all our makers that expect to stay in the business, become thoroughly competent, you will be surprised at the extension we can make, and the prices we can get for our goods. The day for selling ordinary butter and cheese is past. Everybody wants fancy goods, and it is our business to see that we have exactly what our friends want. Let us unitedly say to-day that we shall put our factories, and especially our curing rooms, in first-class condition, and have our makers attend one of the excellent dairy schools, so generously provided by our Government, and be in a position for making a decided advancement in the quality of all our goods in 1900.

Transportation.—The Hon. Sydney Fisher, has looked after the transportation well during the past season, and our butter was placed on the British market in fine condition. Still we would urge him not to relax any, as our quality will be improved and the quantity will be largely increased this coming season. We want some arrangements with our railways for an improved service in connection with our cheese. In the hot weather we should have ventilated cars, so our cheese would reach the market in fine condition. This Association will take this matter up with our leading railways, so as to insure an improved service, and we ask the co-operation of everyone to assist us to obtain this very desirable end. The Hon. Sydney Fisher, Prof. Robertson, Hon. John Dryden, and President Mills have heartily given their assistance and co-operation, for which we all feel thankful. Our instructors have been all that could be desired. The members of our Board have worked harmoniously together, so that the year just closed has truly been a happy and prosperous one for all our dairymen. I am glad to be able to testify that all our butter and cheese men in Eastern Ontario are united and giving each other every encouragement. This convention opens up a new year for us. When we leave Madoc four our several homes, let us be inspired with one idea, and let that be "Improvement" all along the line, better feed and a larger supply, better cows and keeping no poor ones; better stables, properly ventilated; better factories, warm, well drained, and plenty of pure water; better makers; and, above all, cleanliness in all departments, from the milking of the cows to the packing of the butter and boxing of the cheese, and we will all have the great pleasure at our next convention of rejoicing together, that 1900 was truly the greatest year in the history of our Association.

Once more let me thank the business men of Madoc and vicinity for your royal reception to-day, and for the generous way you have assisted our Secretary, Mr. Murphy, in making arrangements for this meeting, and I feel sure that you will all be satisfied that our meeting with you has been a great success in advancing our great national industry. We extend a hearty New Year's greeting to sister associations, and trust they will all have a successful season.

COMMITTEES.

The following committees were then appointed:
Business: The Reeve (Mr. J. C. Dale) of Madoc, A. T. Wood and R. G. Murphy.
Nominations: Jas. Whitton, J. R. Dargavel and Wm. Eager.
Finance: T. B. Carlaw, John McTavish and Edward Kidd.
Legislation: Wm. Eager, Henry Wade and R. G. Murphy.

WELCOMED BY THE REEVE.

Mr. J. C. Dale, Reeve of the village, was introduced, and as head of the municipality addressed some cordial words of welcome to the Association. He assured the members that every business man and every professional man in the place was pleased to have the gathering meet in Madoc, and he knew by the large attendance of farmers of the section, that they, too, were glad to have leading dairymen come and talk about the great industry. Much of the prosperity that Madoc district enjoyed to-day, rich though it was in mineral deposits, was on account of the great development of the dairy business. He remembered when the first cheese factory was built in the township of Madoc. Up to that time the farmers of the neighborhood had depended almost entirely upon grain; but he could see that the prosperity of the section in an agricultural sense had dated from the beginning of that cheese factory. He could also remember when the people at the front used to refer to Madoc township as a bare and unproductive place, but he doubted if there was a more prosperous township in the Province to-day, thanks to dairying. Financial gentlemen had informed him that there was no township in Ontario that met its interest account better than did Madoc, and the cow was the chief factor in winning that good reputation. The value of land in the township was as high as in any part of the Province. The dairy industry has done a great deal for the village and the adjoining section, and it was therefore not surprising that he and his colleagues rejoiced to welcome so representative a body as the Cheese and Butter Association of Eastern Ontario.

Mr. A. F. Wood, ex-M.P.P., also added his greetings to that of the Reeve, and referred to the great advance made in the Madoc district since the cheese factories had been started.

The President, after thanking the gentlemen who had spoken for their welcome, called upon some of the leading dairymen present to make brief impromptu addresses.

Mr. J. R. Dargavel spoke of the work which had been done and was being done by the Association to further the dairy interests of the country, and as one proof of the success which had crowned its efforts he pointed to the difference in price which the dairymen of Ontario were receiving in comparison to that received by the dairymen of the adjoining State of New York. This was largely owing to the high class of instruction given by the inspectors and instructors in the employ of the Association. He much regretted that the hands of the body were tied for want of sufficient funds. The grant from the Government was only about $3,000, although the Association was spending about $10,000, the difference being made up by the dairymen and manufacturers. He hoped that, in view of the splendid work being done by the Association in educating the farmers and improving the quality of the milk products of the Province, the Government would see its way clear to at least double the grant.

Mr. Edward Kidd, after thanking the people of Madoc and vicinity for their hearty welcome, said that some people asked what the Association was doing for the money it received from the Government. Mr. Dargavel had shown that the Association had spent over three times as much as it got from the Government, and that the effect of that expenditure had been to enhance the value of our cheese product compared with that of our neighbors immediately to the south. The instructors and inspectors were all paid by the Association, and in various ways the organization had the dairy gospel proclaimed all through the eastern part of the Province. As a result our great industry was now in a flourishing condition. Considerable of the income of the Association had come from fines from persons who had been tampering with their milk, and much as this was to be regretted it was necessary to do all that could be done to stamp out dishonesty among patrons. A fair amount of the revenue of the Association also came from sums paid in for instruction, and he trusted that more instruction and less prosecution would be the record for the future, although wrong-doers should always be brought to account. The Association deserved the most liberal support of the Government.

Mr. J. Aug. Hayes, who was introduced in a happy manner by the President as a Director of the Bedford District Dairymen's Association, of Quebec, said that although taken by surprise he had pleasure in speaking a few words on behalf of his Association, more especially as the gentleman who had introduced him was not only President of the Eastern Ontario Association, but was also a honorary member of the Bedford Association.

Mr. Hayes continued: The District of Bedford Dairymen's Association is working along the same lines you are, with the same grand object in view—the spreading of practical knowledge of methods in the producing and manufacturing of the products of the dairy in the form of butter and cheese, not only among the butter and cheese makers but among the dairy farmers themselves, in order that all along the line we will be in a position not only to maintain the reputation of the Dominion of Canada as the grandest dairy country on the face of the earth, but to still achieve greater success until our dairy products have established themselves in the markets of the Mother Country as the finest goods that can be made. This we have practically done in cheese, and I believe the future is very near when the same can be said of our butter, if we are only true to ourselves and keep this grand object in view. Realizing that this is the main object of our Associations, let us learn all we can from one another, and when we leave here and go home to our work let us do so with a still stronger determination than we ever had before to make this new year of 1900 the most successful dairy year in the history of our Dominion. We have done well in the past, let us do better in the future. And now let me say I feel sure that this Association is proud of the reception it has received from the citizens of this stirring little town, and I am sure that the people of Madoc will reap a benefit from your visit worthy of the efforts they have put forth in providing so nobly for your comforts.

DEVELOPMENT OF THE DAIRY HERD.

By J. H. Grisdale, B.Agr., Agriculturist Central Experimental Farm, Ottawa.

The development of the dairy herd is a most important point in the success of the butter and cheese industry. There was a time when the development of the herd was not thought to be of very great importance; but to-day our farmers are fully aware of the important part that dairying plays in agriculture, and the necessity of keeping their cows in the best possible working condition. The progressive dairyman now knows that he must have cattle of the very best character, that he must waste no feed, and that no animal must be kept that is merely eating off its head. We keep cattle for the purpose of earning money and making a profit. But how many dairymen are making a profit out of the business? Is it too much to say that fifty per cent. of those engaged in the industry do not make a profit out of it. It is only those who realize from $35 to $40 a year from each cow that are making anything out of the business. Too many men are feeding cows that do not pay for their keep, and no other industry could stand such a profitless kind of work.

Average common cows can be made to yield a profit. This has been done in a public manner out in Minnesota. Prof. Hæcker, of the Experiment Station of that State, bought up some common cows, and where he began with an average return of $27.50 a year, he managed to bring them up to $44.50 a year. In the states of Nebraska and New York practically the same thing has occurred. In the state of Connecticut some of the very best herds were experimented with, and the cost of milk production was reduced about six cents a hundred, and the cost of producing a pound of butter was lessened by two cents by improving the rations. Of course it would not do to say that feeding is everything. If we start in to feed a herd of cattle that are more or less unfit for producing an abundance of milk we are likely to do so at a loss. Fitness is requisite.

In selecting a dairy cow we must first consider her purpose. Why do we keep a dairy herd? Is it not for the purpose of sending good food and plenty of it—of milk, butter or cheese—into the market? The dairy cow is not only an animal, but she is a machine. And if we are to judge a machine we must consider the purpose for which that machine was intended, and its apparent fitness to meet the requirements of that purpose. The cow must grind up a certain quantity of food and turn it into milk. She must thus have capacity for a large amount of this food, and therefore should have a large barrel, long and deep; either of these characteristics, or both joined to good digestive powers. There must be a good sized mouth to fill this machine; if the mouth be small the cow cannot eat much, and therefore cannot produce much milk. The food is not at once turned into milk and taken directly into the udder. What the animals eats is first changed

into blood, and then into milk. The udder, however, is a most important organ, and should be large and well developed. A cow with a small udder will be only an average yielder of milk at the best, and the average cow is just the animal you should get rid of. In addition to a deep, large udder, the dairy cow should have large large milk veins. The venous or waste blood from the udder is carried off in the milk veins. A large udder and well developed milk veins are found together in a good type of a dairy cow. As I have already told you, the leading points of the best type of a dairy cow are a large abdomen, that is a long and deep barrel, a large mouth, and large and well developed milk veins and udder. All other things should be subsidiary to these four leading characteristics. The dairy cow should have a "wedge" shape. If you want a cow that will devote all her energy to turning food into milk get one that narrows from the hook points to the shoulder.

A good constitution is necessary in a dairy cow. There is nothing more draining upon the nervous energy and strength than the calls of maternity. There is no more severe strain upon an animal than the yielding of a plentiful supply of milk. The constitution is tried in this connection mainly in the lung and heart power. To be strong in these two respects means that the chest must be large and deep and slope up to the shoulder. I was never so strongly impressed with this point as I was when in London recently attending the Stock Show. You are all well aware of the recent dairy test there, and how that splendid cow Aaltje Posch 4th made a record as a producer of butter. This Holstein cow was not so strongly characterized by such marks as small head, fine bone, etc., but her heart and lung power appeared to be well developed. She was early picked a winner as to form, and she bore out that judgment. However, as far as possible there should be a general development of all these points. One or two may be lacking, or appear to be lacking, when these may be only concealed by the over-development of some of the others. Any cow that will lay on a great coating of fat outside is one that is not wanted for the dairy. The fat should be put into the milk as much as possible. The fat is worth more in the milk than it is on the cow's back.

The question of getting a good dairy cow, then, resolves itself into the three headings of selection, breeding and feeding. Let me briefly consider these in the order named. Choose your calves by the dairy form. It is very early indicated which calves may be expected to develop into a thoroughly good dairy cow. Once you have made a resolution to try and develop your dairy herd, stick to it. Your President said to-day that there are some animals earning only $14 a year, and the owners are spending from $25 to $30 on each of these animals in board and keep. This is a fact; remember it, and let it influence you. One great help to proper selection is to choose a sire that has been tried. Make sure that he has produced good stock before you try him on your herd. If you cannot get a tried sire, and must use a young animal, see that he is not too young. Young bulls bred to heifers mean small and inferior calves as a rule, and even with older cows a young sire is not desirable. The bull is generally speaking responsible for the form of his progeny, while the dam is more largely responsible for the internal qualities. This is a principle that has long been established. However, do not depend too much upon the form of the sire, important though that may be. The pedigree of the animal and the performance of his kin and himself must go with his appearance. See to it that his dam has been a good milker, and that his sire came from a good milking strain, and go as far back in his history as you can for milking qualities. Without these points being considered you have nothing but chance in selecting a sire. Always choose a pure-bred sire, because he is the result of generations of selection, and is therefore likely to be strongly prepotent. But there are culls among pure-breds as well as among grades, and a pure-bred cull is more to be condemned than a good grade. Many a man in making an endeavor to improve and grade up his herd, says, "I cannot afford to put much money into this thing at first, so I must get a cheap pure-bred animal." But if he gets a cheap, poor cull of a sire he is really going backward, and his herd will not improve but rather deteriorate. By all means get a good pure-bred bull from a reliable cow. Judge pure-bred stock both by form and performance.

Having now the cow and the sire, let us look at the raising of the young stock. It will not do to take every heifer calf and say, "This shall be our future cow." You must select for ancestry and form. Do not leave the little thing in the pasture, giving it a little hay-tea and other occasional attention, and think that you will see it develop into a

good dairy cow. It must be fed properly. We want in our dairy cattle flesh, muscle, and milk producing qualities. If we would have flesh, we must feed our animals flesh-forming material as protein. About seven or eight per cent. of milk is protein, and only about four or five per cent. is fat. This is indicative of the relative quantities of these materials which should be fed to a diary animal. Nature therefore tells us that this is about the right proportion for a dairy ration. If you are told by nature to feed certain kinds of food to a cow to produce milk, and you feed some other kind of a ration, do you think that nature will alter her laws and bend herself to meet your wishes? No, indeed. We must bend and bow to the rules which nature has laid down for us; and to obey her in this respect is to be wise and successful. The best time for a cow to come in is the fall or early winter. Our factory men are willing to start winter creameries, and these establishments properly conducted are the ones most likely to pay. The cows which come in the fall are the ones which will give the best milk record for the year. Too many farmers consider theirs an industry in which they should work for seven or eight months, and do little or nothing the rest of the time. But the better plan is not to work so hard in the summer, and not to take it so easy in the winter. Do not let the cows run down in the winter, feeding them a little corn stover and rye straw, but feed them decently all winter. A calf dropped in the fall will come through the winter in good shape if properly cared for, and will get a good start on the grass in the spring. See to it that heifer calves are fed wisely. Do not get them too fat. See that their ration is well balanced; that they get a fair proportion of food to develop fat; but see also that they get a good share of flesh producing material, or what are called albuminoids or protein. By feeding bulky foods in a proper way you can increase the size of the abdomen, which is that part of the machine which largely decides the quantity of milk a cow can give. For this reason roughage is a double benefit fed in an intelligent way; it enlarges the barrel and is cheap food. But the more condensed and valuable foods, such as meals, etc., are not to be neglected. Why do we feed bran? Simply because it contains a certain constituent which is important in building up the tissues. This is described as albuminoid, and is practically the same materially as is found in the white of an egg. If you will examine the curd from skim-milk you will find that is chiefly albumen. From this you can estimate the large amount of albuminoid or portein there should be fed te our dairy cows.

Selections does not mean breeding only, but also means feeding. Selection by feeding is one of the quickest ways to develop a dairy herd. There is not a herd of milking cows owned by any man here to-day that cannot be made better milkers by a little more thought being put into their feeding and care. And thoughtful feeding is nothing more or less than scientific feeding. We should feed, thinking of what we expect to get from the animal. There is now no reason for every dairyman not knowing the exact proportion and relation of the various constituents in a ration fed to his cows. I repeat that he has little or no excuse for not knowing what food is likely to make fat, and what is likely to make flesh and muscle, or milk. If he is in doubt as to the food value of certain rations, let him write to the Agricultural College, Guelph, or to me at the Central Experimental Farm, Ottawa, and we will send you a reply giving you its composition, and let you know what is thought of it in Canada and all over the world, for that matter. Do not lay too much stress on the size of your ration. You may have a large ration, and yet it may be a poor one because it is not properly balanced. I have known some dairymen to be feeding one of albuminoids to sixteen of carbohydrates, and then wonder why they did not succeed. If you do not give a milking cow enough protein she will keep all you give her to keep her going, and she will be merely sustaining herself and giving you no return. If a cow is expected to give forty or sixty pounds, as she should do, or twenty to thirty pounds, which she usually does, she must receive about two and a half pounds of protein, while as a rule there is only about a pound fed. This is an expensive item in feeding, but it pays. Do not let the word "protein" frighten you. It is that substance which gives feeding value to the oil cakes, to oats, meals, bran, etc. The Storrs Experiment Station, Connecticut, by giving proper direction to the farmers in that section, helped them to lessen the cost of producing milk six cents per hundred, and two cents a pound in the case of butter.

The best way to make money in dairying—in fact it is the only way—is by lessening the cost of producing the milk. As I said before, about fifty per cent. of the cows on

our farms do not pay for their maintenance. You must feed as nature dictates. If you look at the period when the cows usually do their best work you will find that it is in June. One reason is that they are then newly calved ; the other reason is that they are on the new and succulent grass. In that early summer grass the proportion of protein carbohydrates is about one to five or six. We must try to continue like summer conditions in winter, and the nearest we can come to June pasture in winter is by feeding corn ensilage and roots with meal or bran. We must remember that without much water we cannot get a full flow of milk. Both roots and ensilage contain a large amount of water, and therefore help to make a ration succulent. Now as between roots and ensilage, it is admitted that the former may be somewhat nearer the balanced ration ; but roots are more expensive than ensilage, and they are more difficult to handle and store. I think that both roots and ensilage are good, and they may be fed together. If you are feeding dry food, there is nothing better than well-cured clover hay ; in fact there is nothing superior to clover hay, but it is too dear for a full ration. A ration that will be relished by a cow in winter can be prepared by putting a layer of clover hay (cut preferred) first ; then a layer of roots or ensilage, and so on. Put a little water upon it, and leave it there until next day. You will then have a mess that will rival June grass. The cow will eat a great deal of it, will relish it, and will turn it into a relatively large amount of rich milk. Feed freely. Feed in summer ; feed in winter ; feed when heifers ; feed when cows ; feed when dry ; feed when giving milk. Feed ! Feed ! ! Feed ! ! !.

Mr. KIDD : Do you believe in feeding twice a day, or three times ?

Mr. GRISDALE : I believe in feeding three times. It is an extra amount of work for her to eat in the morning and then be idle all the day, only to work like a slave when she eats again in the evening. I would rather feed her three times a day, and I let her work at an easy gait all the time. I think a study of the general laws of the animal will go to support my theory. Overfeeding of any animal is likely to be injurious. If you ate only one meal a day, and a heavy one at that, it is not likely to do as much good as the three ordinary meals a day. One or two meals is likely to too largely strain the stomach.

Mr. KIDD : Do you believe in letting the cattle out for exercise in the winter ?

Mr. GRISDALE : I believe in keeping them in on cold days, but under certain conditions it would be well for the animals to take exercise in a well-covered or well-sheltered yard, where they may come in or go out as they like. Prof. Jordan, of New York State, has tried this, and he found an increase of ten or fifteen per cent. compared with animals exposed all day, and they also did better than the animals that were kept in all day. Those kept in, however, did better than those exposed all the day.

Mr. JAMES CASKEY : Do you think a cow gets sufficient exercise from the mere digestion of her food ?

Mr. GRISDALE : No. If you develop only one arm or muscle you are not developing the whole body.

Mr. CASKEY : Do you believe in the principle of close housing of dairy stock in winter ?

Mr. GRISDADE : I do not. That is, not in keeping them in absolute confinement all the time.

Mr. CASKEY : At our Farmers' Institute, Mr. Woodward said that successful dairymen must have the following three requisites for their stock : close housing in winter, constant watering, and high feeding.

Mr. DERBYSHIRE : What do you think yourself ?

Mr. CASKEY : I do not think that my method is perfect, as I have not water constantly in my stable. If I had everything as I would wish I would let the cows out on fine days, but shut them up during the inclement weather.

Mr. GRISDALE : I quite agree with the position just taken by Mr. Caskey.

Mr. NEWMAN : Can you give us a good device for a watering trough for winter stabling ?

Mr. GRISDALE : This is a difficult problem to settle. At the Central Experimental Farm they abandoned the old method of watering in a trough, because it was thought that that might have had something to do with the spread of tuberculosis. I have visited some of the best dairy farms in Ontario and Quebec, and have noted the plans for watering stock. I have found the Buckley and Woodward devices to have been

adopted by several leading stockmen. The Buckley device has a long pipe extending from one row of cattle to the other, and at intervals between every two cows the pipe comes up to a small trough which gives in some cases just enough for one cow and sometimes sufficient for two. The water can go up into the trough, but it cannot go back again. The water comes from a large tank, and it is controlled by an automatic valve which keeps the water to a level. As the water is drank by the cow more comes in, and the water is kept up to the level. One drawback to this device is that the ensilage and hay gets into the trough, and it has to be cleaned out frequently.

A MEMBER: I know where the trough has a lid on, and the cows learn to lift the lid when they desire to drink. It is a home-made device.

Mr. HONEY: I have seen something similar. The cover projects over the front, and is hinged on the back, and when the cow wants to drink she lifts up the cover and drinks, and when she withdraws her head the cover or lid falls down again. With these troughs, however, a cow may be eating chop or ensilage and some may get into it, and the warm breath of the animal would likely make it sour. Some think that warm stables are the cause of tuberculosis and other diseases, but I think that dirt is the most prolific cause of disease. Which would you prefer—to let a cow remain in a stable without exercise, or let her exercise in the barn yard when the thermometer is below zero, as it often is?

Mr. GRISDALE: Let her out for a few minutes or for half an hour in ordinary weather in winter; that is, if she wants to.

Mr. KIDD: Most of the dairymen around Ottawa leave their cows out for from two to four hours a day when it is not too cold.

Mr. DARGAVEL: I never saw a cow go out just for "exercise." I think you will find that if a cow is turned out of a comfortable stable she is more likely to wait around for the stable door to be open again. A herd put out on a winter's day will not average more than a couple of rods distance from the stable door. Then where can the benefit be? Either let them stay in the stable, or else let them out and see that they are driven a certain distance and back again—for exercise.

Mr. GRISDALE: I think Mr. Dargavel must have been watching the cows after they were a few hours out. I have noticed that in winter the cows walk about more or less except on very cold days. We find that for the first fifteen or twenty minutes cows will move around lively, but if it is cold and they do not move around we put them in at once.

Mr. KIDD: Do you believe in dehorning a dairy herd?

Mr. GRISDALE: It makes the cattle quieter; but if you have a cow whose appearance pleases you do not dehorn her. She will not look so well.

A MEMBER: Is watering once a day sufficient?

Mr. GRISDALE: If you have to drive them far once a day is quite sufficient for the operation. But if you have water convenient you may water them twice. Cows will drink twice a day even with ensilage, although they will not take so much. Fresh cows need to be watered twice a day.

The PRESIDENT: If you wish to get a large quantity of milk from a cow you must give her a large quantity of water. She must be kept in all the time in winter, and every time you let her out of the stable in cold weather she loses milk. If she is a liberal giver of milk, she has enough business to attend to turning her food into milk, which is a good deal of exercise, and I can assure you that she does not need to be raced around much under these circumstances. When the cow fills her stomach thoroughly, and has a nice bed to drop on, if you watch her you will see happiness in her eye showing her contentment of mind, and she will not think of going out for "exercise." (Laughter.) I think she will do much better kept in than by being allowed out, so far as winter treatment is concerned. She must have time to chew her food in comfort. Do not depend too much upon exercise. I know farmers who are using a flail during the winter, and it gives them nice exercise. (Laughter.) The ideal watering trough for a dairy stable is a clear, pure spring about forty feet above the stable site, and let that blessed water with its grand reviving power run through the stable. If you can warm the water for the cows in winter, do so. It is best with the chill taken off. About seventeen years ago I was advocating the use of ensilage corn in the winter, and also urged that warm water be given, and some of the fellows just about hissed me. But last fall I was invited back to

that place, and I found that most of them had followed my advice, and were doing well. Well, I repeated the address of seventeen years ago—a little more polished, of course, and more up to date—and I was cheered to the echo. Every speaker there that night thought just as I did seventeen years ago. Their motto now is that the cow must have the very best opportunity of doing her best work. Harris Lewis many years ago at Brockville advocated shutting the cow up in winter, and keeping her as warm as possible so that she might give us $50 or $60 worth of milk instead of $20 or $25 as was the average then. I want down to his farm in the old Mohawk valley, and saw him at home. I noticed that when he went into the yard the cows all came towards him, with apparent pleasure. I know some dairy yards where as soon as the gentle husbandman appears the cows turn tail and flee in dread from him. Mr. Lewis showed me the record of every cow in his herd. He knew just what each and every animal was doing. Now, take my advice and weed out every cow that does not pay for her keep and give you a profit. Beef her, or sell her to some neighbor who likes to keep cows just for the fun of the thing. (Laughter and applause.) Good dairy cows should be kept in during winter, as a rule. Of course on a really warm, nice day she might be let out if she cared to go. Keep her warm, with a good bed, plenty of proper food, and she will repay the best attention you can give her. Feed her with a ration that will not cost too much, for the best rations are not the costliest ones. With ensilage, meal, and oats, and some clover hay she will be almost up to June conditions. Feed her twice a day, and a nice little lunch of well-saved clover hay at noon, just to tone up her system, and that animal will pay you over and over again.

Mr. GRISDALE: I am delighted to see that you have come back to feeding three times a day. (Laughter.)

A MEMBER: Is barley a good food for a cow?

The PRESIDENT: It will do if she is not giving milk. Bran is the most profitable thing for milch cows, and it will also make more manure for the same money than any other really good cattle food. It will pay the dairyman also to raise large quantities of peas and oats. Enrich your land from year to year, by keeping a good, well selected cow, feeding her with the best food, and returning to the soil all the manure.

Mr. GRISDALE: Let me say a word here regarding the best thing for supplementing pastures during the summer drouth. Soiling, or giving green feed to cattle, is a wise and necessary thing. It is well to start before the pastures are entirely burned up. Have something ready to supplement the grass before the end of June. It must be a quick-growing crop. I consider oats and peas mixed in about the same proportion to be the best thing for supplementing pasture during drouth. And this can be kept up by sowing small sections every week for about three weeks. By that time the new corn will come in, which is also a good aid. You may also use vetches; but the trouble with vetches is that you are likely to have them come up more or less the following year, which is not an advantage. Peas, oats and barley also make an excellent mixture. In some parts of the Province sorghum may be sown, but if the season is not favorable it is not likely to be a good crop to use. We have not used lucerne as a soiling crop, it is generally a failure with us, although we had a good crop last year.

The PRESIDENT: What is your opinion about ensilage in summer to supplement dry pastures?

Mr. GRISDALE: Ensilage is a good thing in such a case, if you have it. I might add to my recommendation of oats and peas as a soiling crop the hint that it is not well to feed the mixture too young, or it will be too sappy. And so with all these special summer crops. It is not well to use rye in this connection, as it is apt to be too woody or fibrous, and a fungous growth comes upon it called ergot of rye, which causes abortion.

A MEMBER: What about light or absence of light in the stable in the winter time? Is plenty of light necessary to the health of animals as well as to plants? For myself I believe in plenty of light in the stable.

Mr. GRISDALE: I believe you are perfectly right in desiring plenty of light. The nearer we follow the laws of nature the better. Light is the best germicide known.

A MEMBER: What would you substitute for clover hay?

Mr. GRISDALE: If you have no clover hay the best plan would be to go and buy some really well-cured clover hay, for there is nothing better than that, otherwise you

will have to fall back on some other hay or straw ; but no other thing in that line can equal clover hay. In case you have no hay you may feed unthreshed oats to advantage. A mixture of peas and oats cut in the last part of the milk stage might in some measure take the place of clover.

Mr. MULLETT : Which do you prefer—oatmeal shorts, or bran and wheat shorts?

Mr. GRISDALE : Bran and wheat shorts, for that is a known quantity. The protein in oatmeal shorts is a very variable quantity. We find that it varies as much as five or six per cent. Sometimes oatmeal shorts are good, and sometimes they are not worth taking home.

PASTEURIZATION AND THE USE OF PURE CULTURES IN BUTTER-MAKING.

By J. W. HART, SUPERINTENDENT DAIRY SCHOOL, KINGSTON, ONT.

It is now about ten years since Storch, the eminent Danish dairy expert, announced that the flavor of butter could be modified by the use of different cultures of bacteria in pasteurized cream. At the present time about 95 per cent of the creameries in Denmark pasteurize either the cream or the whole milk. As Danish butter sells for higher prices than any shipped to the British market, it would seem that no other arguments were necessary to convince every practical butter-maker of the utility of the practice when the cows are kept in the stables. On the other hand extensive trials conducted by the Dairy Division of the Bureau of Animal Industry, United States Department of Agriculture, in several States, fail to show that pasteurization is of benefit in summer when the cows are at pasture, either making butter for export, or for domestic consumption.

By the pasteurization of milk or cream, we mean exposing it to a temperature high enough to destroy practically all of the germs present, and afterwards cooling the milk or cream to a temperature of 50 degrees or lower. The standard temperatures for the pasteurization of milk are 150 degrees for 30 minutes, 160 degrees for 15 minutes, 170 degrees for 10 minutes. If the milk is to be used for butter-making no injury will result if it is heated to a higher temperatures, provided it is cooled quickly afterwards. No matter how particular the patrons of a creamery are in caring for their milk during the winter, it will contain an abundance of germ life. The greater portion of these germs would be injurious to the flavor and keeping quality of the butter, and by pasteurizing we kill off good and bad alike.

The effect of pasteurizing alone upon the butter is to drive off a great deal of the flavor, so it is well to consider the sources from which the flavor of the butter is derived, and how it is affected by the heat of pasteurization. Several distinct sources of flavor in butter are recognized. We have first, the volatile flavoring oils, those pungent aromatic oils that are easily converted into vapor. When present in the food they are carried through the cow's body into the milk. On good upland pasture in summer, the herbage imparts an agreeable flavor to the milk and whatever product is manufactured from it. The same effect is observed in winter when fragrant early cut hay is fed. The volatile flavorings oils of the turnip and onion, on the other hand, are anything but agreeable. The second source of flavor in butter, is the cow herself. Dairy products made from the milk of fresh cows will have a finer flavor than where made from milk of cows well advanced in their lactation period.

Another source of flavor in butter arises from certain products given off in the growth of bacteria. Certain varieties of lactic acid producing germs have the property of imparting to the butter a more agreeable flavor than some others, and it is these lactic acid germs that produce agreeable flavors that the butter-maker should endeavor to cultivate in the starter he uses, whether butter or cheese is the end in view.

Another flavor from a different source would be very evident if the milk had been in close proximity to any loud-smelling substance, or to the butter had been added salt that had absorbed odors injurious to it.

Flavor from whatever source is volatile, and may be and (in pasteurizing) is, to a considerable extent, driven off by the heat generated. In pasteurizing milk or cream we

get in the butter something of an insipid or flat flavor, or absence of flavor, showing that the quick, lively or volatile flavor of the butter has been removed by the process. It is just here that a heavy starter containing the right kind of lactic acid germs is needed to ripen the cream, so as to get a fine aroma in the manufactured products. The same principle is illustrated by the farmer, who, in summer fallowing his field, kills the weeds and germinating weed seeds, sows clean seed, and reaps a clean crop.

Two methods of pasteurization have been employed at the Kingston Dairy School, that of pasteurizing the whole milk and pasteurizing the cream after it had been separated. The whole milk is pasteurized by means of Reid's pasteurizing apparatus. The operation destroys a large proportion of the germs liable to cause objectionable flavors in the butter, drives off much of the volatile flavor present, and leaves a fairly clean soil for the propagation of germs afterwards added to the cream in the form of a starter. Connections were made so that the exhaust steam from the engine could be used for heating the milk, but it was found in raising the temperature to 160 degrees that there was considerable back pressure on the engine, so that it was not apparent that there was any economy in using the exhaust steam. In separating at 160 degrees as compared with 90 degrees, there is a great gain in the capacity of the separator. Our work confirms the results secured at the Wisconsin Dairy School, where it was found that the quantity of milk fed any of the separators could be increased one-half and have the skim-milk test no higher in fat. This means practically that if 2,000 lbs. per hour could be fed through a machine at 90 degrees, leaving one-tenth of one per cent. of fat in the skim-milk, at 160 degrees the feed might be increased to 3,000 lbs. per hour with no increased loss of fat. Trials at the Kingston Dairy School show that a separator handling 3,000 lbs. of milk per hour at 80 degrees left in .12 per cent. fat, while at 160 degrees there was no trace of fat on the neck of the double-necked skim-milk bottle when 3,300 lbs. per hour was fed. The fact that the capacity of the separator can be increased by 50 per cent., or the efficiency of an inferior separator may be improved to such an extent that there is no appreciable loss of fat in handling the milk, is a matter of great importance, and the value of butter fat saved would in many creameries pay (in a single season) for the installation of a pasteurizing plant.

The great objections to pasteurizing the whole milk are that it requires considerable fuel, and the separator bowl clogs sooner; but, if there is a large amount of milk to be fed through the machine, there will still be considerable gain in time on account of the increased capacity of the separator when the milk is heated to 160 degrees. Heating the milk to separating temperature in the vat is decidedly objectionable, and the Reid pasteurizer is a convenient medium for heating and elevating the milk to the separator.

Another advantage of pasteurizing the whole milk is that the germs are killed before they have any opportunity to multiply. Where the milk is heated to eighty or ninety degrees for separating, we have the most favorable temperature for their rapid multiplication. The patrons of our winter creameries now realize the high value of skim-milk as a food for young animals, especially calves. They demand that it be returned to them sweet. Failing to have the skim-milk sweet for the patrons, will cause many farmers to keep their milk at home, either using gravity creaming, or getting a hand separator. Unless the skim-milk is pasteurized it is practically impossible to have it sweet for the patrons.

In Denmark bovine tuberculosis is so alarmingly prevalent, that the milk is of necessity pasteurized to prevent the spread of the disease. While we have practically ignored this phase of the subject, is it not time to enquire if there is any great danger of spreading this and other infectious diseases by means of raw skim-milk returned from the creamery and if there are not occasional sporadic outbreaks of disease that could be traced to this source?

In regard to the keeping qualities of the butter made from pasteurized cream, we find that it will keep far better than the butter churned from raw cream. Indeed this is one of the strongest points of the practice. The butter always appears fresher, and in shipping it to the British markets, there will be no necessity of using any injurious chemicals to preserve it. There is no loss of yield in pasteurizing if the cream is properly handled.

Tests of the butter-milk made daily at the dairy school, rarely show 1-10 of one per cent. fat, usually the tests reads much lower. Of course a rich cream is handled, containing thirty per cent. or over of fat.

A necessary adjunct to a pasteurizer is a good cooler, over which or through which the cream should be run as it leaves the separator. If the *milk* is pasteurized the cream will leave the separator at a temperature of 120 degrees or thereabouts, and is therefore much more quickly and easily cooled than if the *cream* were pasteurized at 160 degrees. Neglect of thoroughly cooling at this stage will render the butter greasy or salvy.

The sooner the starter is added after cooling cream the better. A two per cent. starter should thicken the pasteurized cream in eight or nine hours at a temperature of sixty-five degrees, after which the cream may be cooled to churning temperature. The commercial ferments that have been used at the Kingston Dairy School are Hansen's Lactic Ferment, and the Orin Douglass Butter Culture. The former we have used for several seasons. By its use we get a more acid cream and a higher flavor. With the Douglass butter culture, a pure culture of the micro coccus butyri aromafaciens, we get a much milder flavor and aroma, where the cream is thickened to the same consistency as when using Hansen's color. Either culture when properly used will give us the finest flavored product, and enables us to secure the highest prices on our home market From what experience I have had with the Orin Douglass Butter Culture, I believe that by its use we will get that mild, rich, melting flavor wanted in butter for export. It has proved entirely satisfactory in making butter for the home trade.

No starter, commercial or home-made, can be successfully propagated unless the most scrupulous cleanliness is employed in every stage of the process. To the thorough washing and scrubbing of every utensil, should be added scalding in clean boiling water or live steam. The ordinary deep setting cans are convenient in size and shape for propagating the starter. To properly carry on the fermentation from day to day, there should be two cans, each covered with an over-lapping removable lid, which will prevent any germs from the air getting in. For heating the milk a sixty pound spruce butter tub can be used. It should be set on a shelf about three feet from the floor. There should be a hole about two inches from the top of the tub to take off the over flow. A steam pipe with a valve should be run down into the tub and terminate about three inches from the bottom. In using, the can containing the milk has to be set in the tub and a pail of water poured around it; the steam may then be turned on while the can is gently rotated from time to time to allow of the even distribution of the heat. Enough steam should be supplied to keep the water in the tub boiling. After an hour the milk should be cooled to seventy degrees before adding the culture, after which it may be cooled to sixty or sixty-five. A second tub can be turned up-side down over the tub containing the starter, to keep the temperature uniform. It should be stirred with a scalded dipper a few times in the first three hours; afterwards the can should not be disturbed until the starter thickens, which it should do sometime inside of twenty-four hours. After the starter has thickened it should be stirred to a smooth and uniform consistency something like thin cream.

The freshest and cleanest milk only should be selected for a starter, and a fresh batch should be prepared daily. It would be found to be most vigorous about the time the milk has curdled. It should keep good for a couple of weeks, but may not get contaminated with injurious organisms for a month, if great care be exercised. When it commenced to go off flavor it should be thrown out and a fresh batch started.

A MEMBER: Do you object to pasteurizing in the vat?

Mr. HART: Yes. The disadvantge is that your milk will be cooked in the vat. Then, again, your factory would be filled with steam. I think that even heating in the vat is objectionable, the milk is apt to thicken.

Mr. NEWMAN: Is it not harder to keep the flavor with whole milk than with skim milk?

Mr. HART: Yes. And for that reason we have put in a small hand separator, for the purpose of separating the milk for the starter.

Mr. NEWMAN: Someone has said that a starter is like a shot-gun: In competent hands it is a good thing, but in other hands it is a danger. I have made a little study of the subject, and I have found out that the reason the skim-milk is so hard to handle is that the butter fat in it is attacked by germs which produce butyric acid, and so it is

better to keep it stirred until nearly the time of coagulation. That will keep the cream down. If you do not stir it enough it will make curds and whey.

Mr. HART: By separating the milk you get rid of a good deal of that injurious matter.

Mr. NEWMAN: The best covering for a starter can is to get some cloth used for bandaging cheese, damp it, and place it over the cover of the can.

Mr. HART: There is a danger of your bandaging getting too wet and dripping. I have also used some paper with advantage.

Mr. MALLORY: How are these starters put up? Are they practical for a private dairy?

Mr. HART: They are in a powder form, and will keep for from two weeks to a month. Once started you can progagate your own starter just as you would yeast.

Mr. J. AUG. HAYES: At the St. Hyacinthe Dairy School they advise the pasteurization of the cream in preference to that of the whole milk. They hold that there is a difference in the churnability of the cream, and that the pasteurization of the cream is preferable to the whole milk on that account. It is easier to keep the cream isolated than in the case of the whole milk.

Mr. HART: I have not made any test in that direction—that is, dividing the milk into two parts and using the cream in one experiment and the whole milk in another. We have found, however, that the buttermilk tests less than one-tenth of one per cent. and we have never got a reading higher than two-tenths of one per cent. Of course prices range a good deal at Kingston. Last Saturday roll butter sold for 25 or 26 cents on the market. Pasteurizing has the tendency to make the butter a little paler, but the color can be kept uniform.

A MEMBER: Do you think pasteurization pays for the extra work involved.

Mr. HART: Yes. We have found it so, especially when the butter is exported.

The PRESIDENT: I think so, too.

Mr. HART: I believe that pasteurization of milk in butter-making is the plan most calculated to improve our export butter trade. In fact, without pasteurization a fine quality of butter cannot be made here for the British market; but by its aid we would be placed on an equal footing with the dairymen of Denmark in everything but distance from the market. Pasteurized butter has better keeping quailities, and if general in Canada our butter would soon sell for about the same price as the Danish. Pasteurization was carried on in about 95 per cent. of the Danish creameries, and was largely practiced in Australia and New Zealand. The best creameries in the United States and Canada are also pasteurizing for butter-making. The speaker then described the system in detail as practiced in the Kingston, and declared that the plan was capable of being conducted in any well regulated creamery.

THE ROMANCE OF AGRICULTURE.

Mr. C. C. JAMES, Deputy Minister of Agriculture, delivered a comprehensive address entitled "The Romance of Agriculture," which was full of historical and statistical facts, given in a simple and popular form. The immense value of agriculture as a source of national wealth was shown by comparison with the value of the output of the mines, forests and fisheries of the Dominion and of the world. He also explained the important part played by clover in the development of nitrogen in the soil, and in an interesting fashion applied this to tillage and rotation. Much interest was manifested as he described the various modes of meeting and overcoming the San Jose Scale and other insect pests of the field and the orchard, and showed how millions of dollars annually had been saved to the country through the investigations of Government entomologists. Incidentally he paid a high tribute to the late Prof. Riley, for his work in economic entomology. He cited the case of Dr. Bull, who discovered and developed the popular grape known as the Concord, as an example of the wealth-creating work done by horticulturists. He also pointed out how Prof. Conn, the bacteriologist, had discovered the germ which gave a peculiarly rich flavor to some Uruguay butter, how he made a culture of it, and had thus produced that commercial "starter" which imparted that same flavor to butter.

Mr. A. F. Wood: I cannot refrain from expressing my admiration at the manner in which Mr. James has handled his subject. He has given us the romance of agriculture in a most delightful manner, but he has also shown us the intensely practical work done along some lines of agriculture by various Governments. I have been particularly interested in what he said about combatting the San Jose Scale and similar pests. In the spring of 1896 I was in Southern California with my family. I was going through an orange grove with my brother in-law, when he exclaimed, "Ah, I see the red scale is here!" The black scale is usually disposed of by fumigation, but this red scale is much more dangerous and hard to get rid of. There was a central depot in that part of the state where the parasite referred to by Mr. James was kept. My brother-in-law added that if he let the scale go for a week or so longer it would be all up with his orchard, so he wrote at once and by return mail received half a dozen of these beetles in a little box, and in a short time all the insects attacking the orange grove were devoured. The beetles died only after the insects upon which they fed were all gone.

THE KINGSTON DAIRY SCHOOL.

By J. W. Hart, Superintendent.

Having been requested to give an off-hand description of the work done at the Kingston Dairy School I shall do so as briefly as possible. This institution was organized six years ago by the Dominion Government, at the suggestion of Prof J. W. Robertson, Commissioner of Dairying and Agriculture. It was at first run in connection with the School of Mining attached to Queen's University. Mr. J. A. Ruddick, a former instructor of this Association, was the first Superintendent. The School is now controlled by the Ontario Department of Agriculture. For a time the School found much difficulty in getting an adequate supply of milk for practical instruction in cheese and butter making, but now there is no difficulty in getting from 6,000 to 8,000 pounds daily, which permits the making of cheese and butter on a factory scale.

The School is opened in the fall, after the factories are closed, and is closed in the spring. There is a long course in either butter or cheese-making, or both, and there are short courses of three weeks each in either cheese or butter-making. We have a full staff of practical instructors, and students are instructed in every branch of the business, if they so desire, including cheese-making, cream separation, butter-making, milk testing, dairy bacteriology, pasteurization, testing, etc., besides the business side of keeping factory records, accounts, etc. Students for the short course must be above sixteen years of age, and must have had at least one season's experience in a factory or creamery. Those taking the long course must have had two or more years' experience in practical work. The School is for the benefit of cheese-makers and farmers generally, and while the theory of cheese and butter making is fully given, the practical part of the work is most thoroughly performed. The man who spends some time in such an institution as ours will go back to his factory not only able to do better work, but determined to do it. In fact, some of our factories in engaging a new maker now make it a requirement that he shall have taken a course at the Dairy School. We have had many assurances from Presidents and managers of factories of their sympathy with us in the work we are doing. We claim that at Kingston to-day we have a staff of dairy instructers equal to the staff of any similar institution on the continent. And we do our work at a less cost than any other place doing the same kind of work. In Wisconsin they have spent $40,000 in erecting Hiram Smith Hall, and in connection with Cornell University they have put up a dairy building at a cost of about $20,000. They have well-equipped milk laboratories. etc., and go into it more extensively than we do; but for all practical purposes I think we are able to do the very best work, and the man who takes a thorough course with us is able to go out and do work that will be a credit to himself and to the country.

Students make the butter and cheese under the direction of the several instructors, doing the routine work from day to day as it should be done in a modern factory. Records are kept of all steps in the process of manufacture from the time the milk enters the weigh-can until the finished product leaves the school. The attention of the student in called to the points in manufacturing where losses occur, the causes of and the means

of reducing them are pointed out. To those who have given the matter any thought no argument is necessary to prove that a man trained in this manner will, in the average factory, save more than enough in the loss of valuable milk solids to pay his wages as compared with the man lacking the training, to say nothing of improved quality whether butter or cheese is made.

The cheese-making department contains all the apparatus found in an up-to date cheese factory, including five cheese vats, upright and gang presses, various styles of curd mills, etc. Three curing-rooms, one of which is connected with a sub-earth duct, are in use where the effects of different temperatures and degrees of moisture upon the curing of cheese are studied.

The equipment of the butter-making department is being added to from time to time. It now includes five of the leading styles of separators, milk and cream pasteurizers combined churn and butter worker, trunk churn, ejectors, in short, every appliance used in the manufacture of butter after the most approved methods.

Several of our instructors are also inspectors and instructors of this Association. These men during the summer, or regular making season, are on their rounds among the factories, and give valuable advice in the short time at their disposal. But at the Dairy School they can have the makers under their direction not for a few hours, but for days and weeks together. Now, we do not claim that we can take any kind of a man and by giving him a term at our Dairy School make a good cheese or butter maker out of him; but we do say that any ordinary intelligent maker who will take a course at our school will be a better maker of cheese or butter after that than he was before, that he will be a wiser and more practical man in his methods, and that he will be worth more to himself and to those who employ him.

The charges for attending the Dairy School are merely nominal. The sum of $1 is charged for registration, and another $1 is deposited to cover incidentals. There are no other charges, as the institution is maintained by the Provincial Government. Of course the student will have to provide for his board and lodging, travelling expenses, etc. We have twenty men under instruction now as against sixteen at this time last year.

The examination at the close of the term is of a very thorough and practical nature. The student is made to tell his reasons for the various operations he is supposed to perform in making first-class cheese or butter. There is no rule of thumb allowed. He learns the "why" as well as the "how" of the business. He takes a vat of milk, for instance, and is supposed to handle it so as to bring out a fine quality of cheese. If he succeeds he gets a professional certificate; if he fails he is not granted one. In addition to the examination he must pass a year in charge of a factory before he receives his certificate.

There are two other Dairy Schools in the Province, the Central, at Guelph, and the Western at Strathroy. There is also one at St. Hyacinthe, Quebec, another at Nappan, Nova Scotia, and one in Winnipeg, Manitoba. We are greatly cramped for space, and a larger building is very much needed. With better quarters we think we can do still better work.

A PIONEER CHEESE BUYER.

Mr. Thomas Watkin, of Belleville, who was introduced by the President as a veteran cheese buyer, said: The year 1870 was my first year in the cheese business in Belleville. At that time I could count upon the fingers of one hand all the cheese factories in the section. In the immediate vicinity of Madoc there were none at all. Since then the people of this part of the county of Hastings have made great strides in dairying. A man one said that he never met a pig on the road without feeling like taking off his hat to the animal, because he had made so much out of the bacon trade. And many of you farmers around Madoc and throughout eastern Ontario should feel like taking off your hats to the cow, for she has made a good deal of money for some of you—when you treated her properly and gave her a fair show.

In regard to the quality of Canadian cheese, I am free to say that there is yet a good deal of room for improvement of the average make. We have a good number of factories

where the finest cheese is made, yet too many of our factories turn out a poorly finished article, and thousands of dollars are lost to the country annually on account of sour, unfinished cheese, which soon go off flavor, and have an unattractive appearance. Sometimes the buyers have to shoulder the loss. We can have a much better average of cheese, and this Association is going to assist in this work in the future as it has done in the past. But the very first step in improvement in the quality of our cheese must begin on the farm where the milk is produced. The patrons must be taught and encouraged to take better care of milk. This is a most important matter. When the milk is got into the factory in first class condition the foundation is laid for a good article of cheese being made. What the foundation is to a house a good quality of milk is to a cheese. I think also that it would pay our factories to have double or even treble the visits that they now get from the instructors and inspectors. (Applause). Then there is the matter of rennet. I am of opinion that much of our cheese that has been poor in flavor during the year has been so because of poor rennet, and the way it has been used in developing the curd. I believe that all the liquid rennet coming into the country should be tested and analyzed. I am fully persuaded that it would pay to have this done. I also wish to place myself on record as against the custom of having the whey drawn back to the farm in the milk cans. I am satisfied that a good deal of cheese is injured by that practice; it develops a bad flavor, and means a bad name for our cheese generally. I cannot speak too strongly against this plan. Some years ago I was buying cheese near Picton, in Prince Edward county. It had been of good quality generally, and I did not pay close attention to the last shipment on that account. Complaints came from the other side of the water that the cheese was bad. I could not understand it until I found that the whey tank was being kept near the factory, and the condition of affairs there was very bad. I could not only see the whey tank, but I could also smell it. That factory lost $300 on account of the poor quality of the cheese. There are very few factories in Canada that are properly fitted with curing-rooms for turning out the very best cheese. In the average curing-room the cheese becomes heated in the summer, and if once heated cheese will not get better. I would also suggest that we should be more particular in boxing our cheese. Greater care should be exercised in having the scale-boards placed just so, and the box should be cut down to near the cheese. It is not good for a cheese to be rattling around in a box, and it is not good for the box either. And when the cheese is going out of the factory, whether it be in the summer or in the fall, take care that the waggon is nice and clean, and a little straw put in to keep the cheese steady and fit, and do not forget to put on a cover or tarpulin to keep out the dust or the rain. It is important that the cheese should be made well, and it is also important that they should arrive in England in the best possible condition. I think we sometimes make a mistake by cracking up our cheese too much. England makes perhaps the best cheese in the world, but it is on too limited a scale. Canada averages a fair quality of cheese, but while the best is among the finest quality to be found anywhere, there is room for improvement in many quarters. Let every cheesemaker and factory man here go home determined that Canada will touch the top notch in the future quality of her cheese. We can do that if we all try our best. Let us lead in both quantity and quality. I quite agree with the President when he warned you against making cheese before the first of May and after the first of November. If the factorymen will take the hint he has given they will never repent of it. In a season when there is a glut in the market cheese made too early and cheese made too late in the year make the prices go down still further.

The PRESIDENT: I am much pleased with the practical and timely remarks made by Mr. Watkin. Every cheesemaker in the section should be here and pay heed to these words of a veteran buyer and handler of cheese. As he says, we must make a finer article of cheese; and we will do it. I repeat that cheese made before the first of May and after the first of November is not the kind of article with which we can compete against the world. I have a report this morning of the cheese shipped from Canada during the year up to the first day of January, 1900. I find that there is a slight falling-off in the number of boxes of cheese exported, but a large gain in the number of packages of butter sent to England. Of course there are a number of men who are keeping cheese back, as the market looks well just now. The figures are: Exports of cheese for the year, 2,403,675 boxes, against 2,419,706 boxes in 1898, or a decrease of 16,031 boxes. The export of

butter has reached 575,985 packages, or 189,646 packages more than in the preceding year. When you consider the value of a package of butter, you will see that there had been a most gratifying increase in the export. Now, if you are making cheese, do not quit that business and go into butter-making. But, if you are going to build a dairy establishment in a new locality, I would advise you to put up a butter factory. We must have larger factories and more concentration of business, which will cheapen the cost of production. If a man gets dissatisfied with a factory, he should not go off and endeavor to start another one on the next four corners in opposition. Do not get on the fence between two factories and drop on this side or that for the sake of a dollar. Stick to your factory loyally, and you will never regret it.

GOVERNING PROPER CONDITIONS IN THE CURING-ROOM.

By J. W. Newman, Roebuck.

After the intelligent dairymen have produced, cared for, and delivered milk to the factory in the best condition, and the up-to-date cheesemaker has made it into cheese capable of reaching great excellence, there yet awaits a very important step, viz., proper curing.

The curing of cheese is brought about by the growth and multiplication of certain forms of bacterial life, and we must fulfil the exact requirements for the particular forms of life that we require if we produce that mild, rich cheese for which the British market now calls. The particular forms which we most require seem to thrive best at a temperature of about 65° F., with relative humidity from 60 to 70, in a clean, sweet, well-ventilated room. Prof. Dean and others have shown us the great advantages obtained from these conditions, but how are we best to obtain and govern them?

I shall now endeavor as briefly as possible to give you an outline of several methods, together with their advantages and disadvantages, in the hope that I may perhaps induce someone more capable than I to take up the subject and give it the prominence and thorough discussion which its importance would seem to warrant.

1. Every factoryman must see that his curing-room is properly insulated, so that heat cannot pass through either way. This can be done by having the room thoroughly surrounded by a *real dead air space* of four inches in thickness. Too many doors and windows are bad, as they are sure to conduct heat and allow hot air to pass through either way.

2. Color affects radiation, and it is a great advantage to have the room whitewashed inside and painted white outside, as it will keep cool or warm, as the case may be, much longer.

3. Every cheesemaker should supply himself with a wet and dry bulb thermometer and scale indicating relative humidity, and also a maximum and minimum thermometer, and keep a daily record of each. Experience will soon teach him at what points these should be governed in order to obtain the best results.

Just here it will add interest to our work to learn exactly what heat and cold are. Heat is a motion among the molecules of matter. Cold is a term of negation, signifying merely a greater or less deficiency of heat. It is not an entity; hence, when we talk of producing cold, we really mean reducing heat.

Heating.—When weather is too cold, we have to heat artificially. This can best be accomplished by steam pipes from the boiler, which will distribute the heat evenly throughout the room. Often in early fall and late spring the heating is neglected, due to inconvenience, but with this plan the simple turning of a valve makes the desired temperature. In this room we have not only the heat that is in the steam, but we also have the process of steam changing to water, which generates great heat. This distilled water is the very best to use again in the boiler. One foot of inch pipe for every twenty cubic feet of air space in room is sufficient, and is not expensive, as most factorymen can now do their own fitting. This also requires one less fire about the building, thus reducing the danger. Where a furnace could be put below a curing room, it would work very well, but the old-fashioned stove system should be placed among "the things that have been," as it causes some cheese to fry while others may be near the freezing point.

Cooling.—Many different methods of cooling are now in use, and some are quite applicable where others could not be used. Every factory man should adopt some plan, and let that be the one best adapted to his particular conditions. The sub-earth duct, ice-racks and cooling by the well, are each excellent methods, and fully described in the report of last year's conventions, east and west. A very good method of automatic cooling is to have an ice house built beside the curing-room. Lay in the bottom from three to six lengths of metal pipe (like that use in city water works). Let one end escape in curing-room and to the other end attach a galvanized iron pipe leading upward and at a height of about twenty feet fix a cowl on it. Have a ventilating pipe from curing room to ensure a draft, and place a damper in first pipe to check draft when the necessary temperature has been reached. Fill the ice house as usual. This is quite effective, and saves the labor of handling and cleaning up after ice.

Another simple and yet practical method is to build a curing-room apart from factory proper and build low or without loft, and force Nature to fulfil our requirements. Nature is like a wonderful machine with large pulleys running in a certain direction, but if cross-bected will run other pulleys in an opposite direction, or in other words by cross-belting Nature's laws we may cause reverse effects. Now, we know that any liquid changing to a gas absorbs heat or renders it latent, and further, that an increased circulation of air hastens evaporation. Now when the hot, dry, summer winds are blowing, by occasionally pumping water in a spray over this low, simple, curing room, the evaporation which ensues will lower the inside temperature many degrees. If this building made of brick it would absorb more water and answer the purpose without pumping so frequently. Further, by growing some vines over the sides and roof of this building the increased surface exposed to evaporation will make this method effective. If these vines were flowering plants, like a variety of morning glories, they would add beauty to the place and be an incentive for better patronage and better milk, for

"Roses will bloom nor want beholders.'

Some shade trees near by to protect this building from the radiating powers of the sun would also favor this system.

The last method that I shall describe is by the use of compressed air. When air is being compressed it becomes very hot, and if while in this state the heat is allowed to escape in surrounding air, water or ground until it is as cool as we can conveniently get it, and then conducted by means of a pipe, and let escape in curing-room, it here lack the heat it has given off outside and is therefore cold. At 100 lbs. pressure last summer, we succeeded in reaching a temperature of 32° F. or freezing point. However, there are certain obstacles in the way of this system in not having exactly suitable machinery, but it is not without many advantages. I believe the results already secured in cooling by this means would warrant the Government in making further investigations along this line and endeavor to have it simplified, and I believe ere long it will, and this method will be used to the advantage of many. Some of its advantages are :

1st. The exhaust steam and first coil of air pipes could be used to heat water for washing and for boiler.

2nd. It would not take up the time of cheese-maker when he is busy and therefore not so apt to be neglected.

3rd. In expanding could be made to do such work as press cheese, pump water and and whey, hoist milk, cut curd, etc., and let exhaust go in curing-room.

4th. While its relative humidity is high it causes a circulation of air, and therefore renders the best condition for curing cheese without mould.

5th. Any temperature can be maintained at any time. No danger of ice running out.

6th. It is clean ; no dirt to be cleaned up.

7th. When it is once fixed right it will last for time indefinite, and is not attended with the annual labor and cost, or the short endurance of an ice house.

In closing, I would say let us each persist in yoking the forces of heaven to do earth's work, and stir up our latent energies to a determination to win success, which is open to everyone, who is willing to pay the price.

CHEESEMAKING.

By G. G. Publow, Kingston Dairy School.

I might say there is no royal road to knowledge in the manufacture of cheese. Scientific teaching has done a great deal to raise the general quality of cheese, but even science must be supplemented by judgment and skill on the part of the maker, whose qualifications largely depend on experience. The object of a cheesemaker should be to obtain the largest quantity of cheese of the highest possible quality. I find that the cheese most sought after should be soft and fat, neither hard nor crumbly. It should have both the aroma and flavor of a nut—the so-called nutty flavor so much sought after. It should melt in the mouth, producing not only an agreeable flavor, but leaving a most pleasant after-taste. It should taste neither sweet nor acid If either in smell or in taste there is anything unpleasant, such taste or smell is termed a taint. The first thing essential for cheese of this quality is to have milk of normal composition from healthy cows, and perfectly clean. Without this no skill on the part of the maker will insure success.

A few of the reasons why cheese are not of this quality are: The milk may have been set too soon, or not soon enough. It is of the utmost importance to have the milk in a certain condition at the time of adding the rennet. If the rennet is added at the right time, so to speak, the cheese is half made. A cheesemaker may have bad results from heating too fast, too high, or not high enough; from the use of too much or too little rennet; from not drawing the whey at the proper time; from improper draining: from lack of maturity at the time of salting; from the use of too much or not enough salt; the curing-room may have been too hot or too cold, too damp or too dry. From what has now been said, it will be seen that the making of fine cheese is not the result of chance, or a process likely to be hit upon by accident, but that experience, based upon shrewd and systematic observation is alone to be relied upon.

Mr. James Whitton: There is a question coming up in our factories to-day which I think ought to be discussed here. There is an idea abroad in various quarters that certain factories are taking too much milk to make a pound of cheese. Throughout the Belleville district the fat usually tests about 3.6 per cent. I would like to find out here how much milk at that rate should be required to make a pound of cheese. Some factories are reporting that they are making cheese from ten pounds of milk, while other factories require eleven pounds of milk to the pound of cheese. Now, if I was going to hire a cheesemaker, and he told me that he could make a pound of cheese from ten pounds of milk or less, on an average, I would tell that gentleman that his services were not required. (Applause.)

Mr. Publow: The question put is practically, how many pounds of cheese can be made from say 100 pounds of milk, testing 3.6 butter fat. The amount of cheese that can be made from a given quantity of milk can be influenced by the treatment given. I have found by careful experiments that from 300 pounds of milk I can make from half a pound to a pound extra by the manner in which the curd is piled in the vat. I thought at first that I must have made a mistake. But I have taken 600 pounds of milk and divided it equally into 300 pounds, and have piled one vat one way and the other in a different manner. One vat was milled early and the other was sheep-skinned down, and we found a difference of from half a pound to a pound in favor of the cheese in which the curd was piled high. But the cheese which contains the most moisture is not the finest quality. If made for quick shipment it would be best, but after a few weeks it goes back. There is a lot of dissatisfaction among patrons over this question of the number of pounds of milk required to make a pound of cheese, and the amount of fat left in the whey. There should not be more than three-tenths of one per cent. of butter fat left in the whey.

Mr. J. A. Kerr: In regard to curing cheese very much depends upon the temperature. There are any number of factories where the temperature is at 85 degrees in the day time and it goes down to 75 at night. Does it make much difference in the quality of cheese made under these conditions?

Mr. Publow: If cheese is cured at a high temperature it should be made firmer to stand it. If cured at say 85 degrees it should be made quite firm. You must give more

acid, but pay attention to the firmness of the body. I would not recommend much over a quarter of an inch on the hot iron. In a lower temperature the cheese does not require to be so firm. The firmer the cheese the more milk it will take to make a pound of it.

Mr. L. E. ZUFELT: There is a demand now for soft cheese, and my experience through the country has been that salesmen are too anxious to get cheese from the factory and are putting them out sometimes as soon as two or three days from the press. Makers are trying to meet the demands of the buyers for soft cheese, and consequently are shipping them too soon after they are made. It is a bad practice and will do injury to the trade.

The PRESIDENT: Any man who will ship cheese only three days old will never see the celestial city. (Applause and laughter.)

Mr. PUBLOW: And I believe that the buyer who takes them will have about the same chance of getting there. The softer we make cheese the sooner it will go to market, but it will be a quick ripening cheese, and it will "go off" flavor early. The man who wants to make or handle these soft cheese must be a little "soft" himself. Too many makers are manufacturing these soft cheese, and they are breaking down in a few days.

The PRESIDENT: Quick ripening and quick rotting.

Mr. PUBLOW: My strong advice is, do not develop too much acid in the curd.

Mr. GALLAGHER: If milk tests say 3.6 per cent. of fat, and it requires eleven pounds to make a pound of cheese, will the amount of cheese increase in the same ratio if the milk tests 4.6 per cent. of fat?

Mr. PUBLOW: That is a hard question to reply to satisfactorily. In normal milk the general rule is that there is about 2½ pounds of cheese for every pound of fat. However, much depends upon the amount of casein present in the milk. If the milk is too rich owing to the very high percentage of fat, greasy curd is likely to result in making it into cheese, because there may not be sufficient casein in the milk to balance the fat. For my own part I believe in paying for milk according to the fat reading—of course under normal conditions. Cattle should receive plenty of green food.

Mr. LYTLE: In our county of Victoria we look for everything good and great to come from the instruction given to the farmers by this Association. Every now and then we have trouble on account of some of our farmers putting in a little water or skim-milk before sending milk to the factory. Some of the factories are going to test the milk with the Babcock instrument, and are going to pay by weight and by the fat reading.

Mr. S. R. PAYNE: I took the course at the Wisconsin Dairy School in 1892, and when I came home I tested with the Babcock tester. I quite agree with Mr. Publow. We found that no one suffers by the use of the Babcock tester. If a man has a number of strippers in his herd, and his milk averages 4.6 of fat, and it is pooled with that of a herd averaging only 3.6 of fat, you can easily see that he is suffering by the transaction. Milk should be paid for both by weight and quality.

Mr. R. COLLINS: In cheese making a good deal depends how the curd is handled. I would like to ask Mr. Publow as to aerating curd after being milled. Some makers keep it covered up from the time it is milled till it goes to press. I have found that the air outside is better than the air inside, and so do not cover all the time. I think the cover could be left up with advantage after the curd is milled for a good part of the time.

Mr. PUBLOW: We take pains at the dairy school to show how to deal with all these conditions. We show the students that the amount of acid in the curd decides as to whether a starter should be used or not. A good starter is a good thing, but it is a curse to the business if you do not understand it. If you get good results without it, never use a starter. If your milk will ripen in proper time without a starter, avoid the use of one. But if the curd is too long in developing we lose fat. If you have tainted milk and open curd then I would recommend the use of a starter. If milk is ripening down fast set earlier. If milk comes in warm it will ripen fast; if it comes in cold it will, of course, ripen a little slower. Watch your rennet test closely, but do not depend upon it too much. Watch how the milk thickens. If the whey expels rapidly cut the curd finer; you will have a fast worker. Now, as to aerating curd: There are seasons of the year when it is advisable to expose curd to the air. I believe in the beneficial action of pure air on curd. After there is a certain amount of acid in the curd I think it is well to give it all the air you can. We get better cheese by exposing the curd to the air under

favorable conditions. We found that midway between salting and the removal of the whey was the best time for aerating. We would expose the curds to the air for about an hour. If the atmosphere is colder than the temperature of the curd I would keep it covered up. If the curd is too warm I would expose it to the pure and cooler air for some time. In the hot weather we found that we got better cheese both in body and in flavor by milling early.

Mr. R. S. ALLAN: Our factory has been erected twenty-eight years, and it is situated on a low piece of land. We keep hogs, and the pens are sixty feet from the factory. We fatten from 200 to 250 hogs yearly, and we have had some complaints of the cheese going off in flavor. We are talking of building a new factory. How near to the old factory would you advise us to build? We have a site on high ground, between 80 and 100 feet from the old site Would that be too close? We are also talking of putting a cement floor in the make-room. Would you approve of it? If so, why?

The PRESIDENT: Have the whey kept ten of twelve rods from the cheese factory, and there used by the hogs. Let each man send a number of pigs to the factory in proportion to the amount of milk he delivers, and also pay his share for the bran and shorts furnished for the lot of hogs. Then when the animals are sold in the fall he will get his share of the profits. However, if you can rebuild, do so. Prof. Robertson, of the Central Experimental Farm, Ottawa, or the Department of Agriculture, Ottawa, can help you with plans and suggestions free of cost if you write them. I would build a factory on a hill, on a good stone foundation. I would have about three acres of land in connection with the factory, and would have a moveable pen for the hogs, shifting them about from time to time. These animals will summer-fallow the land I would keep the pen as far from the factory as I could. You can pump the whey, or let it run down hill, if on a good high site. You can just coin money by running the business in a clean, up-to-date way like that. The cheese and butter business of Ontario is on a sure and certain basis, and put up a building that will be an ornament and worthy of the trade, and not one through the walls of which the gentle breezes of heaven can play. I would have a cement floor for the work-room, with proper gutters, so that with a hose every drop of the drippings can be washed off. Keep the factory just in such shape that if a lady came came in she could put her foot down without fear of it sticking to the floor.

Mr. PUBLOW: I must say that 175 hogs is a large number to have near a cheese factory. They should be kept no closer than where any bad odor can be detected from them. There should also be the best facilities for keeping them clean.

Mr. J. G. FOSTER: They argue around here that it does not injure the cheese to draw the whey back in the milk cans, and some argue, too, that the cans are more easily cleaned when the whey has been left in them.

Mr. GALLAGHER: The whey tanks at our place are cleaned every two or three weeks, and in this way we find that we can have the whey handled without much danger. Of course a dirty whey tank is always a source of danger.

The PRESIDENT: If the can is first washed out with luke-warm water and then scalded with hot water, and if the can is then turned upside down and the glorious old sun is allowed to beam upon it and purify it, it is all right. But so many people are off visiting, or here and there, and the milk can which has carried the whey does not get a fair show. The whey can needs to be attended to just as regularly and carefully as you attend to your cow. It makes a fellow's heart glad to see the cans clean and shining. Then they look like Canadian factory cans. It is a bad thing for a cheese factory when the milk waggon can be smelt before it can be seen. Sometimes the driver wears the same pair of pants from spring until winter, and only occasionally gets a bath. But, seriously, our milk drivers cannot be too careful and clean in their appearance and in their work.

Mr. PURVIS: The worst flavored milk I ever knew of was brought in a can on which the tin had worn off. I would like to hear Mr. Publow's opinion on the use of such a can.

The PRESIDENT: Such an old can might be used for whey, but never for drawing milk. Do not put a drop of milk in a can on which any of the tin has worn off. Keep your seed peas in that old can.

Mr. BAILEY: I think it would be a good thing if the Association would get an Act passed prohibiting factorymen from drawing whey home in their milk cans. (Applause.)

Until something of that kind is done we can never stop this evil that so largely threatens our cheese industry. I know from my experience when I was your inspector and instructor that this was one of the greatest difficulties I had to deal with—the drawing of this filthy "hog slush" home in the milk cans. Most of our whey vats are not fit to keep whey in, and therefore the stuff cannot be fit to be placed in our milk cans. Sometimes this stinking stuff is kept for twenty-four hours in the can. I think that every buyer will bear me out when I say that they can go into a warehouse and after examination pick out the cheese which have been made from milk brought in cans in which whey has also been carried. I think we ought to carry a resolution at this meeting asking the Legislature to prohibit by law the practice of carrying whey home from cheese factories in milk cans.

The PRESIDENT: This discussion shows that we must have better factories, better makers and better milk. I would advise every maker to attend a dairy school.

Mr. KIDD: It has been said here that we should ask for legislation to prevent the carrying of whey home from cheese factories in milk cans. The proposal is a ridiculous one. I have a cheesemaker who has carried off several gold medals and other prizes at the Toronto and Ottawa exhibitions, and at his factory the whey has always been carried home in the cans. I think we ought to discuss this question right here and now. If the farmers can carry whey home as we do in some of our factories where excellent cheese is made, who shall stop them? Let careful men do it if they wish to. I have heard that when some cheesemakers get a cut in price they make all kinds of excuses, and that while sometimes it may be for other causes they blame it on the whey cans.

Mr. JAMES WHITTON: I would not lay very great stress on taking prizes for cheese. In most cases the cheese is made specially for exhibition purposes. But I am just as sure of it as I am that the sun shines, that to draw whey home in the milk cans is injurious to the cheese industry.

Mr. KIDD: Is the fact that the whey is brought home in the cans any worse than allowing the unwashed cans with the milk souring to be carried home, too? If the cans remain for hours on the stands before being brought home is it not a source of sourness and injury about as bad?

A MEMBER: Is not the milk a little better than that dirty, stinking whey from an old tank? If whey stands in a tank for days it must be bad for the cans and the factory.

The PRESIDENT: I think it is better to bring the pigs to the factory than to bring the whey to them. I know, however, that Mr. Kidd has his whey carried home in an uncommonly careful manner.

A MEMBER: What is the proper temperature for putting cheese to press?

Mr. PUBLOW: It would depend a little upon the season of the year. In summer time the cooler the temperature the better—down to 70 degrees if you can get it. Try and not have it any higher than 80 or 82 degrees. Do not lay too much on the temperature; but if the curd is in proper condition put it in the press. In hooping at a high temperature we are likely to lose more fat in the pressing.

Mr. WATKIN: I am afraid that a great many cheese are not allowed to remain in the press long enough. I would like to ask Mr. Publow how long cheese should remain in the press?

Mr. PUBLOW: Much depends upon the kind of press you use, and the care given in the pressing. I believe that two days are better than one; but at least twenty-four hours should be given. If you have a gang press or continuous press that length of time will do all right. With an old style of press you had better leave it in longer.

Mr. HART: Mr. Newman spoke of various methods by which the temperature of a curing-room may be lowered. We are acquainted with most of them, but not so much with the plan of using compressed air. I would like to know something about the cost of installing that apparatus, and the results.

Mr. NEWMAN: The compressor that I got was the Westinghouse air brake pump, costing $8. It does not cost much to set it up. We used 200 feet of pipe, and did the fitting ourselves. We made use of an old boiler as a reservoir, but found that it is not necessary to have so large a reservoir. I found, though, that it would take a very large reservoir to cool over Sunday, and that would be very expensive. In justice to Mr. Hart

I may say that he suggested a tank of brine in the curing-room, through which the compressed air should be allowed to escape. I did not try that plan, but I think it is well worth trying. The compressor can be run at an ordinary rate by an engine of from three to five horse-power. The running of the compressor is not very costly. We have used ice, having an ice-house, but we did not have any racks. But now, if I had to use ice in a curing-room I would have racks I believe the plan of cold water running in pipes around the room is a good one, but I fear the iron pipes will not last long under the peculiar conditions of a curing-room.

The PRESIDENT: The ordinary iron pipe will not last long, but galvanized pipe will. It gives you that moist and cool atmosphere, which is an advantage.

Mr. R. T. GRAY: I have tried this water pipe plan, and have found it a good one.

A MEMBER: In case of grease coming freely after milling, what would you do?

Mr. PUBLOW: In such condition I would add the salt, and work quickly. If the grease still continued, and I found that it could not be prevented by careful handling, I would take off the grease, before salting, by putting on water at a temperature of 90°. It is difficult in some sections at certain seasons of the year to prevent greasy curds. There is not enough casein in such a case to hold the fat.

A MEMBER: Does it injure cheese to have mould on the rind of cheese?

Mr. PUBLOW: Mould does injure cheese. Try and not have mouldy cheese. I would prevent mould coming on the cheese by paying attention to the temperature, having less moisture and warmth, and by giving plenty of light. In a dark, damp room, the place will be full of mould—the very walls will be mouldy—and it will be almost impossible to prevent mould coming on the cheese. Give good ventilation to such a room, and have it whitewashed from time to time.

Mr. TWEEDY: Does piling curd before milling hurt the body of the cheese?

Mr. PUBLOW: It depends upon the amount of moisture. If there is lack of moisture the piling improves the cheese, but if too much moisture is in the curd then piling would injure the body of the cheese.

Mr. S. R. PAYNE: Has anybody had experience with the sub-earth air duct?

Mr. KIDD: We have had some experience; but we found that when the air was warmer outside than in the curing-room we had to close off the duct in order to keep the room cool. We prefer ice. A few pieces of ice on the floor will help to keep down the temperature of a room We find that by placing it on sawdust it gives satisfaction. Clean sawdust is no dirt. By this means we find that we can keep the temperature at about 70°, or about 10° below the average curing-room. Sometimes the sub-earth air duct works satisfactorily, and sometimes it does not. A good deal depends upon the condition of the outside air.

A MEMBER: It is sometimes difficult during warm weather to cook the curd sufficiently firm by keeping it at 100 degrees. The curd knife I use cuts it into five-eight inch cubes.

Mr. DERBYSHIRE: I would have knives that would not cut over three-eighths of an inch.

Mr. PUBLOW: I believe in cutting the curd finer than five-eighths of an inch. I would cut three-eighths, or even finer. Do not cook above 100 degrees, or you will be apt to get the curd too firm.

Mr. RUTTER: Does the high cooking hurt the butter-fat?

Mr. PUBLOW: I do not think it does; but you are apt to have the fat leak out afterwards. You had better take a longer time in cooking.

Mr. RENWICK: How would you manage a very gassy curd?

Mr. PUBLOW: If I had no starter to put in the milk I would stir it a longer time before starting to cook to ensure development of the lactic acid.

Mr. ALLEN: Would a cement floor be better than a wooden one in a factory?

Mr. PUBLOW: I do not think it would. I have worked on a cement floor and found it very hard to work on, and found that the cement used to chip and break up, and occasionally crack, and had great difficulty in keeping it clean. I have no doubt that if the cement floor was well laid, that it might do well for a curing-room, but I would prefer a good plank floor, well laid and oiled, for a work room.

Mr. ALLEN: How are ice racks arranged in the curing-room.

Mr. PUBLOW: Last season quite a few of the factorymen put them in in this manner: They made a box about four by six feet, then lined it with galvanized iron and attached an inch and a half steam piping to that, running the pipe around the inside of the building. They had a rack made to fit the box, standing up about three inches from the bottom, and the ice was washed off and put in chunks on those racks and the drippings ran through the pipe around the building. Put in in this manner they were found to work well. I would add that those factories improved their curing-rooms by making the floors and walls tight and providing good ventilation.

Mr. KIDD: I would like to know whether cheese will cure as well in the box after being in the curing-room for six days as they do if left on the shelves? The reason I ask this question is that in our section a great portion of the cheese was shipped in about seven days. My own opinion is that they should be kept at least fifteen days.

Mr. PUBLOW: I do not think the flavor of such cheese will be as good, and they will mould early. Cheese should not be shipped too green, but should be kept in the factory and turned from time to time until a certain amount of moisture is drawn out of it. If cheese are kept on the shelf without turning they will not be of the best quality. The bottom portion will be apt to get bitter if not turned. If the makers persist in selling cheese at a week old or less the patrons should say. "We will not have our cheese sold at this green stage; they must be kept until at least a couple of weeks old." The men who are losing by this unwise policy of selling cheese too young are the men who are producing the milk. I would like to lay special stress upon having better curing-rooms. Keep your cheese until fully cured, and then sell them every week when ready to go.

The PRESIDENT: I think we can fairly claim that by putting a curing room in proper, up to date shape, there can be a saving in the shrinkage of a pound of cheese a box. That would be about 3,000 pounds in the average factory, or about $300 in the first year, and all this improvement could be made for from $250 to $300 at the most. Not only would we have more cheese, but it would be of finer quality, which would command a better price, and would also create a larger demand, by still further increasing the reputation of our cheese in the old country. Cheese cured under the varying conditions of many of our curing rooms will not stand the test when shipped to the mother land. If I was going to build a factory I would have it of brick. I would make cheese in one part of it and butter in another. I would not make cheese before the first of May or after the first of November. I would put in the best maker I could find—one who had graduated from the Agricultural College or the Dairy School—paying him good wages, and I would have the best article produced that experience and knowledge could get us. A first-class building, a first class maker, and a first-class article are hard to beat.

Mr. WHITTON: I am, I believe, the first Canadian who made cheese in North Hastings. I am proud of the fact that I helped to lay the foundation of this great and growing industry in this county; and I am also proud of the fact that the people of this vicinity have shown by their presence and interest here that they believe the dairy business is of great importance to the county of Hastings. I have been going to cheese and butter conventions since 1872, and I can truthfully say that this caps them all. The making of cheese has been most ably discussed here. You have received valuable hints from some of the men who have addressed you to-day, among them some of the best handlers of the milk product that there are in Ontario, and that means in the Dominion. As a Hastings man I am proud to be able to say that we are making as good cheese in this county to day as can be found in Canada. The past season was one of the best that our farmers have had for a long while. You seldom hear the dairy farmer complain of hard times. However, there are some things that farmers must consider. They cannot all have whey left at their doors. They must all club together. Mr. Watkins very truly said that if we were to have fine cheese we must begin with the milk at the farm house. That milk must be sent pure, and clean and unadulterated. You must rest assured of one fact, and that is that you cannot feed turnips to dairy cows with success. Do not feed turnips to cows if you are feeding for milk. The dairy trade has been the salvation of this part of the Province, and we cannot afford to do anything that will injure the reputation of our product, and the feeding of turnips will injure the flavor of milk. I repeat it as strongly as I can. You cannot make good cheese or butter out of turnipy milk. The English consumer will not take cheese or butter that has any of that flavor.

Last spring I was invited to this town to a banquet given by the Cheese Board of Madoc, and I told them this same thing. I also said that if they would make cheese as early as April and as late as November they might just as well throw that cheese into the lake. Cheese made after the first of November or before the first of May is not worth giving away. There is no gain in it, for if it goes to the British market in May or June it injures the reputation of the really good cheese so much that down goes the price, and the net result is a greater loss than if the early cheese had never been sent at all. There appears to be a great deal of strife about the amount of milk it takes to make a pound of cheese. I have looked over the books of some of our instructors, and find that there is no great difference in the quality of the milk. Some men boast that they can make a pound of cheese from ten pounds of milk, while it takes eleven pounds in the hands of others. Mr. Publow says that it will take about eleven pounds of milk to make a pound of good cheese from milk testing about 3.6 fat. Do not expect your cheesemaker to make a pound of cheese for every ten pounds of milk. If he claims that he does he has to take it out of the patrons some way.

Mr. KIDD: I have used ice all summer, and with the same men working in the same factory we have had varying results. Our best average was 10.41 pounds of milk for a pound of cheese. But in some of our factories it takes much more than that.

Mr. PUBLOW: This "average" question needs to be carefully thought over. The farmer who furnishes the milk has something to do with the result, and so has the maker of the cheese. I have told you that cheese made from milk taken from the same vat, which has been cooked and handled differently, one being milled fine and the other sheep-skinned, gave different results. But the better the milk is handled from the very first the more cheese can be made from it. However, I have come to the conclusion that the fault is chiefly with the producers of the milk and not with the makers. The milk received should never be in such a condition that it will have to be made into cheese too quickly.

Mr. EAGER: This has been a very interesting discussion, and I would like to say a word in regard to this "average" business. Nine farmers out of ten when they get their bill from the factory look over it and say, "How much money have I got for each 100 pounds of milk?" If we wish to do things right we must start right. Things are very different in the cheese industry to-day to what they were a few years ago. The methods, the apparatus, the premises of ten or fifteen years ago are not equal to the demands of to-day in this great dairy trade. What intelligent farmer would to-day buy a mowing machine which was made ten years ago? Would he not rather say, "I must have the very latest, up-to-date machine there is in the market, to do my work in the very best manner." And so it should be in the cheese business. How are you doing your business? Are you doing it in the same old slip-shod fashion that you did fifteen years ago? If you are not, then where have you made improvements? Do you mean to tell me that there is a factory in this section that is not paying for milk according to its quality? You cannot make a fine coat out of a piece of shoddy; and you cannot make first-class cheese out of a poor quality of milk. Now, to pay for milk brought to a cheese factory by the number of pounds weight, and not by quality also, is a slip-shod way of doing business. This pooling business is not done with beef, or any other commodity of the farm except milk. If Mr. Jones and Mr. Smith each take a fat animal to the same market, one worth $25 and the other worth $45, would it be thought right for the man with the poor animal to want his neighbor to "pool" with him. We must pay for the milk according to quality, and that is according to the registered amount of butter fat. We must keep right up to date. There is a difference in the richness of milk in different cows, in different herds, and in different localities. Start right, and you are likely to be right all along the line; start wrong, and you are likely to go wrong all along the line.

A MEMBER: I believe that a pound of cheese can be made out of ten pounds of milk, and that it can be done honestly.

The PRESIDENT: Do the right thing as makers and patrons and you will meet your reward both here and hereafter.

VALUABLE PRIZES FOR ESSAYS ON DAIRYING.

The SECRETARY: Through the generosity of Mr. E. G. Henderson, Manager of the Windsor Salt Co., $100 has been placed at our disposal to be given in prizes in the following manner: $50 as a prize for the best essay on Cheese-making, to be placed in my hands not later than the first day of next December. The writer of the essay must have been engaged in actual work as a cheese-maker during the season of 1900. Instructors and professors are barred. For practical butter-makers $50 will also be offered as a prize for the best essay on Butter-making, under similar conditions. The Board has decided to supplement these two valuable prizes by offering a second prize of $25 in each case. Here is a fair chance for practical men.

Upon motion of Mr. KIDD, seconded by Mr. WHITTON, a vote of thanks was tendered Mr. Henderson for his kind and generous offer.

THE BACTERIAL CONTENTS OF CHEESE IN REGULATED AND UNREGULATED CURING-ROOMS.

BY DR W. T. CONNELL, QUEEN'S UNIVERSITY, KINGSTON.

I have had the pleasure of addressing this Association several times on bacteriological subjects in their relation to dairying, and I am pleased to see the continued and widely spreading recognition of the value of this subject in dairy work. For the bacteriologists may take to themselves some credit in the advancement of the dairy industry. They have frequently been enabled to point out the origin of taints in milk, butter and cheese, and to outline measures tending to their eradication. Taints have in many cases been traced to the entrance of contaminating bacteria or germs from such infecting source as filthy ponds, dusty stables, uncleaned udders, dirty milkers or foul factories and surroundings, conditions the reverse of cleanly, the avoidance or clearing away of which has resulted in checking the taint. As examples of such bacterial taints it has now been clearly shown by many observers that manure particles and dried manure as dust or mud is the source of taint in such conditions as foul and gassy milk, pinhole and gassy curd and "open" cheese.

Then, I have shown in one factory how a filthy gutter was the cause of seeding a factory with bacterium which produced rust like discoloration of the cheese. These are only some isolated examples of the detecting of such taints. Another way in which bacteriology has come to the front of recent years is in the preparation of pure bacterial culture starters, to replace the old and often unreliable sour milk, buttermilk or sour whey starters. Such pure culture starters are more reliable because we know what we have to begin with, and with care are assured of good results; whereas, with our milk or whey we cannot be so certain. Pure cultures are now a staple article in dairying, being prepared on a commercial scale by certain firms under the terms "lactic ferment," "lactic starter," etc., and are also furnished from the laboratories of the Agricultural College at Guelph, and can also be provided by myself on application. I might add other ways in which bacteriology has advanced the interests of dairying, but I must proceed with my subject.

During the summer of 1899 I was engaged under the direction of the Dominion Department of Agriculture, and more particularly under the direction of Prof. Robertson, our energetic Agricultural Commissioner, in examining cheese made on certain days and kept part in a curing-room with the temperature carefully regulated averaging about sixty-three degrees F., and part kept in an ordinary curing-room. Two cheese each, of seven different batches were in this way examined at different intervals, and the contained bacteria were estimated quantatively, and then the species identified, a task which I must say is certainly very tedious and close. The samples were carefully taken by the cheese-maker and placed in sterile tubes according to my directions, then packed in ice and sent for examination.

My results while generally in line with those of other observers, such as Von Freudenrich, in Switzerland, Lloyd, in England, and Russell, in Wisconsin, differ in some particulars. These observers find that the bacterial contents increase rapidly for the first few days and then undergo a gradual diminution.

In the cheese I examined the bacterial contents were on the second day always very high, and, as a rule, from that period on gradually diminished; some few show an increase for some days. I find the same conditions exist in cheese manufactured in our Dairy School at Kingston this winter, *i.e*, a higher bacterial content in the cheese as taken from the press, with a gradual diminution in the days following. I can only account for this fact by saying that Canadian makers as a rule develop considerably more acid in their curd than do either the Wisconsin or the English makers. This means, of course, a greater development of those bacterial forms producing acid, and consequently their presence in such great numbers at an earlier stage than is found in English or Wisconsin cheese. Now, before tracing out the differences between the cheese kept in regulated and variable rooms, I must speak more fully of the nature of the bacteria we find in the cheese.

Without an exception in the cheese examined (whether taken from the rooms in which the temperature was regulated or non-regulated) the lactic acid bacteria make up the great bulk of the bacterial content. In fact, other species were present in such insignificant numbers that they could exert no influence in the process of cheese-curing, and in normal cheese we always find that these species soon disappear. While this rule holds good for normal cheese, it does not hold good for certain tainted or "open" cheese. In a slightly affected cheese of this latter class lately examined in the Dairy School, comparatively speaking, large numbers of gas-forming bacteria were present, but even here the lactic acid bacteria were in proportion of fifty to one. In none of the cheese I examined last summer, however, was the gas-former species present in more than insignificant numbers. The lactic acid bacteria gradually decline in numbers, usually from the first, falling down to 1,000,000 to 3,000,000 after the 60th day, some cheese showing a higher content than others. With the decline in numbers it was found that these lactic acid bacteria gradually lost their acid forming power when introduced into milk. This power could be again brought back by careful cultivation. This is of importance, for if any species had escaped destruction up to this point their growth could be no longer held in check by the lactic acid germ. This accounts for some cheese "going off" when they have previously been looked upon as first-class.

We can sum up by saying that in normal Canadian cheese the bacterial content practically consists of the lactic acid bacillus—the same micro-organism we find active all through the course of cheese manufacture being the active principle of the starter—the cause of milk and cream ripening and of the breaking down of the curd allowing of the application of the hot iron test.

What are the differences, if any, between the cheese kept at a regulated temperature and those kept in the ordinary curing room? The cheese in the regulated temperature were found to have a slightly higher bacterial content and this content remained high for a longer period than in the case of the cheese kept in the variable room. Dr. Russel, of Wisconsin, in a series of examinations made in the same manner, has had the same results as I have noted with regard to the bacterial contents. I had overlooked his work till after I had made my own observations, and I am pleased to find that I can confirm him in his reports. Dr. Russel found, however, that the curing advanced somewhat more rapidly in the variable rooms, while I think observations made at Carp showed that ripening of cheese seemed to be more marked in the cheese at a regulated temperature, and as regards the commercial value of the cheese I think that almost without exception the the cheese kept in the regulated curing room were more decidedly better in body and and flavor, and hence of more value than those of the same batch kept in the ordinary curing-room. On this point Prof. Robertson will be able to give full information.

Is there any relation between the contained bacteria and the curing changes? Manifest curing changes are not seen in cheese till after some days have elapsed in the curing-room, it is during the period of decline of the bacterial contents that these changes become noteworthy. From this it is clear that the agent which causes the ripening of the cheese must either be inherent in the milk (milk enzymes of Babcock and Russel) or must be a ferment developed during the period of bacterial activity in the milk and cheese *i.e.* during the process of manufacture and the first few days after the cheese is placed in the curing-room.

Babcock and Russel, in Wisconsin, claim, and by many experiments seem to have shown, that there is present in milk as it comes from the cow a ferment which has the

power of digesting casein in time, and they claim that it is to this inherent enzyme we must look for the active agent in cheese-curing. The flavor depends partly upon its action, but mainly upon the products of bacterial activity in the cheese. There are some fallacies in their otherwise excellent work which I will not point out here.

If the statement made in German *Milch Zeitung* is correct, viz, that cheese can be perfectly made and ripened from milk that has been pasteurized at a temperature of 185° F. for ten minutes by the addition to the milk of measured quantities of calcium chloride and a starter, then their enzyme theory is entirely upset; for this enzyme would be destroyed at this temperature so that its action would be excluded. This statement, however, in the *Milch Zeitung* yet lacks confirmation, and we will have to accept it with great caution. I have not yet given up the idea that the curing process depends upon the lactic acid bacteria, though I know nothing of any casein-digesting enzyme which this bacillus forms. Lloyd, of England, thinks the change can be explained by the action of these bacteria on the lime and salts, and consequent chemical interaction.

It is certain that we must first have more accurate chemical knowledge of the changes which do occur in the process of cheese ripening before we can make positive advances. The bacteriologist has gone about as far as he can advance along these lines till the chemist comes to his aid.

Now, while it is not of general importance to know the exact mode and method of the curing changes, it is of importance to the practical man to be made acquainted with the results of experiments, particularly as it may and has led to beneficial commercial results. To the experimentalist it is of importance to know upon what the curing process actually depends, for he can then more scientifically work to bring about results of practical value.

To sum up generally the results of my work and that of others on the bacterial content and curing of cheese are as follows :—

1. Normally in cheese the greatest bacterial content is found in from one to four days old cheese. At this period as high as 500,000,000 bacteria may be present per gramme of cheese.

2. Following this period we have a gradual and continuous decline in the number of bacteria in the cheese.

3. The bacterial content remains high longer and the decline is more gradual in the cheese kept at the regulated room temperature (63 degrees, F.).

4. Lactic acid bacteria are practically the only bacteria found in normal cheddar cheese during curing. In all cheese gas-producing bacteria have been demonstrated, but in insignificant numbers. These gas-producing and allied forms are present in larger numbers in tainted and open cheese.

5. In the cheese examined the gas-producing and "allied" "foreign" bacteria have not been more common than in the cheese at the regulated room temperature; they were nor present and hence did not multiply. Certain it is that in cheese in the variable room, as the lactic acid bacteria more rapidly decline, any foreign species present would more rapidly have a possible chance for development, and hence cheese in the variable room ought to go "off" more commonly and earlier than those in the room kept at 63 degrees, F.

6. We are still unaware of the exact rationale of the curing process. It is quite certain, however, that the curing agent is either inherent in the milk (milk enzymes "galactase" of Babcock and Russel), or is formed during the process of cheese manufacture and in a few days immediately following the placing of cheese in the curing room.

7. That commercially, cheese made under the same conditions, but cured at a temperature regulated between 60 and 65 degrees, F. (average 63) is more valuable than that allowed to cure in a temperature more variable. Further, it keeps better, another factor of importance commercially.

PRODUCTION OF PORK FROM DAIRY BY-PRODUCTS.

By J. H. Grisdale, Agriculturist Central Experimental Farm, Ottawa.

The subject upon which I have been requested to speak is the value of such by-products of the dairy as skim-milk and whey in the production of pork. Some skim-milk may not be good for feeding hogs, and some whey may not be good. But if it be kept in a normal condition there is no more valuable food for a young hog than skim-milk. All of our live stock pass their early days on milk. It is a natural food, and for that reason it is difficult to wean young pigs without the use of considerable milk. Where we have succeeded in weaning pigs without milk they are always of an inferior stamp, for even in subsequent days they do not seem to pick up. Whey is also of considerable importance along this line, but it is not nearly of so much value in feeding young pigs as is skim-milk. The main reason is that a good deal of the albuminoids, or flesh-forming material, has been extracted. And not only that, but the skim-milk appears to have a tonic or exhilarating effect, and seems to have a stimulating effect on the growth of pigs. It does not depend so much upon the quantity of this milk that you have given them as upon the fact that you are feeding it. The value of whey for fattening pigs was brought out to-day by the President, when he recommended the plan of having the hogs kept near the factory, and have the whey given to them when fresh and sweet. This is one of the best ways of raising pork cheaply, but there is also the danger of giving the cheese a bad flavor on account of the piggery contaminating the air around the factory. This might be obviated by keeping the hogs about a hundred yards or more from the factory, or as far away as is convenient. Whey fed along with pasture makes pork that may be said to be of fair quality. Certainly it is a cheap method of raising pork. I know of one man in the neighborhood of Ottawa whose farm comes right up to the factory, and last summer he fed twenty pigs about 100 yards away from the factory. He carried the whey over to the pigs, and there fed it to them. He had about two acres for the twenty pigs. There was a little Dutch clover in the field. The pigs had considerable grass, and they had a nice place to lie down in. At the end of the factory season he found it was necessary to feed only two bushels to each pig in fininishing off. He found that he had made a clear profit of five dollars on each animal, or $100 on the twenty hogs. You will see, therefore, the great value of whey in supplementing pasture. In the summer there was practically nothing but the whey and pasture. If you have to take whey home I would advise you to take it in a barrel and not in a milk can. As to feeding skim-milk, I may say that in sections where butter-making is the industry rather than cheese-making, the skim-milk can be handled even better than the whey, and it is worth about twice as much pound for pound as whey. But remember that although whey looks thin and watery it contains a good deal of nutriment. There is all the milk sugar and a large percentage of the albuminoids. We have been pursuing a number of investigations as to the value of whey in fattening hogs at the Experimental Farm, and have tabulated the results. Skim-milk we found was worth about half as much as corn, pound for pound. We found in these experiments that when pigs were fed meal alone that 4 27 lbs. were required to make a lb. of gain; but when meal and skim-milk were fed—all the milk they would take and only half the meal fed formerly—that only 1.26 lbs. of meal were required for a pound of gain, with 25.39 lbs. of milk. One pound of meal would thus be worth 8.43 lbs. milk.

A mixture of peas, wheat and rye produced 1 lb. of pork for each 3.43 lbs. fed. When fed with all the skim-milk it was found that 2.17 lbs. of this meal were never needed, and 11.10 lbs. of milk, for each pound of increase, or 8.82 lbs. of skim-milk to 1 of meal.

The experiments also showed that about 1.83 lbs. of skimmilk were the equivalent of a pound of corn. This would seem as if skimmilk has the most marked effect when used with corn.

We found too that when barley was fed alone it took 4.35 lbs. for each pound of grain made, while only 3.64 lbs. were required when fed with 2.52 lbs. of milk.

The use of milk with a mixture of peas, barley and rye fed whole bears the relation of 6.99 of milk to 1 lb. of the grain.

A meal composed of equal parts of ground peas, barley and rye was fed in one case without skim-milk, when it was found that 4 36 lbs. were required for a pound of pork, and in another case when all the milk the pigs would consume was fed with a similar ration of meal it required 3.46 lbs of meal and 4.81 of milk to make a pound of pork. According to this experiment skim-milk would be worth about one-fifth of an equal part of the meal.

From these experiments we learned that skim-milk may form the largest part of the food of young and growing pigs with advantage, while for the fattening of hogs weighing over 100 lbs. it is economical to give only an allowance of skim-milk—say not exceeding 5 lbs. a day. We found in practically every case that the swine which had skim-milk as a part of their ration were healthier and more vigorous than those which had grain without the skim-milk. Skim-milk, I should say, may be considered as worth from one-sixth to one-fifth as much as mixed grain, and gives the best returns when it constitutes a comparatively small share of the total food—perhaps about 3 lbs. a day would be about the average. Of course we gave them water besides. We keep water before our hogs all the time, in a trough, and put the grain before them as they require. It is well to have the grain ground, especially barley.

A MEMBER: Can you give us any idea of the relative feeding values of sweet and sour whey?

Mr. GRISDALE: I cannot from my own experience, but I remember that at Guelph Prof. Day carried on an experiment with sweet and sour whey and skim-milk at the same time, testing their value as pork producers not for quantity so much as for quality. He informed we subsequently that the sour skim-milk and sour whey fed to hogs gave them better results than that which was fed sweet. I know that the sour whey did not smell nice, and the skim-milk was curdled.

Mr. PAYNE: It stands to reason that if the milk sugar is fermented it must be injured as a food factor.

Mr. GRISDALE: I know that some of the milk sugar will be turned into alcohol, and may thus affect its feeding quality.

The PRESIDENT: A friend of mine once said that it was nice to have a pickle occasionally as a relish for the appetite, but that it was not wise to try and live upon it.

Mr. HONEY: We hear a good deal about hogs for making export bacon. Do you think that skim-milk and corn, or pasture and whey alone, are suitable food for making first-class bacon for export? If pigs are fed grain carefully and allowed to run around in the pen there will not be much waste of food. If the chop is damped a little do you not think it would be better?

Mr. GRISDALE: Would corn and milk alone make first-class bacon? That is an important question. We fed 160 pigs along this very line, and the results seemed to indicate that corn and milk together are good flesh formers; but if they were fed too much and got too fat the packers would not like the bacon so well. The chief objection to feeding corn with milk is the tendency to put on too much fat. Profs. Day and Robertson have also found this tendency towards fat when fed too long on this diet. There is a tendency towards softness if finished off on pasture and whey, and to avoid this towards the end of the season they should get some peas and oats to get them hardened in flesh. Under such circumstances I think either of the plans of early feeding will give good results. If the pig has been fed all summer on flesh forming foods it is easy to finish him off later.

The PRESIDENT: The question of damping grain reminds me of Theodore Lewis' answer to the farmer who questioned that wise old German's advice as to feeding grain and meal dry. "It will take too much time for the pigs to eat the dry food," said the objector. Mr. Lewis looked at the other, and quietly said: "Mine friend, vot vas that hog's time worth?" (Laughter).

Mr. HONEY: We cannot go to any place in the country now where farmers assemble without getting this question asked about the hog. The cow and the hog must be produced together. We must select the typical hog, and then feed the animal right. If we feed all one kind of food too long at a time, such as skim-milk and corn, the pork will be too fat and soft, and packers do not want too much grease. That sort of bacon does not suit Englishmen. It does not pay to raise fat; flesh is what is needed. I would say to you that it is best to feed your pigs well. I do not think it is best to put a young pig on

pasture and give it practically nothing else but milk, and then finish off with grain. I would mix a little grain with the pasture and skim-milk right along. I would not lard at the last, but would lard all along. There are six weeks in the young pig's life that requires a lot of skill, and that is the period from the sixth to the twelfth week of its age. If a pig is stunted at that period he will be a poor thing no matter what subsequent treatment he may receive, and I would not take home a cart-load of them as a gift. Grow the pig ; stretch him out ; give him bone and muscle in that second six weeks of his life, and you have something to build on. Now, we want to avoid getting the soft, greasy bacon hog. You know that at London at the Fat Stock Show you would see the bacon experts go and handle the pig from one end to the other, and they wanted it to be solid, and to have even fat and lean all the way through. I agree with Mr. Grisdale that there is nothing to equal skim-milk for young pigs, but you must give them something else to harden them up. Of the grains, give shorts and barley to young pigs, but do not give corn, rye or wheat to very young animals. The pig wants a mixture in its food. He must have a balanced ration. Who among us would like to eat all potatoes at one meal and all fat pork at the next? We should deal with the pig in an intelligent manner.

A MEMBER : How do you feed in the winter ?

Mr. HONEY : I give them a little meal and shorts, and barley ground very fine. I like the pigs in winter to have a mixture of some roots once a day with the grain. In the summer they do well with clover, but in winter they cannot get the green feed. For young pigs I would have the roots pulped and mixed with shorts and barley meal. I never give the meal dry, for I find that if the meal is put in dry there will be a good deal of waste. I do not think it is profitable to keep a pig in a pen that will freeze. I think it pays to dampen the feed of young hogs, as they would be likely to waste some if the grains are left dry. Do not in any case make the food sloppy ; dampen it only a little. I have eighteen pigs in one building at the present time. I take a fifteen quart pail of skim-milk, and after I put in their chop I add that fifteen quarts of milk among the lot. That will not wet it very much, but will get it nicely damped. Then after they have fairly cleaned the trough I may give them some skim-milk or water to drink. I would never give a pig more than he would eat, so that he would leave some of his food in the trough.

A MEMBER : Does your pig feed ever freeze in winter ?

Mr. HONEY : It must be a pretty cold pen where the food will freeze before a hog can get his dinner. (Laughter).

A MEMBER : Would it pay to cook potatoes for small pigs ?

Mr. HONEY : Small potatoes not fit for sale are good for young pigs.

A MEMBER : Do you think it is best to keep a pig through the winter ?

Mr. HONEY : No. I do not think it is wise to winter a pig if you can help it.

The PRESIDENT : Do not keep a pig over winter if you think he can get through the same hole in the spring that he squeezed through in the fall. (Laughter).

Mr. Honey : That reminds me of the Irishman who had a pig of that sort, and he declared that the creature drank a pail full of swill and then was able to get into the pail he had emptied. (Laughter) Seriously do not crowd a pig too much. A pig six months old should weigh from 175 to 200 lbs. Too much weight at that age means an increase of quantity at the expense of quality. A hog should make about a pound a day of gain for the first six months.

A MEMBER : How many pounds of whey a day would you advise for a pig weighing about 100 lbs.

Mr. HONEY : It would all depend on what you would give with it, and whether the whey was sweet. I believe the whey is worth double when sweet to what it is when five days old. A fifteen-quart pail of whey—that is about thirty pounds—would be sufficient for about seven pigs about three times a day. In our part of the country we do not allow patrons to draw the whey home in their milk cans. They haul a load of whey home once a week. I repeat my opinion that whey fed within twenty-four hours after being drawn is worth double the value of whey four or five days old.

Mr. EDGAR : Are potatoes good food for a bacon hog ?

Mr. HONEY : No ; not to finish on.

A MEMBER : What class of hog is best to buy for bacon ?

Mr. HONEY : Buy the breed that you like best, as you will take best care of them.

There is a bacon type of a hog, and in all the breeds you can get something near the right form by selection. I am afraid that if I state my own preference of breed some of you will jump on me. However, I keep improved Yorkshires, and the very best and longest type I can get. I get them fit for the market in six months, and they make good bacon.

OUR PROVINCE AND OUR PEOPLE.

An address upon the above named subject was delivered by Mr. C. C. James, Deputy Minister of Agriculture, which dealt with quality of the early immigration into Ontario, and in which the speaker paid a high tribute to the courage and character of the settlers who opened up the country. He predicted that large population would yet be seen in the now sparsely settled northern districts of the Province, as well as the immense immigration that was certain to pour into the Canadian Northwest generally.

CANADA'S GREAT POSSIBILITIES.

By J. W. Johnson, Mayor, Belleville.

After apologizing for the absence of Sir Mackenzie Bowell, who was suffering from sore throat and could not be present to deliver an address, the speaker said that he had been asked by Sir Mackenzie to represent him, and speak upon the present outlook in Canada. One of the most remarkable things in connection with the progress of Canada was the growth of the dairy export, which has increased from $1,600,000 in 1871 to about $20,000,000 in 1899. In fact Canada sent into the British markets about sixty per cent. of the cheese imported into that country. The reason we had made that great progress in our cheese trade was that our farmers as a class were honest. They may not be more honest than the dairymen of the United States, but we have a bigger policeman to attend to the dairyman if he does not do what is right. Skim-milk and prayers do not go well together, and the work of the instructors and inspectors has done much to show that it is not only right, but that it is also wise, to do the honest thing in handling milk.

The cheese and butter trade, like that of other industries, is helped or hindered by transportation facilities. It is a fact that Canada stands to-day as one of the great maritime countries of the world. Great Britain comes first, and Canada comes sixth. There is a great fight between this country and the United States as to which country shall control the transportation of this continent, and I believe Canada will win. We have spent $55,000,000 in making the route from the great lakes to the sea as perfect as can be made. We have now a splendid water way of about 3,000 miles from the Straits of Belle Isle to Port Arthur. This has been accomplished by a great sacrifice on the part of the people of Canada. There is no country that has shown more enterprise than Canada in the way of pushing along the construction of canals and railways. (Applause.) When Governor Roosevelt, of New York, a short time ago sent his commission to enquire into our canal system, they were surprised, and so were some of our own people, to find that $55,000,000 had been spent in building canals in Canada, or $10 per capita. If the United States had been as enterprising in proportion to their population they would have spent $800,000,000 in canals alone. We have now at least fourteen feet of water from Lake Superior to Montreal, with the completion of the Soulanges canal. I believe that the Conners Syndicate, which is coming to Montreal to do what that place cannot do or has not done for itself in the way of building elevators, is one of the best things that has ever been developed for the prosperity of that city, and it will also be of great benefit to the Dominion at large. All the grain that now goes to Montreal from the Northwest is a mere bagatelle compared with that which goes through Buffalo to the seaboard. Is it not far better for us to give that syndicate certain rights and privileges to perform their special task, and to see something done within this generation, than to let the occasion slip and see scarcely any progress made? For no other organization seems able to do what the Conners Syndicate offer to accomplish. And so I say that the Harbor

Commissioners of Montreal and the Dominion Government have been perfectly justified in making the agreement with the Conner's Syndicate. The scheme means the incoming of more vessels to the harbor of Montreal, and the result will be the cheapening of freight for you and for me. I believe that Canada's trade will grow beyond what anyone here can conceive.

In addition to the magnificent waterway comprised in the great lakes, the St. Lawrence river and the canals, we have been improving our railway system, until now it is the finest and the largest in the world in proportion to our population. In 1867, at the time of Confederation, we had 2,250 miles of railway, but the energy of our people has increased this to 16,000 miles in the thirty years or so intervening. We have the great Intercolonial road, connecting the Maritime Provinces with the Upper Provinces, the Grand Trunk, which so well serves the central portion of Canada, and the Canadian Pacific Railway, which is one of the grand highways of the Empire. It has 3,836 miles, and has cost about $107,000,000. We have been sorry to see so many of our bone and sinew leaving for the United States, but, after all, transplanting is a good thing. It is necessary that some of our sons should go to other countries to learn and to develop, and return with ripe experience. We cannot keep all our youth in our own towns. But now that our western railways are opening up our north-west, we find that Canadians are returning and occupying our lands there, and many Americans are coming too. This is the result of our enterprise in the years gone by.

When you put your cheese or butter on a steamship you get your bill of lading signed, and you insure that cheese or butter. But beyond the insurance against fire and the danger of the elements connected with navigation, there is further danger of attack by "the Queen's enemies," as the bill of lading says. However, we have the Queen's navy. That insurance is one of the best afforded our trade, and the people of the old country have been paying for it all. I think the time has come when Canada should do her full duty by paying a fair share of that insurance. Many of us cannot at present go and fight for the Empire, now carrying on a war in South Africa, but some of our boys have gone, and I think that Canada's duty is to pay the whole of the bill incurred in sending the Canadian contingent there. The time has come when we must face the fact that we are an integral part of the great British Empire—that our future is within the folds of the Union Jack. We are not sponges and we must pay our share of the cost of Empire, as well as share its honors and advantages. When we were boys in the past our parent paid the cost of protection. But are Canada and Australia in the position of boys any longer? Canada is the best part of the British Empire. It is a country worth living in, and it is a country worth dying for. (Applause).

LESSONS FROM THE VERMONT DAIRY CONVENTION.

By Prof. H. H. Dean, Ontario Agricultural College, Guelph.

I am on the programme for an address to-morrow, and I have just returned from a long journey to the Convention of a sister Association in Vermont, and feel rather weary; yet it is like a tonic to see before me a number of my old students, and I therefore cannot resist the feeling that I should accept the kind invitation of your President and give you an impromptu address this evening. The Vermont Dairy Association has been holding its annual meeting at Brattleboro' this week, and I was there on invitation. It does us good sometimes to go and see what our neighbors are doing. It is necessary to get out of ruts in our work, and these conventions—provincial and state, national and international as it were—help to knock off the rusty spots of our mental machinery. The State of Vermont joins Canada at the Province of Quebec, and yet the people there know comparatively little about us. They have an idea that we do not do very much over here outside of cheese-making. The chairman of that convention said that he would like to have Canada annexed, and become a part of the United States. They thought we would be a small fraction of their territory, but for a few minutes I endeavored to disabuse their minds of that idea. When I told them of the immense stretch of territory comprising Canada, and how it dwarfed even their great republic, it opened their eyes. I also told them that our national song was yet full of loyalty to the Queen.

In going over the State it struck me that Vermont was rather bare and uninviting so far as the land was concerned, yet I found that on these Vermont farms they had from 100 to 200 cows. At St. Albans, Vt., they have the largest creamery in the word. They are getting high ideals of the diary cow over there, for it is the general opinion that no cow should be kept for butter-making whose milk tests less than four per cent. of butter-fat, as she would be unprofitable. Most of those who spoke of the quality of their herds claimed that their cows gave 5 per cent. of butter-fat, and that they got from 300 to 500 pounds of butter per cow. One man said that if he was asked to describe an ideal milk cow he would say, "She should have an Ayrshire body with Jersey characteristics." A man present asked me the price of good Ayrshire cows over here. They want to get the vitality, stamina and quick movement of the Ayrshire, that will forage among the hills, and if with that they can get some of the rich milking quality of the Jersey they have just the kind of milch cow that is required. The most of the farmers at the Vermont convention were in favor of silage. However one man objected to silage because it smelt like whiskey—Vermont is a temperance State. (Laughter). He also thought that corn ensilage was responsible for the introduction of tuberculosis in that State. I do not agree with the idea that ensilage has anything to do with tuberculosis. The past season was a dry parching one over in Vermont, just as it was with us in western Ontario. One speaker remarked that there were three things of which one can be reasonably sure: death, taxes and a summer drouth. It was impossible to dodge the first two, but by having a silo filled with corn it was possible to overcome the effects of a summer drouth. In our own case at the Agricultural College, by feeding corn ensilage and about six or eight pounds of meal we found that we were able to overcome the summer drouth. Our dairy cows were producing a large amount of milk under these circumstances, while our neighbors just near the college were finding that their milk supply had fallen off greatly. Have a good, large summer silo, and by taking off a few inches every day you can keep the silage from spoiling, and thus maintain the supply of milk during the dry season.

Another point brought very strong at the Brattleboro' convention was the matter of butter-fat registration. The State of Vermont has passed a law requiring every person who operates a creamery to have a license before they can use a Babcock tester. About 259 operators had to try for a license, and about thirty per cent. were proved to be wholly incapable of handling the Babcock tester. If we are going to use this test to any extent we must have a Provincial law passed that will require the operators to have a license after an examination. Each person wishing to apply for a license must deposit a dollar with the College. If he does not want to go to the College, six samples are sent to him from milk already tested at the College, and he must test that milk in the presence of some responsible person, and both must testify that the test was properly performed. They go further than that in Vermont. Every piece of glass connected with the Babcock tester must be examined by a state official and endorsed by him. A charge of five cents is made for each article or part of the apparatus which is tested. I learn that many pipettes have been rejected as a result of this official test. Now, I think that something of that kind could and should be done in Ontario.

I found that those Vermont dairymen have reached that stage where they can show how much milk each cow in their herd is giving and how much it costs to feed her. They are managing the whole business on a dollar and cent line. I found men there who could give me the profits they were making on each individual cow. We must study this, too, if we are to keep in the front rank. Every effort is being made over there to make the best possible exhibit of agricultural products at the Paris Exposition. They feel quite keenly the fact that Canada won the most prizes in these lines at the World's Fair at Chicago, and they are bound to retrieve themselves. But I trust that we will again succeed in our competition with them, but we shall have to put forth every effort in order to do so this time.

I was much struck with the fact that the women of Vermont take a very active interest in the work of the Dairy Association. In fact they have a Woman's Auxiliary in connection with the general organization. One of the meetings of the Association was conducted by the ladies, and a lady occupied the chair, although some gentlemen also spoke. That meeting was thrown open for questions, and one of the questions propounded by a woman was: "If you had a cranky husband, who was always getting out of temper, what kind of ration should he receive?" The reply was: "I would not give him any pie,

or doughnuts, or anything that is likely to interfere with his digestion." (Laughter.) The food that a man eats must have a very important influence upon his temper and character, and indeed in every way.

The State Superintendent of Education gave a very interesting address upon "Life on the Farm," in which he drew a very pleasant picture indeed. He showed that it was possible for life upon the farm to be enjoyable and wholesome in every respect. Gov. Hoard was there, and was as full of wit and wisdom as ever.

I was greatly touched with the sympathy manifested by those present at that gathering in Vermont when an allusion was made to our Canadian boys going to South Africa. They actually cheered our boys. (Applause).

REPORT OF INSTRUCTOR BENSLEY.

I take pleasure in herewith submitting my report of work done as one of your instructors and inspectors for the season of 1899.

I commenced work on May 8th and finished October 27th. Of this time I spent 127 days in factories, testing milk and giving instructions in cheese-making, three days attending cheese boards, four days settling milk cases, eight travelling and five days detained on account of rain. The number of factories visited was 78.

I tested about 5,700 samples of milk, and of that number I found but 13 wrong, all of which admitted and paid the fine imposed on them. The amount contributed by factory men for my services was $355, amount of fines $170, only half of which goes to Association, making a total of $440. I am pleased to say I found a marked improvement in the style and finish of the cheese in most of my section, but there are still cheese makers who are very careless with there work in every respect, and it is among this class of makers where most of the trouble is.

The principal fault with cheese this season was weakness in body, caused principally from makers ripening their milk too much and not giving their curd time to cook. It is astonishing how makers will persist in this kind of thing when they know what the results will be. Year after year you will find makers who are having their cheese rejected from this very cause and still it seems to be no warning.

G. H. Bensley.

REPORT OF INSTRUCTOR HOWEY.

I have much pleasure in submitting this my fifth annual report as instructor and inspector of this Association for what is known as the Belleville section. I visited fifty-five factories. In accomplishing this work I spent 149 days in the employ of the Association. 137 days were spent in testing milk and giving instructions; the remaining time was spent in travelling, attending Boards of Trade, and settling milk cases.

The amount of money contributed from factories for my services is $260; total amount of money received as settlements from patrons delivering deteriorated milk, $610 making a total to the Association, $565.

In regard to the quality of cheese in my section there has been an improvement, although the cheese maker is handicapped to a certain degree with poor buildings. I see by some of the instructors reports that the buildings in their sections are fair. I wish I could say this in regard to my section. I can say that there are not one half dozen factories in which I would submit myself to manufacture first-class cheese in, because the temperature rises and falls with the sun as high as in the nineties.

I might say I think it is time we had better factories, better shipping facilities, and not these old box cars that carry a temperature of a hundred degrees and over throughout their whole journey. Refrigerator cars in hot weather and ventilated cars in cooler weather are absolutely necessary. If cheese makers will still persist in binding themselves to make good the loss which occurs from causes over which they have no control, just that long we will be without these improvements. I believe, however that in Canada we can have these improvements so constructed that we can get a prime quality of June, July and August cheese.

H. Howey.

REPORT OF INSTRUCTOR WARD.

I now present my second annual report of work done for Cheese and Butter Association of Eastern Ontario. The territory allotted me was Peterboro' and Lindsay sections. The number of days spent in employment of Association was 170. Of this time 149 days were spent in testing milk and instructing, seven days in driving and calling, fourteen days on milk cases and travelling.

Of the ninety-one cases of deteriorated milk I settled forty-seven, settled by court, six, and balance were settled by management of factories. The amount of money received to be paid into the funds of the Association is as follows: from fines, $415.34; from factories, $365; total, $780.34.

Late delivery of milk in morning I consider a serious trouble in some of the section I travelled over. It should be remedied as far as possible.

Return of whey in milk cans under existing circumstances, I believe, should be abandoned.

There are factories in my sections that pay for milk by quality and are giving good satisfaction. The feeling in that direction seems to be growing, and I would say let it become general as soon as possible, if it will stop fraud in the delivery of milk, for we must have pure milk, delivered in good condition, if our cheese are to advance in quality, which should be the aim of both producer and maker.

Seeing the gross ignorance of the law in regard to the delivery of milk, has forced on me an idea that there should be a copy of the law in pamphlet form placed in the hands of every patron of this country.

Another difficulty which I think threatens the dairying business of this country is the strong competition among makers, which is putting the price too low for manufacture. I think I can tell as soon as I get into a factory whether the maker is properly paid or not. Where he is as a rule everything is right, a proper interest taken in the work, and things in much better shape.

On the whole I found a decided improvement in curing-rooms and equipments over last year. A few of the makers still run their milk too fast and over handle their curd, which means loss on both quality and quantity, but as a whole I found makers careful and anxious to arrive at the best result.

I cannot close this report without referring to the great mistake which is being made by putting in too many butter plants too close together. The result is, there is not sufficient business to be profitable on capital invested.

Quality of cheese as a rule has been good; very tidy and neatly put up in most of my factories. But right here I would like to urge makers as far as possible to attend a dairy school.

This season which has just closed has been a good one for the producer, and I hope may prove to be a profitable one for the buyer and shipper, for their interests are mutual.

In conclusion I would like to urge makers to be careful about receiving milk, for where we find a careful maker in this respect the result is plainly noticeable.

R. W. Ward.

REPORT OF INSTRUCTOR PURVIS.

I commenced work on the 18th of April, and quit work on the 5th of December, working steadily from the 28th April till the 5th November, after which I was not fully occupied. Of the 182 days spent in your employ I spent 167 in factories giving practical instructions in cheese making and testing milk; 3 attending court, prosecuting parties accused of tampering with milk; 5 in driving; 6 detained on account of rain; and one in Montreal examining cheese.

During the season I caught 22 parties tampering with milk; 6 of these refused to settle, and I had them brought before a magistrate and fined. The balance settled either with myself or with the managers of the factories where the wrong was committed.

The amount contributed by the factory men for my services was $618.00, and the amount collected from fines and settlements was $241.

This is a better showing than ever before, and I think it proves that the patrons are learning to fear the consequences of sending adulterated milk to cheese factories.

The make of cheese was never of so high a grade before in this district, and a great deal of credit is due both the makers and patrons for the eager way in which they are trying to improve. Another improvement I wish to note is that of the new factories built since my last report. A large number of new, well equipped factories have been built during the last year, and no less than fifteen of these have been fitted up for both cheese and butter.

I wish to express my thanks to the makers and managers throughout my district with whom I did business, for the uniformly kind way in which they treated me and assisted me in the discharge of my duties, and I am sorry that I could not visit all who applied for my services, as I had to refuse upwards of forty applications, not having time to go to all.

A. P. Purvis.

REPORT OF INSTRUCTOR ZUFELT.

I have the honor of handing you this, my third report as instructor for this Assscciation. The number of factories visited officially was 53. Altogether I spent 155 days on the road as follows: 127 days working in factories; 15 driving; 6 attending fines and cheese boards; 7 lost on account of rain.

The amount of money received for the Association was: Fees from factories $441,50; ½ fines ($460) $230, total $671.50.

As the work of an instructor is much the same from year to year it is scarcely necessary to repeat what has already been given in previous reports. Suffice it to say that I have endeavored to assist the makers in what difficulties they have met with and help them improve the quality of their cheese, and think I can say I have been fairly successful.

L. A Zufelt.

REPORT OF INSTRUCTOR LOWERY.

I have the honor of presenting to you my second annual report as inspector and instructor for this Association. The district allotted to me was Campbellford, Madoc, Stirling and Brighton. I visited 76 factories.

In accomplishing this work I spent 164 days in the employ of the Association, as follows: Three days lost on account of rain, seven days driving and calling at factories, and one hundred and fifty-four days in actual work at factories, giving instructions and testing milk.

Of the 8,518 samples of milk tested with the Quevenne lactometer, and 4,282 with the Babcock tester, thirty eight were found to have been tampered with, and were fined $683. The amount contributed by factories for my services was $370, and from fines $341.50; netted the Association $711.50. I had less trouble this season than I had two years ago in the same district with parties tampering with their milk, which goes to show the benefit of the Babcock tester.

It gives me much pleasure to report favorably on the quality of cheese made in the majority of factories in my district; but I am sorry to state that late in the season I found the quality not so good, on account of feeding turnips. In one particular factory the where the milk all seemed to be flavored with turnips, I spoke to one of the patrons about it, and he simply told me that they might as well close the factory if they had to quit feeding turnips. I contend that it is impossible for any make good flavored cheese from such milk. But the trouble is in getting first-class milk to our cheese factories, and I think more attention should be given to the farmer who produces the milk. One thing I would like to impress upon the Association is to try and reach the farmer, and instruct him more in caring for his milk, as that is the foundation for making fine cheese. I noticed in traveling through the district a number of hog pens under the milk

stands, and I am sure milk could not have a good flavor standing all night over a hog pen. If all milk sent to cheese factories was better cared for, we would have more cheese and a better quality for the same amount of milk.

The general conditions of the factories was fair, with the exception of a few of which were not fit to make or cure cheese in, and the temperature in the curing-room in hot weather was just as high as it was out doors. It is a very important point to have a good, cool curing-room to cure cheese after they are made. The trouble in making cheese that have to be cured at such a high temperature is that they are too dry for the English market. But I must say just here that Madoc has very few of the style of factories I have just described.

In conclusion, I found the makers doing very good work, with the exception of a few who fail to make the most of what is at their disposal, and do not seem to understand that cleanliness is essential in making fine cheese.

J. B. Lowery.

REPORT OF INSTRUCTOR PUBLOW.

I have the honor of handing you my twelfth report as instructor and inspector for the Cheese and Butter Association of Eastern Ontario, for the season of 1899,

I commenced work on April 25th, and ended Nov. 6th, working in all 169 days. Of this time, I spent 130 days giving instructions in cheese-making, testing milk and visiting factories; 4 days in settling milk cases; 5 days attending Cheese Boards; 20 travelling to factories; 2 attending exhibitions, and 8 detained on account of rain.

The number of factories visited was 94. Of this number 72 received official visits.

Out of 7,150 samples of milk tested, sixty-one were found to be deteriorated; fifty-five of those had fines imposed on them, ranging from $10 to $50 each, amounting in all to $1,270. Four were not fined, giving satisfactory explanation that the deterioration was accidental, and paying for the lost time in making investigations, and two are not settled. The parties have acknowledged their guilt, but have asked for an extension of time to pay their fine.

Out of the amount received from fines $130 was paid for solicitor's fees, leaving $1,140 to be equally divided between the factorymen and the Association. The amount contributed by factorymen for my services was $500, which with the amount from fines $670, makes a total to the Association of $1,070.

I am pleased to report a marked improvement in the quality of the cheese. While some of the factories did not always turn out good cheese, I had fewer complaints of rejections than any previous year. I found some factorymen adopting a very dangerous practice, that of shipping their cheese too green. I found on several occasions that the cheese had been shipped to within two days of the hoops. I believe this was largely due to parties wishing to receive the high price that was prevailing at the time, and I believe if factorymen persist in shipping their cheese too green, it will go a long way to injure the reputation of the Canadian cheese.

I am pleased to report a marked improvement in the curing rooms of quite a few factories that I visited this year. They have had their walls and floors thickened, and have provided good ventilation and arranged ice-racks for controlling the temperature, for which they have been well repaid by a marked improvement in the quality of their cheese.

This report I have confined to the work actually done, but I shall be pleased to give any further information if required.

G. G. Publow.

The President: If a factory is not in good condition, call a meeting of the patrons, and point out to them in a friendly way where the danger lies, and how their financial interests are affected.

Mr. Lowery: I found in a certain district some fault with the cheese, and pointed it out to the officers of that particular factory. The president of that factory asked me

to come back that week and give the patrons a talk on the care of milk. I see that gentleman here, and I would like him to tell you if there were any better results as the outcome of that meeting.

Mr. ENGLISH: I can assure you that Mr. Lowery's visit and talk had a good result. Nearly all our patrons attended that meeting. I can recommend such meetings.

The PRESIDENT: Any man who will feed turnips to cows furnishing milk to cheese factories ought to be prosecuted. In fact turnips will spoil the milk both for cheese and butter making.

A MEMBER: Do mangels and sugar beets injure the flavor of milk?

The PRESIDENT: No. But it pays better to feed corn.

Mr. DARGAVEL: There are cases where a farmer can grow roots better than he can raise corn.

The PRESIDENT: If you can feed carrots, mangels or beets better than corn do so, but do not use turnips for milch cows. Butter and cheese depend so much upon flavor. In judging butter at least 45 points in 100 are given for flavor alone. Do not allow some "sucker" away back in the country to put you in for loss just because he will persist in feeding turnips. (Applause.)

Mr. PAYNE: Can a man be punished by law for sending turnipy milk to a cheese factory?

The PRESIDENT: He cannot be. But I think he ought to be.

Mr. WHITTON: I believe that milk with a turnipy flavor should come under the head of impure milk.

The PRESIDENT: And so do I. I believe there there ought to be Act passed fining a man for sending turnipy milk to a cheese factory or a creamery. We must do something with these people, or the reputation of our dairy goods will suffer.

Mr. PUBLOW: I think the turnipy flavor may be very easily overcome without prosecuting anybody. We have a lot of Scotchmen in Lanark.

The PRESIDENT: And Scotchmen and turnips go together.

Mr. PUBLOW: It would look like it. I warned them every year against feeding turnips. But one maker notified his patrons that they might feed turnips. The next year they paid a "dock" on their cheese. In that factory they have since made it a rule that if it can be proven that any patron feeds turnips to his cows such patron or patrons will have to pay for the dock. In other words, the men who feed the turnips must pay for the whole loss. In disposing of the fines made through my prosecutions as inspector, one half goes to the Association and the other half to the local factory. We have arranged with a solicitor to take each case at $5, whether there is a fine or a settlement. I find that it is the best thing to have the matter attended to without taking up too much of my time.

Mr. DARGAVEL: We have a number of inspectors employed by the Association, and it appears from the reports that Mr. Publow has collected a large proportion of the fines inflicted upon patrons who has been tampering with milk. Now, I would not like this meeting to run away with the idea that the people of our district, of which he is inspector, are more dishonest than those of other sections. I think the reason is that Mr. Publow has a greater faculty for picking out the offenders and convicting them than the other inspectors have. We are paying our inspectors large salaries, but will see that we are getting good work from them. I think the idea of employing a solicitor is a good one. I notice that in some of the inspectorates the fines for infractions of the law regarding tampering with milk are comparatively small. The magistrates place the fines at only $5 or $8. This is too small for certain offenders, and these magistrates ought to be brought to task. (Applause.) The man who waters his milk does so in cold blood, so to speak. A man who will steal in a store may do so on an impulse; and, in my opinion, the man who coolly goes every morning and put water in his milk is by far the worse man—the meaner thief. I hope that the other inspectors will do what they can to bring the magistrates up to a higher sense of their duty. The inspectors should meet together and agree upon a concerted plan.

Mr. WHITTON: I think that Mr. Publow has taken the right way of getting at the facts of the case. The inspectors are badly handicapped by a great many of our salesmen. Some of these salesmen are afraid of having certain individuals prosecuted, and bring all possible influence to bear to quiet the matter. Some presidents and salesmen are

fearful of losing their positions, and they have not got enough backbone to support our inspectors. There is a cheese factory on these four corners, we will say, and another on the next four corners, and the fellows who are on the line between the two factories are generally the chaps who are doing this tricky work. If one of these border fellows does anything wrong, the salesman will say to the inspector, "Do not do anything to that man, or we will lose his patronage." The makers should and decide that they will not take any milk from any man whose milk has been rejected by another factory.

Mr. A. F. Wood: I have had men come to me as a magistrate—men of character and standing—and say that they had been threatened by the inspector and told that their milk was wrong, and that they were to pay a fine of $10. I have known men in this vicinity who have been thus threatened, and I have told them not to pay it. One man thus advised by me refused to pay the $10, and he was not fined, because the president of the factory testified that he did not think that he had tampered with the milk. The Babcock test may sometimes be in the hands of men who have not been properly educated in the use of that instrument.

The President: Our instructors are all trained men. If these men bring an offender up before a magistrate that functionary should strengthen their hands as much as possible.

Mr. Payne: I took a course in the Wisconsin Dairy School, and had a high percentage of marks in the examination; and I have found in making the Babcock test that with the same class of milk that there will be variation in the record from time to time, and from day to day—sometimes nearly one point in the difference. Mistakes have been made sometimes, and people have been suspected and accused who have really been above reproach.

The President: There are six milk cans on stands along the road, and the waggon comes along and picks them up. Five of these cans have milk averaging 4.5 per cent. of butter fat, and one can has milk that will test only 2 per cent. Does that mean that there has been a steal?

Mr. Gallagher: Are these offenders accused oftenest of skimming or watering?

The President: Of watering; because the pump is the handier way.

FINANCIAL STATEMENT.

Receipts and Expenditures of Cheese and Butter Association, Eastern Ontario, for 1899.

Receipts.		Expenditure.	
To Cash on hand from 1898	$ 57 95	By expense Convention at Kingston	$ 580 03
" Membership fees	106 00	" Reporter	100 00
" Legislative grant	3,250 00	" Printing	125 65
" Advertisements	109 00	" Advisory Board Meeting	114 75
" Refund for Secretary	25 00	" Interest and Discount	16 16
" Prosecutions	2,067 34	" Directors' Meeting, Toronto	221 00
" Factory fees from Inspectors	2,909 50	" Grants to Industrial and Fat Stock Shows	100 00
		" Officers Salaries	186 00
		" Acid for Instructors	48 25
		" J. A. Kerr, bal. salary, 1898	25 00
		" M. Sprague, salary and expenses	400 00
		" A. P. Purvis, "	1,092 00
		" L. A. Zufelt, "	930 00
		" G. G. Publow, "	1,014 00
		" Hugh Howey, "	780 00
		" G. H. Bensley, "	735 00
		" J. B. Lowery, "	810 00
		" R. W. Ward, "	850 00
		" Balance on hand "	396 95
	$8,524 79		$8,524 79

We the undersigned hereby certify that we have examined the accounts and vouchers of P. R. Daly, Esq., Treasurer, Cheese and Butter Association of Eastern Ontario, and find them correct in accordance with above statement.

Morden Bird,
F. W. Brenton, } Auditors.

ELECTION OF OFFICERS.

The election of officers passed off unanimously, and resulting as follows:

President.....D. Derbyshire.....Brockville.
1st Vice-President.....John McTavish.....Vancamp.
2nd Vice-President.....L. L. Gallagher.....Wilton.
Secretary.....R. G. Murphy.....Elgin.
Treasurer.....P. R. Daly.....Foxboro.'
Directors: Division No. 1.....Edward Kidd.....North Gower.
" 2.....Wm. Eager.....Morrisburg.
" 3.....J R. Dargavel.....Elgin.
" 4.....James Whitton.....Wellman's Corners.
" 5.....T. B. Carlaw.....Warkworth.
" 6.....Henry Wade.....Toronto.
Auditors.....Morden Bird.....Stirling.
F. W. Brenton.....Belleville.

Instructors:

A. P. Purvis.....Maxville.
L. A. Zufelt.....Chesterville.
G. G. Publow.....Perth.
Hugh Howey.....Newburgh.
G H. Bensley.....Warkworth.
J. B. Lowery.....Frankford.
R. W. Ward.....Peterborough.

Mr. Derbyshire thanked the Association for again electing him to the presidency, and praised the officers who had given him such excellent help during the years he had occupied the chair.

POINTERS ON CHEESE-MAKING.

By Prof. H. H. Dean, Ontario Agricultural College, Guelph.

As this is the last session of the Convention it may be in order for me to review some of the main points in connection with cheese and cheese-making. I understand that in a long discussion yesterday you went into the details of making, so I will content myself now with emphasizing some of the leading things in connection with the business, as they present themselves to us to-day. At the beginning let me utter a word of caution to both cheese and butter makers. When you have reached a high point there is a tendency to become satisfied, and serious effort for further improvement is not likely to be made. Although we have done well in the past, it would be a great mistake for us now to rest satisfied with what we have accomplished. The world to day is asking for and expecting progress along every line of human endeavor, and if I read history aright the main point in the struggle in South Africa is to get the people there to make progress. And so we must not be satisfied with what we have done in the past, but must advance still further or we will be left behind. I am afraid that our success in the past season may make our cheese-makers and factory owners careless in the coming year. The history of the cheese trade has shown that when there has been a good season with everything working well the following season has usually been the very reverse.

One of the things referred to by some of your inspectors is the fact that a number of factories are sending out improperly cured cheese. I know that when there is a strong demand for cheese, as in the past season, the tendency is to rush the cheese out of the factory as soon as possible. No cheese is fit to leave a factory until it is at least two weeks old. Cheese which have been shipped two or three days from the hoops are not fit to eat. I hope you will read all the dairy literature possible, and get up to the times. Our salesmen should study the markets more closely than they have done. After all, the success of the cheese or butter business depends largely upon the hearty support of the patrons, and that support is not likely to be given in its greatest measure unless we can

make the business profitable for them. No man wishes to enter or remain in a business that does not pay. We naturally look for some reward for our labor. If there is no reward, or only a slight reward, the people are likely to grow careless. Cheese and butter makers should take more interest in the patrons, and go out and visit them as often as is possible. I know that the instructors are busy men, and cannot get out as often as they wish among patrons, but makers should do more visiting. We are apt as instructors and makers to lay all the blame on the patrons if any fault is found with the quality of the cheese. But the patron has also many difficulties to contend with. Some of the difficulties they have to face arise from various causes. I know that at the College we have taken the milk from our own cows, and have kept everything as carefully and as clean as possible, yet I am satisfied that at certain times of the year, owing to atmospheric conditions there will be bad flavors, and gas will be in the curd, no matter how the milk may have been treated to avoid that very trouble. Now take that flavor, sometimes called "goose" flavor, that has given so much trouble in the western part of the Province, and which you have perhaps had trouble with here in the east. This flavor develops in the curd and not in the milk. I have met with but one man who says that he has detected it in the milk. The patrons are almost powerless to get at some of these flavors in order to get rid of them. I believe that the cheese or butter maker who will get out among his patrons from time to time, and give them some needed advice in a right and kind sort of a way will be able to accomplish more than any other man can— even more than the inspector could. Now, I admit that the average maker is over-worked, yet I think they could do something in the way of visiting patrons with mutual advantage.

There are three things that give the cheese-maker a good deal of trouble: 1st, bad flavor; 2nd, gas; 3rd, over ripe milk. We have been making some tests to see at what temperature it was best to keep the milk over night. Some say that it is not necessary to cool milk for cheese making, and I used to say so, too; but I have come to the conclusion that it is necessary to cool milk to 60 degrees at night, in hot weather, or the milk will be over-ripe in the morning. There are times when it may be necessary to cool to 55 or even 50 degrees on Saturday night in order to have the milk ready for cheese-making on Monday morning. In fact it can be laid down as a general rule that if the Saturday night's milk is to be fit for working into cheese on Monday morning during hot weather it must be kept below 60 degrees if at all possible. And even at a temperature of 60 degrees, milk will sour in hot weather. When milk is over-ripe or is working fast, you cannot make such good cheese as in the case of milk in normal condition, nor can you get as much cheese from a hundred pounds of such milk. That means a less return of cheese product from a given quantity of milk for both patrons and manufacturer.

We have made about forty experiments in the past season to find out the exact facts in regard to the aeration of milk. Our cheese-makers recommend aeration, but only a few experiments have been made. But at the College we took the milk of our own cows, and aerated one-half of it, but did not do so with the other half. We found that the aerated milk was sweeter in the morning, for the aeration had cooled it, but we found that there was not so much difference in the general result as we were led to expect. If the cows have clean and wholesome food, and are in clean surroundings aeration may not be of so much importance as we have been led to believe. But if there is bad food, or food that has a bad flavor, then aerating the milk in a pure atmosphere will do good. But aerating milk in a barnyard where the dust is blowing into the aerator is worse than useless. One night last summer it was very windy and dusty, and some dust got into the milk, and it was the gassiest lot we ever had. We have tried another test. We have taken the first few streams from the cows and rejected the same, but even then we found gas in the curd, although some have said that in this way we should not be likely to have trouble with gas. However, I am not prepared to say that will always be the case. We shall need a number of years of experiments before coming to correct conclusions regarding this point. Some experiments have also been made by milking the cows out in the pasture field, away from buildings, in order to see what benefit would be to the milk. Our pasture field is about half a mile from the buildings. Now, we milked in the pasture field, and also aerated the milk there, and as far as we could see there was no improvement in the matter of gas in our cheese. Therefore, I say, do

not be too hard on the patron. I make no excuse for dirty patrons, or men who permit bad conditions to exist, but makers should assist patrons in every possible way.

We need a marked improvement in the condition of many of our factories, and in their equipment. In a number of our factories at one time it was necessary to roll up your pants and have thick-soled boots if you wished to keep clean, and if you leaned up against the vat or the curd sink there would be a stain across your clothes. If we do not do anything else at the dairy school we keep harping on this point of cleanliness in the factory, cleanliness in the surroundings, and cleanliness of person on the part of the maker. I cannot understand how good cheese or butter can be made in factories where the floors are dirty or slimy. I find, too, that very many floors are leaking, and that is a menace to the flavor of cheese. I will tell you how we put down a floor in our dairy building last season. We got the best Georgia pine we could get, costing $30 per thousand feet, an inch and a half thick, and put the joints together with white lead. Then we put on a coat of linseed oil, turpentine and drier. We soaked it twice with that to fill up all the cracks and pores in the floor. If the floor is treated twice a year with that it will improve it and add to the cleanliness and safety of the factory.

The drainage about the cheese factory or creamery should also receive careful attention. For a gutter I prefer a block of pine 6 x 6. I do not believe in galvanized iron, which soon wears out. I would connect such a gutter to the sewer tile. See that all the drainage is taken away as far as possible from the factory; but do not run it into the pasture field of a patron. That sewage should be treated in some way to prevent bad flavors from getting into the air and water to injure the milk of cows. Where you have sufficient fall you could with advantage build a filtering bed, which could be done at a comparatively small cost. If a very small factory I would recommend a bed about 10 x 12 feet, made as follows: excavate about two feet deep and put in a row of six inch drain tile. Then fill three to four feet of coarse sand or gravel on top of the tile. Run all sewage on the filter bed. The impurities are taken out by the sand, and the water which runs away from the tile below will be harmless. The sewage water filtered through such a bed is said to be purer than the water from many of the wells from which drinking water is taken.

After the milk comes into the factory it should be handled carefully. We made experiments this last season with two sets of 600 pounds of milk, each taken from the same vat. As the result of several experiments, we found that where the curd was handled roughly there was a loss of about one pound of cheese from the 600 pounds of milk. That would mean a loss of $1 on each large vat of milk. We tried the experiment mainly to see if there was any difference in the texture of the cheese made by rough handling, and to our surprise we found there was little or no difference in the texture, but there was a difference in the amount of cheese made, to the credit of the carefully handled milk.

Where cement floors have been used in the factories of the west they are well spoken of, although some of the makers complained of them being a little cold.

Prof. Dean then referred to the experiments made at the college in reference to curing cheese at different temperatures. He found that the results of 1899 agreed with those of 1898 in the main, but there was not the same marked difference in quality as was found last year, although the cheese cured at 60° were finer in flavor and texture than those cured at about 70°. There was also less loss in shrinkage by curing at the lower temperature.

Experiments were made by placing cheese in a warm room for about a week and then removing them to a cool room to finish the ripening process. The experiments indicated that there was little or no advantage in doing this as compared with curing the cheese at a uniform temperature of 60° to 65°.

He concluded by urging makers to give more attention to the curing of their cheese. The curing-rooms should be properly insulated, and some means adopted whereby th temperature could be controlled in extreme weather. The maker who will do this, wil find that his cheese are more uniform in quality, and they will lose less in weight during the curing process.

PIGS FOR HOME AND FOREIGN MARKETS.

By F. W. Hodson, Live Stock Commissioner, Ottawa.

For more than a decade the production of the right sort of pig has received a good deal of attention in Ontario, and in the east and west he is also being considered. The export bacon trade and the home consumption has steadily increased, until now the curing of prime bacon has become one of our great national enterprises.

The business man who has an article to sell, or who expects in the future to have, will, if he is wise, carefully consult the consumer's requirements. For our pork products we have—

1. The home market for fresh pork.
2. The home market for hams and bacon.
3. The lumber woods and mines.
4. The export trade.

For the first the demand is very insignificant ; the spare-rib, sausage and tender-loin, all known as offal, find a fair market from Sarnia eastward. The demand for what little fresh pork is used is for light, lean meat, in the shape of chops and loins ; if heavier pork is used for this purpose much of the fat is pared off. It is to a great extent the fresh pork trade in Chicago, Detroit, Cincinnatti, Louisville, Buffalo, New York, and other cities that maintains the price for hogs on the American side. We have not the population in Canada, therefore our packers ship considerable quantities of offal to the United States, and, after paying two cents per lb. duty and express charges, they still realize a higher price than can be obtained in Canada.

In Canada the consumption of bacon and hams is rapidly increasing, but the demand is for lean, nicely marbled flesh, just the goods required by the best English trade.

The lumber and mining camps will buy and use fatter meat than any of our other markets, but even here there is a growing demand for lighter and leaner goods—both as long clears and barrelled pork.

The Canadian export trade is almost entirely in lean, mild-cured sides, known as "Wiltshires." To produce this brand the packers require a long, deep, smooth pig, possessing a light head and shoulder, an even back, not too broad, but well covered with flesh, not fat ; at the same time he must not be a razor-back. The sides, from ham to back of shoulder, must be long and deep ; the underline straight and free from flabbiness ; the ham smooth and tapering, with the greatest amount of flesh on the outside. The pig must stand on strong (not coarse) well-set legs and feet, and he must be healthy, vigorous and a good feeder. We find this is the style of pig required by both our home and foreign markets.

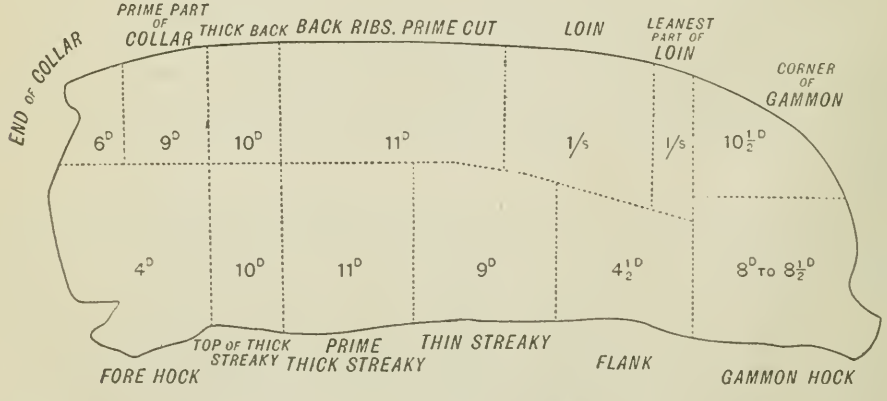
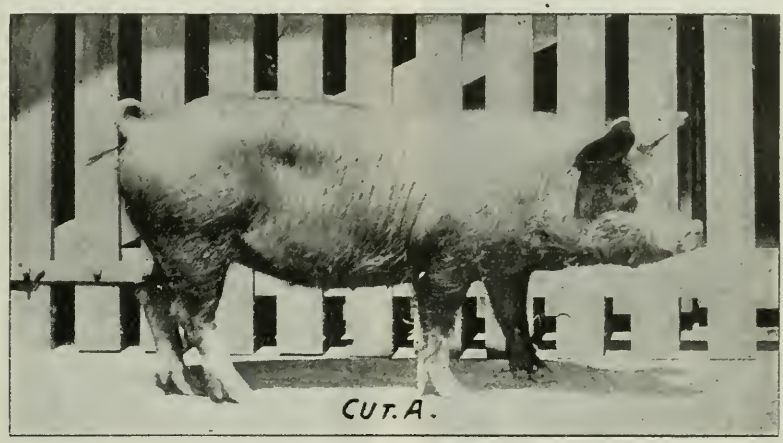


Fig. 1.—Diagram showing various cuts of a side of bacon, and the average prices realized for each during 1897. (Copied from R. A. S. Report for 1898).

Though the greatest care may be taken by both our feeders and breeders to produce just what the markets require, there will always be enough of the heavy fat type to more than fill all demands. The aged sows and stags must be disposed of. To do this to the best advantage they should be made as fat as possible, their chief value is for lard, and unless they are made very fat they are of little use to the packers.

That we may understand the value of the various cuts, and realize the necessity of producing pigs of the proper type, I direct attention to diagram No. 1.

A careful study of this chart will well repay any interested person. The most valuable meat is found between the shoulder and the ham.

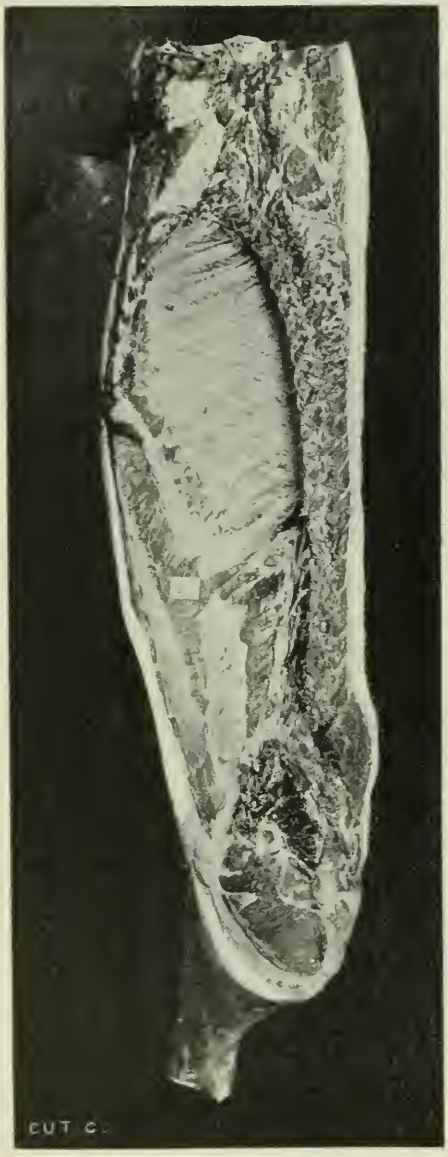


CUT A.—Too thin. A sample of thousands of unfattened hogs sold by the farmer at a loss to himself and with no satisfaction to the packers.

CUT G.—A pig forced from birth.

I will now direct your attention to cuts A and C, which represent an unfinished pig. Hundreds of such are annually received by the eastern packing houses. They are too light and too thin, and should have been fed from thirty to sixty days longer. Packers do not want this sort; they prove a loss to the trade and to the feeder, as well as to the country at large. As for No. A, nobody wants it. Still it has to go into consumption somewhere, to the injury of the Canadian market at home and abroad. In the English market it is known as "skin and misery."

Another very objectionable type is represented by cuts G and I. These represent a forced pig, before and after curing. The sides are too short, the shoulders too heavy, he is pot-bellied; all such dress out a large percentage of offal. His underline is very



CUT C.—Too thin. Side cured ready for shipment. Side of pig shown in cut A.—Note the slight thickness of fat on the back, considerably lower than the standard.

CUT I.—Side of forced pig, cured. Too thick and fat.

defective, indicating a poor class of meat where good cuts should be found. Cut I is the cured side of this pig, and is unsaleable except at a very low price, whether in Europe or Canada.

D1 was a famous prize-winner at Toronto exhibition, said to be one of the best pigs ever shown at Toronto. This is in the condition old sows and stags ought to be when sold to the drover. Her shoulder and jowl is too heavy; the head is worth only one to

one-and a-half cents per lb., while the shoulder, as we have seen, makes cheap meat. Her underline is very good, but the back is a little slack; the neck too heavy and the

CUT F.—Too fat. Cured. Side view of part of carcass shown in cut E.

CUT M.—Cured side. What is required for British market. Side of bacon, first-class quality. Note the even disribution of lean.

back too broad. Cut F shows a cured side such as made from this sow. There is altogether too much fat in proportion to the lean to be saleable, except as lard, and to a limited extent to the mines or shanties—markets which should be supplied by our culls.

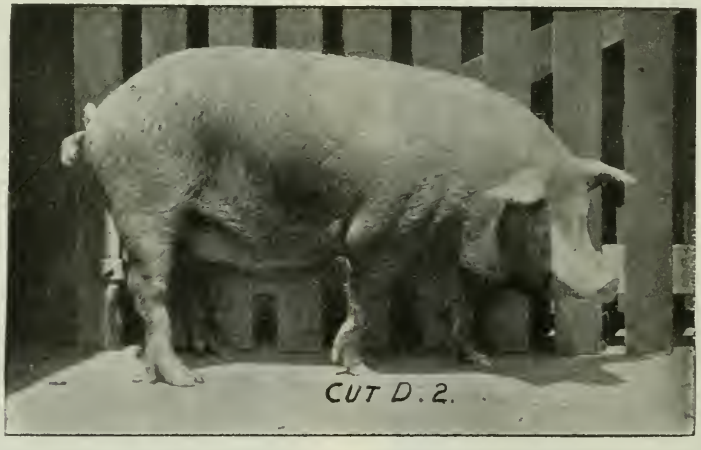
D2 is a type of pig the most careful and experienced breeders will sometimes get. He is too heavy in shoulder and jowl, short in the side, flabby in the rear flank, light in the ham and heavy in the back. Yet he is a more saleable pig than any of the before mentioned. As well as being off type, he is too fat; he belongs to a type that makes fat nstead of flesh, and is now over-fat. It would have been more profitable to have sold

him a month earlier. As he was photographed he weighed 200 pounds. If a farmer has a pig of this type, it will pay him better to kill him when quite small and use him as fresh pork or sell him to a local butcher. He never should be made into export bacon. If not killed young, such pigs should be made into long clears or barrel pork. Cut E

CUT D1—Too fat. Taken at the Toronto Exhibition.

shows the pig dressed. As well as being too fat he has a very bad crown, a defect which always classes bacon as No. 2 or 3.

All the animals heretofore illustrated by cuts A. C. G. I. D1. D2. F. and E. grade



CUT D2.—Too fat Mark the heavy shoulder.

in the Canadian and English markets from No. 2 to rejected, and sell in Canada, live weight, for one-half to one cent per lb., less than prime No. 1.

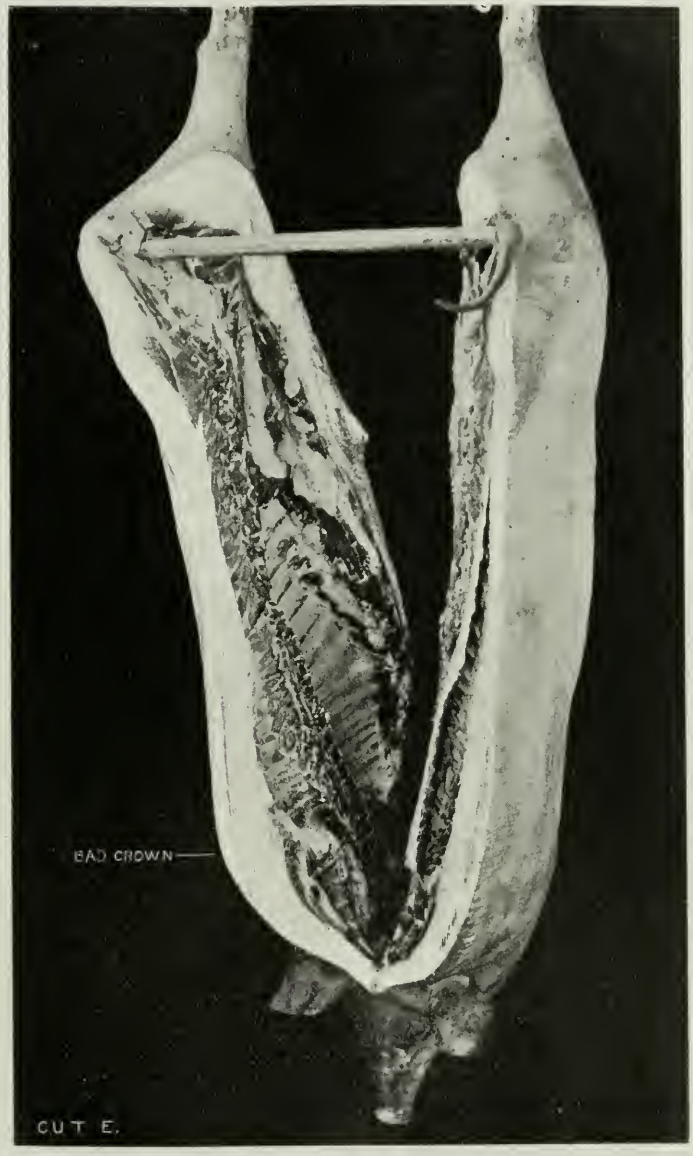
I before described a packer's model. No. K. fills the bill. He is strong, vigorous, a good feeder, has a fairly light head, a long side and a good ham.

No. 12 is also a good pig, but is heavier in the jowl and coarser than No. K. He is not so well bred and shows it.

Cut M. represents the cured side of K, and is first class in every particular. Note the lightness of shoulder, length of side, and even distribution of fat down the back.

Nos. 13 and 14 represent two model bacon hogs. No. 13 is better in head, jowl and length of side, but not as good as No. 14 in back or rear flank.

It has been proved by carefully conducted experiments that it costs no more to produce pigs of the right than of the wrong type. In fact pigs such as are shown by cuts K, 12, 13 and 14 are more economically produced than the thick fats. Being full of lean meat, they weigh better for their appearance than do the others. They are active and robust, and will consume and turn to good account coarse foods not acceptable to the others.

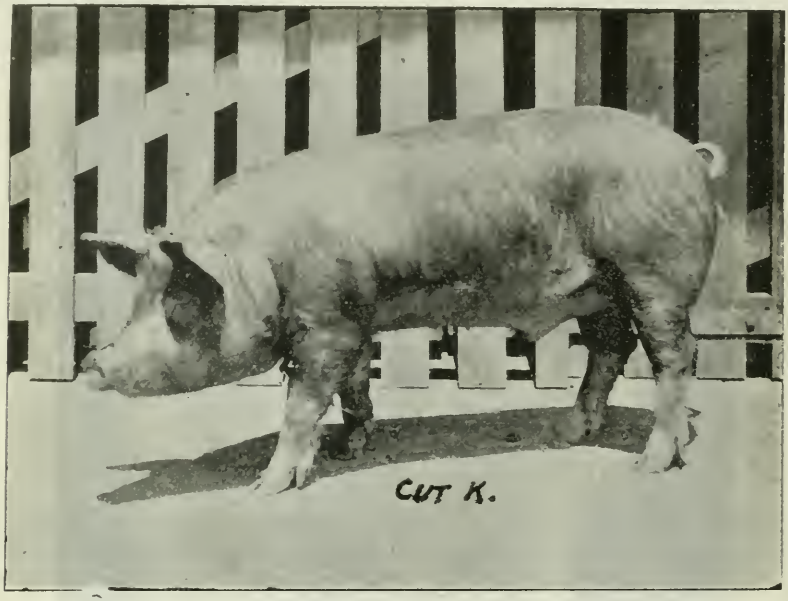


Cut E.—Too fat—dressed. The thickness of fat on back, especially on the top of the shoulder, causes this carcass to be discounted against as much as 1c. per lb.

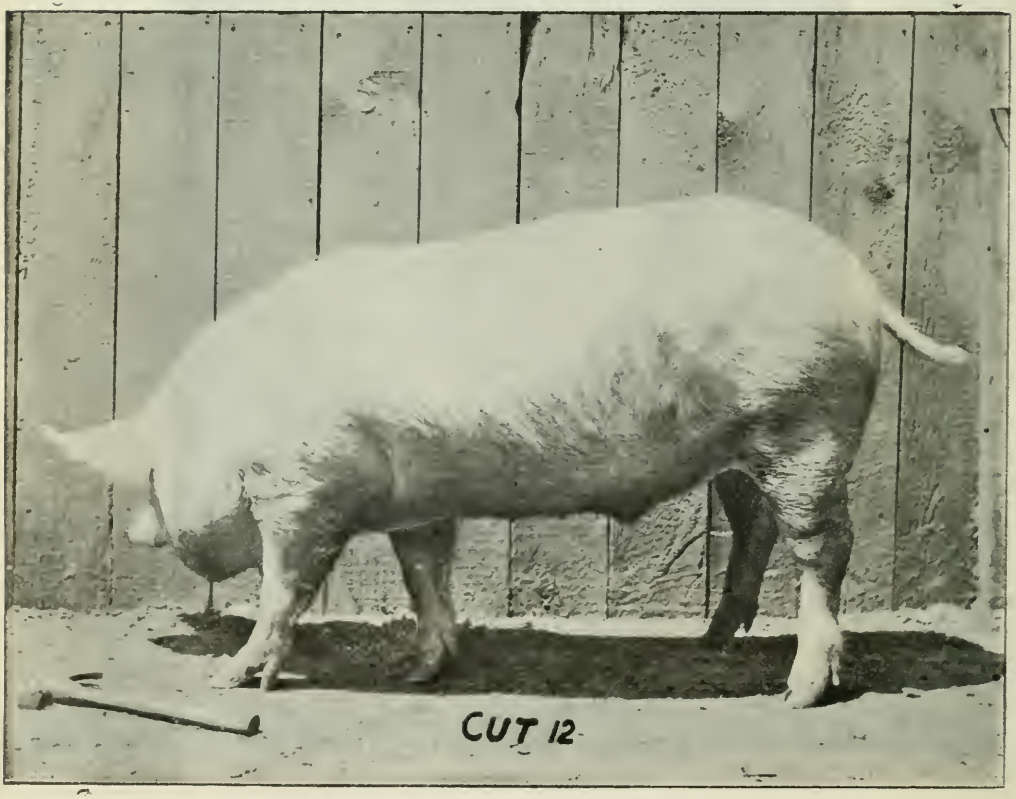
The Canadian market demands a long, lean singer, therefore it is in the interest of Canadian farmers to supply the best pigs for that purpose. First class goods means a growing market at home and abroad anything else means a stationary or receding market.

At the present time 25 per cent. of the pigs marketed in Canada are what is known

as "softs," 25 per cent. are fats, and at least 10 per cent. unsizables. Or in other words 60 per cent of Canadian pigs grade as No. 2, or lower, which is 40 per cent. more than might be expected, if breeding and feeding were carefully done. Canadian farmers lose



Cut K.—The Packer's Model.



Cut 12.—Lean Singer.

at least 20 cents per hundred on all pigs sold, because of this condition; packers fixing their buying price according to their average receipts from sales. The man who insists on breeding the wrong type not only loses 20 cents per hundred, but he causes his neighbor to do so as well; not only this but he injures the home and foreign trade. Therefore it is to the interest of every citizen that the right sort of pigs be bred on every Canadian farm, and that they be properly fed.

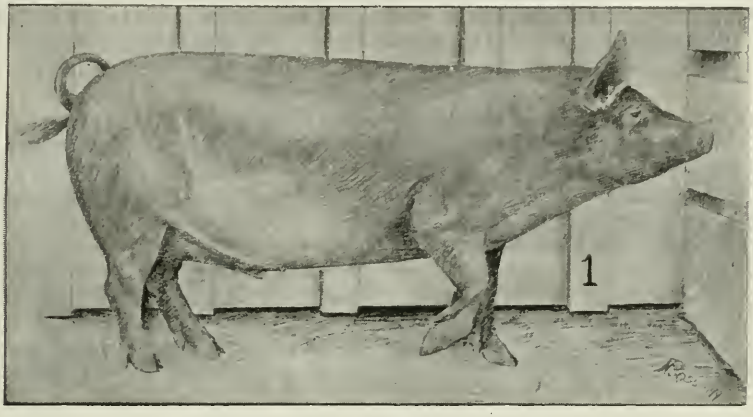


FIG. 13.—Light jowl and good neck; shoulders well proportioned; belly sags a little towards the rear; a good length of side.

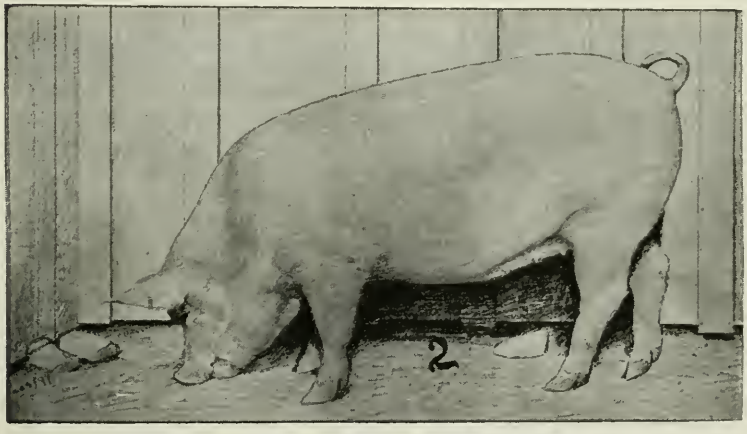


FIG. 14.—Well proportioned shoulder, good top line and good trim belly, but lacks length.

Pigs of the wrong type cannot be made good by any kind of feeding—yet bad feeding will spoil a good pig.

A NEW DAIRY BUILDING PROPOSED.

Moved by Mr. KIDD, seconded by Mr. CARLAW, and resolved:

"That the Cheese and Butter Association of Eastern Ontario, now in Convention assembled, requests the Ontario Government to place a sufficient sum of money in the estimates for the Session of 1900 to assist the Industrial Exhibition Association of Toronto, to erect a suitable building in which to hold the annual show of dairy products, as it is well known that the present building used by them is totally inadequate

for such an exhibition; and that a copy of this resolution be sent to the Hon. John Dryden, Minister of Agriculture."

VOTES OF THANKS.

The following motion, moved by Mr. Murphy and seconded by Mr. Zufelt, was heartily adopted: "That the thanks of this Convention be given to the citizen of Madoc for their splendid reception to the Association, to the speakers and orchestra for their valuable help, to the press for its sympathetic reports, and to the railways for reduced fares."

In putting the motion the President endorsed the sentiments expressed therein, and closed by exhorting the dairymen present to return to their homes determined that 1900 would be the year most deserving of success. If the valuable suggestions given in the addresses and discussions were only acted upon the Convention would be a mighty power in bettering the great dairy industry.

He then declared the Convention adjourned.

CHEESE AND BUTTER ASSOCIATION OF WESTERN ONTARIO.

ANNUAL MEETING.

The Thirty-third Annual Convention of the Cheese and Butter Association of Western Ontario was held at the new City Hall, Stratford, on the 16th, 17th and 18th of January, 1900. The first meeting was opened by the President, Mr. Harold Eagle, after which Mayor Hodd, of Stratford, extended to the Convention the freedom of the city of Stratford.

PRESIDENT'S ADDRESS.

By Harold Eagle, Attercliffe

I may say I always have a little difficulty to know whether to address you as the "Cheese and Butter Association," or "The Butter and Cheese Association." I want to congratulate you on the good attendance we have this morning, and I also want to congratulate the men in the southern counties, and also those in the eastern district, for the very successful year they have had, especially on account of the increased price both for butter and cheese; but, as to my fellow manufacturers in the southern counties, I cannot congratulate them, for this reason: We had in the southern counties the worst drouth in the last summer we have ever experienced, and making cheese on a commission was not very satisfactory. The increased price made it profitable for the farmer towards the latter end of the season, but for cheese manufacturer it did not have that effect, and I think the cheese manufacturers in the southern counties have really had an exceptionally bad year; but of course the increased price, owing to the drouth in England, has made the outlook for next year far better than it has been for a good many years. During the last two or three years a good many of the patrons of cheese and butter factories were discouraged at the low price, and some of them were becoming disheartened, but the good prices we have received during the last year will have a most encouraging effect.

I understand from the reports that the exported cheese for last year, 1899, reached the sum of eighteen million dollars, and if my information is correct the output of butter realized almost six million dollars. We are safe to estimate it at five million dollars.* Now, gentlemen, the butter industry most certainly is coming to the front. Years ago we used to try to boom cheese for all it was worth. Taking the position that possibly there might be a danger of over-doing cheese production, (I never saw the danger myself, but other men did) the efforts of this Association and others interested in the dairy industry, have lately been chiefly directed to boom the butter industry, and whatever has been tried, certainly the results have been very encouraging when we consider that three years ago the export was not two million, and this year it is almost six, gaining one hundred per cent. every year, or three hundred per cent. in three years. I am sure the dairymen of this country must feel that it is a highly gratifying result. It should encourage them to keep on pushing the business, so that in the future the industry will advance and prosper as it has done during the past three years; and I have not the slightest doubt that if every maker, every patron, and every man connected with the business, will put all the energy and vigor that is the inheritance of Canadian manhood and womanhood into the business, they will make the butter industry of Canada the largest and most prosperous in the world

Gentlemen of the Cheese and Butter Association, there are one or two other things I want to mention. You understand the difficulty I have had in addressing you ever since the name of this association has been changed. I had to turn to the programme to see whether to address you as "Cheese and Butter Association," or the "Butter and Cheese Association." For some ten or twelve years this association was conducted under the name of "The Western Ontario Dairymen's Association," and I do not think they will ever get a name that will suit as well, and I think that if the powers that be would allow the name to be changed back to the "Western Dairymen's Association," it would be a good thing for the Association. Of course the secretary receives most of the corre-

* Since ascertained to be: Cheese, 188,327,402 lbs., valued at $19,328,918. Butter, 26,784,429 lbs., valued at $5,377,827.

spondence, but a good deal of it comes to the president, and, as president of this Association, I have to say that one-half of this correspondence comes addressed to me as President of the Western Dairymen's Association, and the Woodstock *Sentinel Review*, which is noted in Western Ontario as a particularly dairy paper, edited by an ex-president of this Association, in the report of the Cheese and Butter Makers Association meeting at Listowel, stated that that Association had appointed the instructors that this Association appointed. There are two associations, "The Butter and Cheese Makers' Association," and ours, "The Cheese and Butter Association," and there are a great many people who do not know the difference between the two associations, and I therefore think it would be much better to go back to the old name of the Western Dairymen's Association. They say "a rose under another name might smell just as sweet," and that may be correct, but I contend that we are known as the Western Dairymen's Association, and it would be better to get back to that name.

Another matter that I desire to call your attention is the very late date at which we got the reports of the last convention. We were looking from day to day, and from week to week for the reports of the convention. If I remember correctly, it was the second week in August before we got the report of the last convention, so I want to say this much to the new Board of Directors, that I think it is advisable for this Association, if the Department of Agriculture cannot get out the report of this convention before the cheese makers start business, this Association should do it themselves. When the report of the convention comes out the last of August or the first of September, it is of no more use than a last year's bird's nest. (Applause) I meet different men who say, "What good does the Association do? It is not only the farmers who are supplying the milk do not get it, but there are some men who are making the most money out of cheese and butter, that you never see at the convention;" and my reply is, to the farmer who is making nothing out of it, and also to the man who is making money out of it and who never comes here, that, supposing there had never been an Association, and everybody connected with the industry were going right along from year to year, the export of cheese and butter would never at this time have amounted to what it does, twenty-three million dollars. And these very men who say they get no benefit from the Association are reaping a very large and substantial benefit from the efforts of this Association, and if our work was abandoned to-day these same men would soon find out that the Association had been a great benefit to them, and they would be the very first to ask to have it reorganized and put into active operation.

Now, I am glad to see so many of you here at this our opening meeting. The few remarks I have made, as to the name of the Association, and the very late time at which the report is issued, I have said because I thought it was my duty to call your attention to these matters. If the Department cannot get out their report before August the Association should do it themselves. Whatever new ideas we have had come from the bulletins and from the platforms of similar meetings to this of the different associations, so the reports of these meetings should be in the hands of the maker before he starts his business. Thanking you for your patient hearing, I will proceed with the next item on the programme.

REPORT OF DIRECTORS.

The directors of your Association for the year 1899 submit the following report:

The past season has not been a profitable one to cheese and butter manufacturers whose income is derived from commissions on quantity instead of on value produced. Owing to the long drouth the production was very small. On the other hand, the very high prices obtained, have, in the case of patrons, offset the loss from small production. The high price ruling in the fall will have a tendency to encourage farmers to increase the production. If so, the maker may, with average weather, look forward to a more profitable season in 1900.

The Directors have continued the work of this Association on the lines followed during the two previous years as defined in the Report of the Directors a year ago.

INSTRUCTORS.—In response to the remarks of the President at the convention last year, regarding instructors, a considerable number of first-class men offered their services to the Board. The following were selected and were duly appointed: James Morrison

(third year); O. O. Luton, Geo. McDonald, and Arch. Smith as Instructors and Inspectors at Cheese Factories. Arch Smith was also appointed to the same position as regarding creameries. They will each lay before you a report of their work.

Grants to Exhibitions.—The finances of the Association being again in a sound position, your Board was enabled to again make grants to the Industrial and Western Fairs for their Dairy Department. An increased grant was made to the Industrial Exhibition on condition that improved accomodation, satisfactory to your representatives was provided, such as suggested by the President of the Fair to your Board, at their meeting in 1898. Although the condition was not carried out in full, you representatives felt justified in authorizing the payment of the grant. A deputation, of which your representatives were members, waited upon the Provincial Government to urge them to erect a building suitable for the Dairy Exhibit. Your attention will be called to this subject later, when you will be asked to consider the adoption of a resolution on this subject, both with reference to the erection of a suitable building, and also with reference to the management of the Dairy Department of the Industrial, which is far from what it should be. Here your Board desires to express to the Windsor Salt Company its appreciation of their contributions, through this Association, for prizes for the Dairy Department of the Industrial and Western Fairs. The subscriptions were without any conditions. The prizes are to be presented at this meeting.

Essays.—Your Directors decided to appropriate the sum of Two Hundred Dollars ($200), to be offered for essays by parties who had actually been employed in the making of butter or cheese in Western Ontario factories in 1899. They have reason to congratulate the Association on the response that has been made, no less than 67 essays having been sent in. The report of the judges will be duly made. The following are the names and addresses of those who have contributed essays :

List of Essay Writers on Cheese Making.

F. H. Brooks	Zenda.	E. B. Shields	Brockville.
J. J. Fisher	Stratford.	Wm. A. Bothwell	Hickson.
S. J. Roy	Belgrave.	D. A. Dempsey	Stratford.
Colin A. Campbell	Stratford.	Mary Morrison	Newry.
Oscar Soverein	Windham Centre	A. F. Clarke	Poole.
Haddon Goodhand	Strathroy.	M. Knechtel	Dorchester.
W. J. Clark	Thedford.	A. W. Edwards	Caistorville.
Walter S. Downham	St. Thomas.	John F. Uren	Snelgrove.
R. R. Cranston	Lawrence.	Ed. Andrus	Putnam.
James Burgess	Bluevale.	W. B. Thomson	Nile.
Thos. E. Nimmo	Ripley.	J. B. Anderson	O. A. C., Guelph
J. S. Clark	Warwick.	J. W. Copeland	Avonbank.
Reuben A. Treleaven	Cape Rich.	M. Morrison	Harriston.
Jas. L. Thomson	Hawkesville.	J. B. Renny	Burgoyne.
Geo. Menzies	Sheffield.	Wyatt Cameron	Jarvis.
J. S. Isard	Paisley.	A. J. Wagg	O. A. C., Guelph
Albert E. Pickard	Glammis.	J. F. Millar	St. George.
Geo. R. Mayo	Sebringville.	Geo. Thompson	Parkhill.
Duncan M. Scott	Tavistock.	Geo. Travis	Courtland.

List of Essay Writers on Butter Making.

Mrs. M. I. Badger	Warkworth.	E. I. Smith	Woodstock.
Alex. Robertson	Ellengowan.	J. R. A. Laing	Avonbank.
Mrs. W. H. Taylor	Parkhill.	Wm. Johnson	Midmay.
Geo. R. Mayo	Sebringville.	Wm. Waddell	Strathroy.
D. L. McIntyre	Crosswell, Mich.	T. B. Marshall	Tiverton.
W. F. Baskerville	Strathroy.	John Cox	Courtice.
A. F. Clarke	Poole.	J. M. Livingstone	St. Marys.
C. H. Thomson	Strathroy.	J. F. Millar	St. George.
T. A. Wiancko	St. Marys.	M. Morrison	Harriston.
Frank D. Booth	Ingersoll.	Wm. Elliott	Galt.
S. R. Brill	Teeswater.	A. A. Frye	Strathroy.
Miss C. Smith	Maple Lodge.	Janet Stewart	Hampstead.
Miss Janet McNevan	Rosedale.	Mrs. Duncan Stewart	Hampstead.
John C. Taylor	Union.	Christina Stewart	Hampstead.

FINANCIAL.—The financial position of the Association is, as will be seen from the Treasurer's report, now to be submitted, again satisfactory.

REPORTS.—The report of the proceedings of this Association, if they are to be of value, should be in the hands of the members before the new season's work at the factories commences. We recommend that the new Board take such steps that the reports will be distributed not later than April 1st.

All of which is respectfully submitted.

HAROLD EAGLE, President.

FINANCIAL STATEMENT.

The secretary-treasurer, Mr. George Hately, then read the financial statement for the year 1899, which, on motion, was received and adopted as follows :

RECEIPTS.

To cash balance from the audit of 1898	$ 595 05
Membership fees, 318 at 50 cents each	150 00
Legislative grant	3250 00
Instructors' fees	770 70
Prosecutions	155 80
Total receipts for the year 1899	$4930 55

EXPENDITURES.

Convention expenses	$ 450 69
Directors and Committee meetings	185 50
Reporting	70 00
Instructors	2566 50
Auditors	8 00
Officers' salaries	36 00
Postage, telegraph and telephone	43 16
Printing and stationery	36 50
Grants	150 00
Accounts not paid, 1898	6 00
Instructors' supplies	16 83
Total expenditure	$3893 18
Balance forward to 1900	$1037 37

REPORT OF INSTRUCTOR JAMES MORRISON.

DISTRICT. The district allotted to me was the south-eastern portion of western Ontario, comprising the counties of Oxford, Norfolk, Brant, Haldimand, Welland, Lincoln, Wentworth, Halton and Peel. In this district there are 112 cheese factories in operation. Applications were received from thirty-three of these, asking for from one to four visits each. Owing to the fact that many of the factories in the eastern part of the district were late in commencing cheese making in the spring I had very little work to do in the month of May. I commenced my work for the Association on the 9th of May, and finished on the 2nd of November.

MILK TESTING. At fourteen of the factories I visited there was no Babcock tester. This accounts for the small number of tests made for butter fat, and also accounts, to a great extent, for a large number of samples of milk that showed that the milk had been tampered with. I would urge all factory men to have a Babcock tester in their factory and to have each patron's milk tested at least once a month. When the Babcock tester is known to be regularly used at a factory, all the patrons are more likely to receive their full profits, the regular use of the Babcock having a deterring effect on the dishonest ones. I tested 5,406 samples with the Quevenne lactometer and 208 with the Babcock

tester. Of these, eight samples tested between one per cent. and two per cent. butter fat, thirty-eight between two and three per cent., 141 between three and four per cent., and twenty-one samples four per cent. and over. Only two of the factories that I visited are paying by p. c. of butter fat.

Prosecutions. Information was laid against twenty-six patrons for tampering with their milk; of these twenty-two were fined by the magistrates from $5 to $10 each, with costs; nineteen for watering, two for skimming, and one for both watering and skimming. The fines amounted to $178, and costs to $77.41, a total of $255.41. Of the four other patrons against whom information was laid, two, by what I believe to be a miscarriage of justice on the part of the magistrate, were dismissed; the other two were not proceed against, they being tried on the same day and before the same magistrate as the two just mentioned.

Making rooms. Of the making-rooms of the factories I visited this season, I would class ten as good, fourteen as fair, and nine as altogether unsuitable to make a first-class article of cheese in; bad floors, leaking roofs, and poorly sided buildings, buildings too small for number of vats, presses and other utensils; not space enough between vats to be easily kept clean; poor drainage; were the principal objections at these factories.

Curing-rooms. A majority of curing-rooms visited are not in the best condition to cure cheese properly. Although we have heard very little of cheese being over-heated the past season, our curing-rooms cannot claim the credit of keeping them in that condition. The cool nights of the past season, without any long periods of very warm weather have been the salvation of the cheese in a great many factories.

Sub-earth Ducts. Sub-earth ducts have been added to four of the factories in my district, and have proved a great help in controlling the temperature of the curing rooms at these factories. A number of factorymen have put ice boxes into their curing rooms (made as described by Mr. A. T. Bell at last year's convention) with very good results.

Whey. Of the factories I visited, twenty-eight returned the whey to the patrons in their milk cans, three fed the whey at the factory, or had it drawn away, the other two fed part of it at the factory and the balance was returned to the patrons in the milk cans.

Whey Tanks. The makers at a majority of the factories are becoming more alive to the necessity of keeping their whey tanks clean, but I regret to report that at some factories the whey tanks are positively dirty, not being cleaned out during the whole season. In talking with one patron of a cheese factory about dirty whey tanks, he said their cheese-maker last year had the whey tanks washed and scalded out every week or every second week, all the season, and was continually finding fault with the milk for bad flavor, and sending home milk almost every day, but during the past season the tanks have not been cleaned out since spring, and the maker has found fault with scarcely any milk all the season. I assured the patron that a clean whey tank was not the cause of bad flavors in the milk, and I urge all factory men who have not elevated tanks, to raise them up before starting the factory next season, and all makers where the whey is returned to the patrons, to see that their tanks are kept clean. They will thus remove one of the greatest causes of bad flavors in milk.

Cleanliness. Our cheese-makers as a rule are improving in regard to keeping their factories and utensils clean, but there are some yet who seem to think if they get their cheese away from the factory without any loss to anyone, they are doing all right. To the makers I would say: "Get away from your factories for a few days, visit some of the best factories in the neighborhood, and be sure to invite the makers of these factories to come and spend a day with you. I am sure you will want to give your factory a thorough cleaning up before they come, and after you once have it nice and clean you will take more interest in keeping it clean.

Quality. The quality of the cheese this season has been much better than last year. The milk arrived at the factory in much better condition on account of the cool nights. The makers paid more attention to the even size and finish of the cheese. There was very little mould on the cheese, and owing to their never becoming over-heated; this made them look altogether more attractive to the buyers, which, together with the good prices realized, made the past season satisfactory to makers and patrons both.

Recommendations. Before concluding my report, I would ask our cheese-makers not to be satisfied with getting along well during the past season. The coming year may

not be so favorable for making fine cheese. By starting out next spring with keeping everything in and around the factory clean and tidy, and practising the same all the season, it will help to overcome a great many of the difficulties a cheese-maker has to contend with.

After Mr. Morrison's report was read, the chairman stated to the audience that it was open to criticism. No person having criticised the report, he said he took it as a credit to the instructor that the report was not criticised, and he presumed that the report was therefore above criticism.

REPORT OF INSTRUCTOR C. O. LUTON.

District. The district assigned to me comprised the counties of Essex, Kent, Lambton, Middlesex and Elgin.

Instruction at Factories. In this district there are 100 cheese factories in operation, but, owing to the very dry weather, especially in the western part of the district, some of the small factories were compelled to close down after running a very short time. The dry weather also had a very bad effect on my work, as the makers did not feel like paying for the services of an instructor when they had so little to do. I visited seventeen of the factories, giving from one to four visits each. I spent forty-two days in factories with makers, and four days were cancelled owing to the factories closing down.

Milk Tests. I tested 2,677 samples of milk with the Lactometer and 205 samples with the Babcock Milk Tester. The samples tested all the way from 2.6 per cent to 4.00 per cent of butter fat. Samples of milk taken from the vat during the months of May, June, and July tested from 3.00 to 3.4 per cent of butter fat; and in August, September, and October, from 3.6 to 3.8 per cent. of butter fat.

Prosecutions. Three patrons were fined for tampering with their milk. They were taken before a magistrate, and fines varying from $5 to $25 were imposed on them, the fines amounting in all to $40. Of these one was in Elgin and two in Middlesex. One factory I visited paid for the milk according to quality.

Making-rooms. The majority of making-rooms I visited I classed as clean, of the balance some were fairly clean, and I am sorry to say some were very dirty; but take them altogether I believe there has been a great improvement along this line. The principal fault to be found is poor floors and bad drainage, when allowing whey and wash water to leak through and remain under the factory for weeks—yes, in some cases the whole season—causing a very bad smell, especially in hot weather.

Curing-rooms. There has been more improvement in curing-rooms than in making-rooms. A great many have put in boxes, using ice with good results, where the ice is put in before the rooms gets too warm. It should be put in at a temperature below 65 degrees, as while the temperature can be held down, it is not so easy a matter to lower it. One of the factories I visited, put in a sub-earth duct during the past season, which gave very good satisfaction, the temperature never going above 69 degrees in the warmest weather. I have seen this same room in other seasons go as high as 82 degrees. I do not wonder at some of the makers having their cheese rejected on account of being overheated, when you see the place they have to keep them. I have seen rooms this season that were nearly as warm as the weather outside, which, together with no ventilation makes a very undesirable place to keep cheese in.

Starters. Some makers were using a starter prepared with Lactic Ferment with good results. A few were preparing it in a haphazard manner, and were having the usual bad results. I would advise all to prepare with lactic ferment, and be careful not to use too much.

Sinks and Sink Cloths. The majority of sinks and cloths were clean and sweet, but there were a few that were far from being clean. Now, one cannot expect to have a clean flavored cheese that has been made in a dirty sink. I believe that is where a good deal of this bad flavored cheese comes from. When a maker's curd sinks are in that shape, the maker is not in a position to dictate to his patrons about keeping their cans, pails, etc., clean.

Attention to Details. Before concluding my report I would urge every maker, before starting next spring, to clean up the yard of anything that might be lying around.

Pile up the wood, repair the fence, have the premises clean and tidy before starting, then keep it that way. They will be well repaid for their trouble.

PROSECUTIONS. I forgot to say in my report on prosecutions, that there were nineteen other patrons who should have been taken before a magistrate, but as the factorymen did not want to prosecute them, they were let go with a warning.

Mr. A. F. MACLAREN: I would like to ask Mr. Luton if he finds many cheeses moulding in factories where they used these sub-earth ducts.

Mr. LUTON: In the factory that I speak about, the cheese did not mould there this season any worse than any other year. It is a bad curing-room for mould in any case.

Mr. MACLAREN: Only one factory in your district used a sub-earth duct?

Mr. LUTON: That is the only one of any importance. There are other factories that I did not visit, but they were small and the drain not far under the ground. I never could get a good report from them.

Mr. MACLAREN: How many factories did you visit altogether, and how many of them did you consider had insufficient curing-rooms where the cheese was injured by over-heating?

Mr. LUTON: Probably half the factories that I visited had good curing-rooms; they used the ice boxes. There would not have been that many, unless they had used ice-boxes to keep the cheese from heating.

Mr. MACLAREN: How many did you find using ice-boxes?

Mr. LUTON: I cannot just say the number, but wherever they used them they speak well of them.

Mr. MACLAREN: I would also like to ask Mr. Morrison the same question; how many factories he visited where the cheese was injured on account of the heating, and how many he found using ice boxes?

Mr. MORRISON: There were four of the factories I visited this year put in sub-earth ducts and at any time of my visit to the factory, I never saw any mould on the cheese whatever.

Mr. BALLANTYNE: Had they any means of keeping it off?

Mr. MORRISON: No. Of course this season there was very little mould in any of the curing-rooms.

Mr. MACLAREN: The price was too high, they did not have time to mould.

Mr. MORRISON: There would be about half a dozen factories had ice-boxes out of thirty-three, and four had sub-earth ducts.

Mr. BALLANTYNE: Ten out of thirty-three were all that were provided with any means at all of controlling the temperature.

Mr. MACLAREN: You consider sub-earth ducts and ice-boxes an improvement?

Mr. MORRISON: They keep the temperature down.

A MEMBER: Can you describe these ice-boxes and sub-earth ducts?

Mr. MORRISON: The ice box is made in a square form, four scantlings are set up to form a three-foot square and these are boarded round with matched lumber, they stand on scantling on the bottom, and there is a pan at the bottom. Some have a door in the side of the ice-box and others put the ice in over the top. The more ice they have in, the more benefit they derive, the more cool air they get from the box, and the longer the ice will last. The water is carried down to the floor, and to the outside of the factory, but is not allowed to run under the factory.

A MEMBER: Which do you consider best, the ice box or the sub-earth ducts?

Mr. MORRISON: As far as I have been able to judge this year, I prefer the sub-earth ducts. The ice box is more useful to take down the temperature, but the sub-earth duct is there all the time and never allows the temperature to get up.

A MEMBER: Do they keep them open all the time?

Mr. MORRISON: Not necessarily, but most of them do. To get the best result from the sub-earth ducts, I would advise having a partition through the centre of the curing-room, and have the ducts come in directly under this partition, so that you can close it off at one part of the curing-room and have all the air going into the other part, or into both at the same time, if you wish it.

Mr. MACLAREN: Do you think the reason the cheese did not become mouldy was because it did not become heated?

Mr. MORRISON: No, it is not necessarily the case.

A MEMBER: How was the milk this season?

Mr. MORRISON: I think the milk came in better this season, better than any other season than I have been on the road, and the cheese has been much better too.

Mr. BALLANTYNE: How do you account for the improved quality of the milk?

Mr. MORRISON: I think the cool nights have had a great deal to do with it.

Mr. MACLAREN: Do you think there would have been any improvement if the nights had been the same as the year before?

Mr. MORRISON: No, I do not think so.

A MEMBER: Has the average been as high as other years?

Mr. MORRISON: I could not say, I have not compared it. I know the average has been fairly high.

Mr. BELL: What is your opinion as to the advantage of the ice-box compared with the sub-earth ducts?

Mr. MORRISON: One reason why I prefer the sub-earth duct is that you have it all the time. As a general thing the ice-box is not used until it becomes a necessity to use it, and by that time your curing-room has become heated more than you want it, and then it is very hard to reduce the temperature unless you have, perhaps, two ice-boxes in a fair-sized curing-room, but the sub-earth duct you have all the time.

Mr. BELL: If a cheese-maker has a thermometer, could not he see the thermometer going up, fill his ice-box, and control the temperature?

Mr. MORRISON: Yes, by using plenty of ice he could do so, but as a general thing it is not used until the curing-room is heated over seventy.

Mr. BELL: That's the mistake of the cheese-maker?

Mr. MORRISON: Yes, and for that reason I prefer the sub-earth duct over the ice-box, you have it all the time.

A MEMBER: How many factories are there in the district you represent?

Mr. MORRISON: One hundred and twelve.

A MEMBER. How many of these factories pay by the test?

Mr. MORRISON: Only two.

A MEMBER: Don't you think they would get much better results if they all paid by the test?

Mr. MORRISON: The quality would be better and the care of the milk, you would expect, would be better. Still I have seen as bad milk come to the factory where they were paid by the test, as where they paid the other way, but as a general thing, where they paid by the test they complained very little of the milk.

A MEMBER: Milk well taken care of will test better?

Mr. MORRISON: Some say it will and some say not. I say, "The better care you take of the milk, the fairer test you will get."

Mr. MCFARLANE: How many weeks' cheese would you have in the curing-room at once?

Mr. MORRISON: I would like to see the cheese go out as soon as they are cured.

Mr. MCFARLANE: Do you think the cheese that is there two weeks, or the cheese that comes in today wants the most moisture?

Mr. MORRISON: The one that comes in to-day wants the most heat.

Mr. MCFARLANE: How would you regulate that?

Mr. MORRISON: By getting them out sooner.

Mr. MCFARLANE: Do the old cheese or new cheese mould quicker?

Mr. MORRISON: Old cheese will mould quicker in the average curing-room.

Mr. EDGAR: What do you think is the reason so few factories pay by butter fat test?

Mr. MORRISON: That is a pretty hard question to answer. They usually leave it with the patrons. If the majority of the patrons wish to be paid by the test, the factorymen are usually willing to do so, and if the majority of patrons do not want the test, it is policy on the factoryman's part to please his patron.

Mr. EDGAR: Don't you think the influence of the factoryman has considerable effect with the patrons?

Mr. MORRISON: I think he has a great deal.

THE CHAIRMAN: One gentleman asked Mr. Morrison, if, during the last year, we had not a higher average than the previous year. I believe the cheese-makers present

will bear me out in this, that the latter end of this year took a far higher average. I believe the reason was on account of the extremely hot weather in November. Owing to the warm weather in November it took more milk to make a pound of cheese than it has done for a good many years. Mr. Morrison also said this last year was a good one. Somebody asked why. The answer is easy. We have had cold nights. There is no worse difficulty in making cheese than hot nights.

PROFESSOR DEAN: I would like to answer Mr. McFarlane's question why old cheese moulds more than new cheese. Mould is simply a plant growing on the cheese. It takes time for the plant to grow, and Mr. McFarlane knows that if he sows wheat or oats in a field and it is a very dry time, these plants don't grow, the seed will not sprout till you have moisture in the ground. You must have the seed, or what scientific men call a spore, and when you get a certain amount of moisture this seed or spore grows. Time is necessary, and heat is necessary, and moisture is necessary. When you get the spore or seed and you give the time for it to grow, and you get the temperature or moisture, then you have mouldy cheese. (Applause.)

REPORT OF INSTRUCTOR GEORGE McDONALD.

DISTRICT. The District that was assigned to me was the Northwestern part, comprising the following counties: Huron, Bruce, Perth and Waterloo. There are seventy-six factories in all, four of which were not in operation, and two made butter all summer.

INSTRUCTION. I made regular visits to ten factories, making from two to four visits each. I spent thirty-two days giving instructions and testing milk in the factories. I spent twenty-three days among the factories, canvassing and getting acquainted with the cheesemakers and factorymen. I had very few applications from the factorymen to give instructions, as the season was favorable and the prices good.

MILK TESTING. I tested 1625 samples with the Lactometer and 195 samples with the Babcock tester; the richest was 5 2, and the lowest 2.4.

PROSECUTIONS. One man was fined for skimming his milk and pleaded guilty, and the Directors settled with him. Two of the factories that I visited were paying for milk according to quality.

CONDITION OF FACTORIES. All the factories that I made official visits to were clean, and everything in good shape, as far as the cheesemaker could control things. Some of the factories that I called on were in bad shape, some of them being a very poor excuse for a building to make cheese in, and giving a maker a very poor chance to make good cheese.

One thing I paid particular attention to was the way some makers move around in their factories. They seem to be putting in time, and letting some other fellow do the work, and the other fellow doing the same, and so on. Now, this should not be the case. Now, I like to see a cheese-maker moving himself and keeping his eye on everything, and keeping things moving, and when it comes to stirring curd, go at it and stir it as if he were going to stir it until he had everything right before he left it.

QUALITY. The quality of cheese had been very good this year, as far as I had a chance to judge. Everything was favorable in my district for making good cheese, good grass, plenty of good water and cool nights.

SANITATION. Regarding sanitary conditions of factories; a few were very good, most of them fair, and a few very bad on account of bad floors.

WHEY. The system of returning whey in cans is still going on. A few factories are elevating the whey tanks, which is a great improvement, for they can be cleaned much easier, but there are still a great number the old way, dirty as ever.

CURING-ROOM. There is a great deal of improvement being made in the curing-rooms this last summer, more ice boxes being put in, and better ways of heating the curing-rooms, and better ventilation.

FACTORY SURROUNDINGS: I would advise every cheesemaker to clean up around his factory, and have things nice and tidy around. Also plant some shade trees around the factory, so that when people are passing it they will form a good opinion of him even supposing they may never see him, and if he does not stay in the same factory all his life there will be something to remember him by.

REPORT OF INSTRUCTOR ARCH. SMITH.

DISTRICT. The district that was assigned to me for cheese factories comprised the counties of Wellington, Grey, Dufferin, and Simcoe, and also all creameries in Western Ontario.

INSTRUCTION I commenced work for the Association on May 2nd, and finished on October 26th, when I was given charge of the Western Dairy School at Strathroy. I made regular visits to nineteen factories. Most of them applied for three, and some for four visits. On account of the great distance between a number of the factories, much time was lost in travelling. The time that was not employed giving instructions to makers was spent in visiting the creameries, in order to become acquainted with the butter-makers, and to explain to them the objects and benefits of the Association.

MILK TEST. I tested 2485 samples of milk with the Quevenne lactometer, and 380 with the Babcock test. The poorest sample received tested 1.2 per cent. of butter fat, and the richest sample tested 5 2 per cent. of butter fat. The milk delivered at the cheese factories of my district, was of better quality than that of the previous year, owing, no doubt to the high price of cheese, which encouraged the farmers to produce more milk and of a better quality, and also to the excellent pasture and cool nights.

PROSECUTIONS There were eleven persons prosecuted for furnishing deteriorated milk, who were fined from $5 to $10 and costs, each. One of the cases, which had been tried before two magistrates, was appealed, when the judgment was reversed, owing partly, I think, to the indefinite evidence given by an expert, from which the judge could take two meanings.

CARE OF MILK. I believe that the man who adds a small quantity of clean water, or removes a portion of the cream, is no greater criminal than the one who neglects to take proper care of his milk, and delivers it at the factory in a tainted gassy condition, as he not only robs the other patrons by deteriorating the quality of cheese or butter produced, but also injures the reputation of the maker as well as that of the factory.

CHEESE FACTORIES. I am pleased to state that the proprietors and managers of the cheese factories in my district are making an earnest effort to improve the condition of their factories, by paying more attention to drainage and sanitation, by elevating the whey tanks so that they can be more easily cleaned ; the putting in of cement floors and by adopting methods of controlling the temperature of their curing rooms, which have a marked influence on the production of a better quality of cheese.

There was only one cheese factory in my district which paid for the milk according to the quality. The whey from each factory was returned to the farmers in the milk cans. In a number of cases the whey was left standing in the can so long that the acid had eaten the tin off the iron, making it almost impossible to clean the can properly, and the result was, that the milk was given a peculiar and objectionable flavor which caused the maker a great deal of trouble. The only remedy I know of for this is to purchase a new can, and wash it immediately after it is returned, or leave the whey at the factory.

CREAMERIES. I am sorry to say that the creameries are not being improved as much as they should be, particularly in the way of equipment and sanitation, or in providing suitable store-rooms which can be held at a low temperature for storing the butter in. A great number of the summer creameries are being run on the cream gathering system. This necessitates an abundant supply of cold water which is oftentimes allowed to run over the floor, or in open gutters, and has a tendency to keep the room damp and prevent the churn and butter-worker from becoming dry, and the result is that they soon become foul smelling. The remedy for this is to conduct the water away in pipes, and also attach a hose and a steampipe. After the churn is thoroughly washed, close the lid and insert the end of the hose in the butter-milk outlet, and then steam thoroughly for twenty minutes. The intense heat will destroy all germ life, and leave the churn dry and clean. This is also an excellent device for steaming the butter worker and utensils, and also the cans or tanks used in drawing the cream.

The quality of the butter made at the cream gathering creameries (with one or two exceptions) was not equal to that of the separator creameries, for the reason that the flavor of the butter was oftentimes determined before the cream was delivered at factory, partly on account of it having been poorly cared for by the patron.

It is my opinion that the quality of butter from cream gathered creameries will never reach the standard of quality that it should, until farmers adopt the use of hand separators, which would not only lessen the amount of labor at home, but would enable the farmer to obtain more butter fat from his milk, and the cream would be of a better quality. It could then be kept in better condition, and delivered at the factory perfectly sweet. The butter-makers would then have it under their control, and, by pasteurizing or the addition of pure cultures, a desirable flavor and a more uniform product made, which would not only sell for a higher price, but would add considerably to the reputation of Canadian butter and also to the profits of the farmers.

To be successful in the manufacture of cheese and butter requires not only a thorough knowledge of the business, but also a very close attention to the work, and now that we have so many expert makers, and an excellent system of cold storage, I think that it rests principally with the farmers to maintain and promote the reputation of Canadian dairy produce, by taking the best possible care of their milk,

Mr. McFARLANE: How much would you allow a farmer for 100 lbs. of whey, if left at the factory

Mr. SMITH: When the whey is left at the factory, it is sold for so much per ton of cheese. In some cases it is sold much higher than others. It varies all the way from four to eight dollars a ton for cheese; usually five dollars.

Mr. McFARLANE: We netted this summer twenty-seven cents per hundred pounds.

Mr. SMITH: I claim that is more than most farmers make from skim milk.

A MEMBER: Will that gentleman tell how he makes that twenty-seven cents per hundred pounds from his whey.

Mr. McFARLANE: The way I can make twenty-seven cents out of it is: I feed it to the cows back again; I feed it warm. Cheese sold this year about eleven to twelve cents a pound, and I got three pounds more of cheese out of it that way by feeding it.

Mr. SMITH: Mr. McFarlane states that by feeding the whey to the cows he enabled them to give enough milk to make three pounds more cheese than they otherwise would have done, and that is how he gets twenty-seven cents per hundred pounds for his whey.

Mr. BALLANTYNE: How do you know with such certainty the exact results?

Mr. McFARLANE: Because I do it all myself. (Laughter.)

Mr. BALLANTYNE: That does not prove it. You can only know that positively by carefully conducted experiments.

Mr. McFARLANE: If you send that much more milk, and get that much more cheese, you know it. If you come down to my place I will show you how to do it.

A MEMBER: I think the whey should all be left at the factory. It should be fed to pigs, and not brought away at all.

ADDRESS BY HON. THOMAS BALLANTYNE.

There was put into my hands since I came in a programme of the proceedings, which happened to be the first I have come across, and I can say that possibly I am the only one present who was at the first meeting for the purpose of organizing a Dairy Convention in Canada. That meeting was held in the year 1868, in the town of Ingersoll. I happened to be present, and I have had to do with these conventions more or less ever since, and for a long time I actively had to do with them. I have always felt that if there was anything I was specially proud of, it was my connection with the dairy business of Western Ontario and Eastern Ontario, and I might also say the Old Country. I have always felt that all we knew in connection with dairying we should not only be willing but anxious to communicate to others. Every pound of poor goods we manufacture diminishes the value of our products. It is important to improve the quality, and I have always felt that it was one of the industries in which it was more blessed to give than to receive. Great changes have taken place since the old days. At that time we had no liberal Government (I am not speaking politically, but I mean in the sense of giving us liberal contributions) to carry on this great work. We were new at the business. We did not know what to do or how to do it. We were groping our way in the dark. The work of trying to educate the makers generally de-

volved upon a very few, and we were largely indebted to our American neighbors in the state of New York. In those days we thought they knew everything about it, and that we had everything to learn from them. I am glad to say they always responded, and the best men they had were always available. There is no reason why that should be continued forever. We began to have those who were intelligent enough, and who were willing, to make comparisons, and do the best they could, and the result was the time came when Americans had to take a back seat. Hence we found at the Centennial Exhibition at Philadelphia we took the lead. Some of the cheese we exhibited there from Canada were pronounced to be perfection. We had distanced them completely. In '78 and '79, in connection with the Annual Dairy Display in New York, when they had dairy displays from England, we out-distanced them, and we then got a reputation for our goods. One reason was that we were never tempted to adulterate our cheese. Professors Arnold and Willard came over to tell us that we could use adulterations and that it would take an expert to tell the difference. As everyone knows, I had something to do with directing the policy of the Association at that time, and I rushed to the front of the platform and said: "It is true one man might do this in one factory, but ultimately you will destroy your trade," and I urged upon them not to adulterate their cheese. I afterwards gave evidence before the committee of the New York State Legislature, and emphasized the same thing. We have never been tempted to adulterate our cheese; we have never tried to make wooden nutmegs. We have never tried to sell our cheese for anything but what it is, and it has been a very important matter for us that we have always been honest in placing the honest product on the British market. I do not say that we have been making the improvements that we should have done. I thought at one time the question of carrying the whey back in the cans would be a thing of the past, but for some reason or other it still continues to be done, and I would urge upon you not to carry it back in the same can in which you take the milk to the factory. I would like to ask if there was a man here who was supplying milk to the people of Stratford, and if he was to take back in his can the sour, dirty whey, where is the man who would buy milk from him? How can you expect prefect goods, if you do not get the goods in the best possible condition? And you will never have it so, if you take back the whey in the same cans in which you deliver the milk. I have been in the habit of going to England every year. When there I take a memorandum of the goods we have shipped, and examine them, and you never find cheese where the whey is taken back, perfect. If you are going to feed pigs, commence and give them all the milk; but don't try to manufacture dairy goods of the quality demanded to-day, and expect to take back the whey. I speak advisedly; I speak whereof I know; I feel we are going back in that respect, and that we are not making the progress we should.

Ontario cheese, known by the name of Ingersoll cheese, used to sell at a premium a cent and a half above the eastern cheese, but that is not so to-day. It is not because we have not experienced makers, more capable men than we used to have, but it is want of that pure flavor. You must understand that the public is getting more fastidious ever day about what they will eat. An improved article improves the consumption. Reference was made to the past season and that the quality was better on account of the nights being cooler, and one of the benefits of that has been the increased consumption. I was in England during the whole time there was a large consumption, and when shipments commenced to be 127,000 boxes a week, I said to myself "It will never stand up under that," Another 127,000 the following week: "It will never stand up under that." But it stood up under it; it improved under it; and why? Because the quality was better than we have seen it for a long time, and there is no reason why the quality should not be better. It is true, of course these impurities will not develop in cool weather as they will during the warmest weather.

I remember when I was making cheese and trying to learn everything I could, I went to the expense of having a separate dish for each one's milk, out of 127 patrons, so as to detect impurities, and I found one person's milk which was longest on the road was always the sweetest. I went to see why it was. It was Mrs. Hoyle's, and she was scrupulously particular and cleanly. Her milk pails were washed and scalded, and her pans kept in the same condition; you could see yourself in them. She was brought up in a dairy district, and knew the importance of cleanliness. We find in the new districts to-day we are getting better goods than in the old, because in the old districts they have

never got into the right method, and the lesson we have to learn above all others is Cleanliness! Cleanliness!! Cleanliness!!! You cannot urge it too strongly. Milk is a most sensitively delicate article—is the most sensitively delicate article I know of to-day. I do not know of anything that is so easily injured, or from so many causes. I have worked over a vat, and have tried to observe and learn, and at every opportunity tried to teach others. When driving in the country there was nothing gave me so much pleasure as to go into a factory, and the cheese-makers were always willing and anxious to get instruction. They were all willing to listen to you. They had many difficulties to contend with; milk coming in with no means of testing it. We had no instructors then, and I may say that we were the first to propose the introduction of instructors. I was impressed with the fact that the only way we could make any permanent improvement was to get good makers to go to the factories. The first attempt was not in all respects a success, but we were on the right track and ultimately it became successful; and if these men do their duty I cannot but believe they will find the makers willing to act with them. The best maker we have would be a better man by visiting factories and learning new methods, than he would be confined to his own factory. When a man compares himself by himself he does not know whether he is right or wrong. When there is a difficulty he does not know how to get around it; but these matters have been very much improved by the instructors. The officers are, no doubt, careful to select the best men, but above all it is the farmer that is interested in getting the best milk to the factory. The expense of manufacturing and of hauling the milk is the same when cheese is eight cents as when it is twelve. The time for extreme prices we had supposed to have past but it may not be so. You have got educated to low prices, and it was not possible during last year to believe that we would ever have high prices again. I am not going to say the extraordinary demand and high price last year was the result of quality. They had dry weather in England, and the warm weather increased the consumption of cheese, and the old cheese did not overlap the new. However, we will have an opportunity of testing next spring, because there is no question the stocks are light, and we will see whether they will be willing to eat cheese again in England at the same price. If they eat to the same extent they used to they will have to pay a good price.

ADDRESS BY MR. A. F. MacLAREN, M.P.

I must congratulate you on having so very good an attendance at this first session of the Association annual meeting. Mr. Ballantyne told you that as the first afternoon was usually only a small meeting you had the popguns and pistols to speak to you, and for that reason they have trotted out the wheelbarrows first and that we will have the steam engines to-morrow. I was very glad indeed to see Mr. Ballantyne come in, because I happened to be the only one of seven presidents here before he came, and I was afraid I would have to speak for seven, when, if I spoke a half an hour for each, it would take nearly four hours and I would not like to keep you here that long.

This is an agricultural country. At the present moment, I consider we are in the centre of or surrounded by the very finest agricultural country that is to be found in America, not even excepting Leeds. As I understand it, about forty-five per cent. of the population of Canada are farmers. About twenty per cent. more of the population are engaged in handling the products of the farm, or making machinery used on the farm, the dairy, etc., such as plows, harrows, reapers, mowers, threshing machines, churns, presses, engines, boilers, separators, and all kinds of machinery used in connection with this wonderful agricultural business. In other words, I might say from sixty to seventy per cent. of our people depend directly or indirectly upon agriculture for a living. Think for a moment of our great natural resources, and then you will see whereon Canada's prosperity depends. As nearly as I can estimate, the fisheries alone yield, annually, twenty-three millions to twenty-four millions of dollars. The mines, mining coal included, yields thirty seven million dollars to forty million dollars annually. Then take our forests—including firewood, lumber, timber, etc. As near as we can estimate they yield the immense sum of eighty million dollars. Our farm crops, say two hundred and eight million dollars at the very least. Include this with our farm products, and you will find

it will reach the great sum of not less than six hundred millions of dollars. This will give you some little idea of what a wonderful producing country we have. It is food for thought for each one of us who are actors in this great play for life, prosperity, and development of this great nation. I regret very much that the agriculturists, the farmers themselves, do not come out in larger numbers to these meetings, where they would always hear something which would be profitable and beneficial, and it is really a great surprise to me that so little interest is taken. I must say that I would like to see the farmers put more business methods into their business as agriculturists than most of them are doing. There is nothing which is produced on the farm to day that is not closely watched by those who handle the product. Let it be horses, cattle, sheep, hogs, chickens, turkeys, ducks, wheat, oats, peas, and barley; hay, straw; turnips, potatoes, cabbage; butter, cheese, milk, cream; fruit of all kinds, or anything along the line of general farm products that you like to name, and you will see the great necessity of having it, in this present age, placed on the market in the best possible shape, as the market demands better goods and will pay for better goods better prices. As we grow older and our country grows older, our people become better off and are able to pay for a greater variety of food and better quality, and it is for us dairymen, in our line at least, to do all we can to produce and ship a first-class article of butter, cheese, milk and cream; and now that we have our cold storage in our homes, in our factories, in our cars, in our steamboats, in our warehouses, in England, let us show to the whole world that we fear no foe, at least in our line of business as agriculturists, as dairymen, and as handlers of dairy products. Some of our best growers of grain go through their crops and pick out the best and healthiest heads of wheat or barley or peas to sow the following year. Now if they go to that trouble in picking out the grain that is growing to have the best seed to sow for the next crop, why should not you go to the trouble of picking out the best cows for dairy work to produce cheese and butter? If they can afford to go over and pick out the best heads of grain for the next year's crop, I think you can afford to go to work and pick out the best cow, and you will find by doing so you will make money. If a cow will not pay as a milk producer or a dairy cow, then make beef of her. If you go on these lines you are sure to win; but if you take any old cow you will find that one cow is eating the other's head off. It is a most important business, this dairy business. Let us leave no stone unturned to give it one grand lift, and each one go home determined to do a little better this year than last. Let the patron be more careful about his farm and buildings keep everything a little cleaner and tidier than ever before particularly where the milk is being handled, the cows being milked, the milk cans being washed, the straining of the milk being done. Then let the man who is to draw the milk to the factory see that he receives every can from the milk stand in good shape. If he finds anything wrong with milk, or milk stand, let him report the same at the factory, and let the cheesemaker go and make things right. If he cannot get time to go, let the director look after the matter. Then see that the man who hauls the milk to the factory has his waggon, straps, cans and everything tidy and clean. He should never use a dirty wagon platform to put clean cans on, and no good cheese-maker should allow it.

Talking about farms and buildings, there is one thing to which I would direct your attention. I noticed in New York State and many different States, that they paint their barns and outbuildings, I think it is an improvement to the barns and to the farms, and that it would pay the farmers of this country to do more painting than they do. It would preserve their buildings, and make the farms look much better. Keep everything cleaner and tidier than you ever have done before, particularly the stables where the cows are kept. Then for the cheese makers, I must say they have made great advancement during the last ten or fifteen years. There factories are very much improved, and you find cheese, cheese-maker and factory all looking better. But they can all improve more or less yet, and I hope every one here will go home and think out some way whereby he can assist in the grand elevation of the whole dairy business of Canada, during the coming year, as there is room and we must keep to the front. It is no use talking,—the United States are coming after us hard—and look at Leeds. Of course their cheese are no better, but they get better rates of freight, and therefore, get better prices or more profit than we do.

There is another matter that should come up good and strong at this convention, and should be discussed very freely by the shippers of cheese, butter, grain, pork and all simi-

lar lines of produce. We must do something to reduce the rates of freight, as it is simply monstrous, simply terrible, the price we have to pay for even shipping a car of cheese a few miles. Why, you can get almost as good a rate on a car from Chicago to Montreal as you can from here. Some way must be found to solve the question of cheaper transportation for the produce raised by the farmers of Ontario. It is all very well and all very nice for the Government to assist the farmer or the agriculturist by giving him cold storage, by assisting with Farmers' Institutes, Fat Stock Shows, Poultry Associations,—all kinds of reports on all this good work—but why not do some more good work along the line of cheaper transportation? Let us have better rates. Let us lay our produce down in England and give the men who do the work a greater profit. I care not what Provincial Government may be in power, I care not who the Dominion governors may be, let them get to work, and by land or by sea give us cheaper rates, if cheaper rates are possible. Figure it up for yourself, producers of grain, pork, beef, fruit poultry, cheese and butter; see what a few cents per hundred pounds saved on all the above named foods would amount for the farmers of Ontario.

I have a few figures to give with regard to our shipments during the past season. At the present time it is estimated that in Ontario we have invested in cows, lands, factories, apparatus, etc, used for dairying purposes, over $175,000,000. Milk produced in one year, 350,000,000 gallons, valued at $50,000,000. Exports to Great Britain from Montreal, from the 1st May to the 1st November, 1899, 451,050 packages of butter, shipment of cheese 1,896,496 boxes. We naturally feel proud of the great advancement we are making and I think we have every reason to feel pride in the great showing we have made during the past few years. In 1894 the shipment of butter was 32,055 packages; in 1895, 69,644; in 1896, 157,321 packages; in 1897, 220,252 packages; in 1898, 280,000 packages; in 1899, 451,050 packages; an increase from 32,000 to 451,000 from '94 to '99. In cheese, 1894, 1,712,715 boxes; in 1895, 1,710,756 boxes; in 1896, 1,726,726 boxes; in 1897, 2,102,985 boxes; in 1898, 1,9000,000 boxes; in 1899, 1,896,-496 boxes.

These are immense shipments of both cheese and butter, and bring in a large sum of money to the country, and we certainly should not allow anyone to pass us in this race. Our butter will bring $2,5000,000 more than in 1898, for increase in quantity and price. Cheese will bring in about $2,000,000 more money than we had last year, and when we season's make of butter and cheese have come forward, the farmers will have more money than in 1898 by $4,500,000. If they can go to work and decrease the rate of freights upon the products, they can make another saving, and I certainly would like to see something done in this western and northwestern part of the country, whereby we may get cheaper rates for our goods. It costs a lot of money to ship a load of cheese from Wingham to Stratford, leave alone sending it to Montreal.

COUNTY HEALTH OFFICERS.

By Dr. P. H. Bryce, Toronto.

Through the kindness of your President and Secretary I have been permitted to address you briefly on a subject, which in my official position I have had something to do with during the past eighteen years, and regarding which some of your officers two years ago appealed to me to take action. I refer to the sanitary condition of your butter and cheese factories, and the various problems associated with the production of good milk. When it is remembered that there are in Ontario some 1,187 cheese factories and creameries, some 6,148 school buildings, and some 3,000 hotels—apart from the 500,000 private dwellings, distributed over 44 counties and districts, and situated in 750 municipalities—it will be evident to you that the Provincial Board of Health, with but one executive officer and one laboratory man, has a tolerably large field of operations to supervise in even the most perfunctory manner. Some two years after the organization of the Provincial Board in 1882 the Public Health Act was passed by the Legislature, making it compulsory upon every municipality, apart from the counties, to have a Local Board of Health. Last year 568 were reported to the Pro-

vincial Board as having been appointed by the Councils. Others doubtless were appointed but not reported. In rural municipalities and urban municipalities having a population of less than 4,000, the Local Board consists of five members, two of whom are the Reeve and the Clerk, and these boards reported 479 Medical Health Officers as having been appointed, along with 150 Sanitary Inspectors.

I think all will agree that this is quite a large array of Medical Health Officers, and I am glad to be able to say that much good has resulted from their work, as seen by the fact that of the common preventable diseases dealt with under the Act the deaths were but 1,502 in 1898, as compared with 2,700 in 1892. These results are all the more remarkable when I state that the salaries paid to Medical Health Officers in 1898, gathered from 285 replies to a circular sent out amounted to $6,923 for 55 towns, and in 108 townships only $1,888. I find further that during the period from 1882 to 1898 105 public water supply systems in our cities, towns and villages have been established, together with 45 sewerage systems To show the effect of this sanitary progress, I find that the deaths from a single disease, typhoid fever, dependent so directly upon these, has decreased from 600 per year in 1882 to 300 in 1898. I further find, too, that public sentiment is sufficiently alive in many rural districts as to cause the Local Boards to act with promptitude in stamping out diphtheria and smallpox—sometimes, perhaps, made more prompt from the mandatory powers placed in the hands of the Provincial Board for compelling local action and municipal expenditure, which otherwise the Act provides may be done by the Provincial Board at the municipality's expense. Doubtless, too, there has been a very general advance in the minds of the public with regard to the preventable character of these diseases, and a general improvement in the sanitation of habitations.

Why then, it may be asked, have we seen within the last three yeears deputations to the Government from commercial travellers demanding its interference for the improvement of 3,000 hotels of the Province; and why some of your members have asked of our Board that your factory inspectors be clothed with powers as Provincial Sanitary Inspectors to compel sanitary improvements in the factories?

The reason is, I think, very evident. Local Boards of Health are composed of average citizens without any special scientific knowledge enabling them to deal with the many scientific problems of construction of houses, stables, drains, wells, school buildings, cheese factories and sewage disposal; and even if they had, and though Medical Health Officers are appointed and often Sanitary Inspectors, no money in any degree adequate for carrying on their work is voted; and while there is power for them to get money when contagious disease breaks out, there is practically very little ever granted or asked for for routine sanitary work. Besides, the municipal councils take good care that if a Board attempt to enforce the compulsory clauses of the Act in abating a nuisance in the case of some offending ratepayer and voter, the two active members or officers of the Board will find their usefulness ended with the year. This as applied to the sanitary conditions of cheese factories is understood, when we know that shareholders of these are often, indeed usually, members of the Council or the Local Board of Health, and by virtue both of their official position and their supposed interests are in their own judgment the most competent judges of sanitary conditions.

Naturally, I have examined with much interest the reports of your annual meetings and of your inspectors, and I find in them from year to year the same story as I find in every other department of my work, that the problem of how to deal with the organic filth of the stable, of the milk house, of the piggery and the slaughter-house and of the factory is perennial, and if one is to judge from the reports it is as far from solution as ever. I further find it the unanimous opinion that hundreds of thousands of dollars are annually lost to the producers, to the merchants, and to the Province from this one preventable source alone.

For years past I have studied the problem, and year by year the conclusion has increasingly forced itself upon me that there can be but one satisfactory solution of the difficulty, viz., that of appointing for each county or electoral division a permanent Medical Officer of Health, a trained bacteriologist and chemist, at a living salary, and who shall devote all his time to the sanitary supervision of his district.

Let us see what there would be for such an officer, paid we may suppose as much as the County School Inspector for the district is paid. Let us assume that there is one

such officer in each of the old settled counties, and that in these the 1,187 cheese and butter factories are equally distributed. Each officer would have 296 to supervise. He would have, further, in his district at least 100 public schools to oversee, spread over an average of 12 townships. We thus see that one such officer would have a rather full day's work for every day in the year. The Public Health Act now provides that a Sanitary Inspector be appointed in each township. Such a Medical Health Officer through these would have his work so systematized that through them and the school teachers he would early learn of outbreaks of contagious disease in any school, and would, during the winter months, when these outbreaks mostly occur, give his time especially to to this branch of his work. On the other hand, it is, as we know, the hot summer months in which organic decomposition is most rapid, and the evils resulting therefrom are greatest about our busy cheese factories. Such an officer would then be free to devote practically all his time to this important part of his work.

What would he do? Primarily he would examine closely the construction of the floors of a factory, for all of the evils due to the putrefaction of organic filth about a factory, none for a moment equals in extent that resulting from such filth decomposing beneath the floors of a factory. I do not need to more than point out that material from the washings reaches this area daily, and owing to the absence of free air currents develops the most dangerous of bacteria,—the anerobes; and that currents of air due to the warmth of the building will bring them up directly into the factory. Such conditions he would order to be remedied at once, or the factory would be closed as producing dangerous food products.

Having had good concrete floors installed, he would at the same time see that their construction would be such that the floor washings would flow naturally to a trapped drain, so constructed that it would carry, as a small tile drain does, all the materials to a good distance, to be there disposed of by sub-surface irrigation tank and tiles—as we now cause to be done at the many summer hotels in Muskoka, where the sewage from hundreds of persons is dealt with daily. He would next see that a good whey tank, properly constructed, covered and ventilated, was placed to receive all the whey as rapidly as it was drained from the vats. If, as in the case now a-days, many factories have a small steam engine installed, there need only be a pump for delivering this to the elevated tank, there to be kept from putrefying by a steam pipe, if it be not removed daily. I need not speak of the economy in preventing putrefactive changes taking place in this whey from the standpoint of its quality as food. That is evident; but from the standpoint of keeping the air of the factory sweet.

I have noticed, too, in the papers and discussions at your sessions, the one point constantly to be dealt with, that of the ventilating of the curing-room and keeping it at an equable and low temperature. Such an officer, however, informed as he would be in the principles of heating and ventilation, would be able to advise the adoption of methods well known to members of the Association in these two particulars. Their cheapness has been pointed out at all your meetings, and the fact that the value of cheese, to the extent of several cents a pound, may depend upon the temperature and ventilation of the curing-room, would be a matter readily brought within the compulsory powers of the Act relating to the production of wholesome food. Every little while health officers are made aware of cases of severe poisoning here and in Britain, from the products of putrefactive decomposition in cheese, and there is but one place to prevent the occurrence of such, viz., during the process of manufacture of the cheese

But the work of such an officer is just begun when he has dealt with construction of the factory. He will assure himself, by analyses if needed, that the water supply, a necessity in good cheese-making, is of the first quality. Time and again in the past year has the Provincial Board had brought to its attention cases of typhoid in the premises of cheese factories, in some cases certainly due to contaminated well water. But he goes further; he has a sanitary inspector who under his direction, would report on the condition of every premises where milk for a factory comes from, just as our best cities and towns license dairies supplying public milk, only after inspection of their premises in the surrounding country. How necessary this is, may be gathered from the fact that in an outbreak in one of cities four years ago, I found cases of typhoid had occurred in thirty families on the route of a single town milkman who supplied 120 families. His barn well was fifty feet from the manure pile on a hill side. As a Medical Health Officer's

powers under the Act are ample to abate all nuisances of this sort, one season's work would have secured safety to a public food supply and to the farmer at the same time.

Such as I have described are some of the duties which a skilled Medical Officer of Health would perform in a work of such enormous commercial importance.

But from the standpoint of the common friend of every ratepayer whose interests are his interests, what invaluable work could such an officer perform were these matters set right.

Your agricultural chemists and bacteriologists have for years been in attendance at your meetings, teaching that the manufacture of butter and cheese demands not only technical skill, but the most exact scientific knowledge, if the highest quality of products is to be produced.

Dr. Connell and Mr. Harrison with others are working at the biological problems, just as in the Provincial Board of Health Dr. Mackenzie is studying the same problems in the relation to disease.

But what are these amongst 1,280 factories of both sorts? In the agricultural returns I find that in 1898 there were 965,021 milch cows in the Province. In this same year 93 creameries with 22,741 patrons made 9,008,992 lbs. of butter valued at $1,632,-230, or at 2 2-5 gallons of milk per lb. of butter, and utilized 20,000,000 gallons of milk in 1,187 cheese factories with an average of 65,121 patrons, who received $8,417,535 for their milk, while the gross value of the cheese output was $10,252,240. Let us assume that 75,000 are patrons of the two kinds of factories, and that as owners, directors and patrons, we assume they received $12,000,000 I find that the municipal expenditure in townships in 1898 for Board of Health purposes was $15,298 in a total expenditure of $5,742,017, while the cities spent $63,648 for Board of Health purposes out of a total expenditure of $12,432204.

The municipal census gives a population in the townships of 1,113,502 ; hence I find that roughly one family in every three of the rural municipalities sends milk to factories and gets his share of the splendid sum of $12,000,000, and of this population 375,000 pays its share of the local health expenditures, every person pays exactly 1.4 cents health tax per annum, or every family pays seven cents per annum for any assistance the Local Board of Health operations may give him in securing good sanitary conditions for his factories, or of the $5,750,000 spent in townships in 1898, but $1 in about every $4,000 was spent in Board of Health operations. It seems hardly necessary to make the absurd position in this matter as it exists at present, more ridiculous by figures. Everyone knows it.

Your Association has already realized the situation by levying a tax upon factories willing to come into the Association, of $10 a season for an inspector. They in their reports all state they did not nearly complete their rounds of inspection, and that it was almost wholly taken up with instructions in testing milk and the details of manufacture. The same story I find in reports of the school inspectors : their time is engaged in testing and investigating the manufacture of brain products, and they have no time for sanitation. If, then, we wish to make a splendid Public Health Act operative, it is clear we must have trained officers paid for administering it. With but one trained officer, as bacteriologist and chemist in each county, in the place of 300 nominal officers for the Province, paid less than $15 a year on an average, we require at least forty men not engaged in practice, the friend and assistant of any medical man of the district in diagnosing doubtful cases of disease, and in attending smallpox when it occurs ; to be further Medical Inspector of School-houses, and the one to deal promptly with outbreaks of diphtheria and scarlatina without its having to decide for the sake of a salary of $15 between offending patients and his public duty, and finally the constant adviser of the recipients of this $12,000,000 for dairy products, and this can be done at an expenditure per family in the townships, of 50 cents annually.

Shall not this Association be the first public association to urge the matter upon our Legislators ?

THE CURING AND BOXING OF OUR CHEESE FOR MARKET.

By D. Derbyshire, Brockville.

You have no idea, sir, the great pleasure it is for me to face your Association, and particularly so this year, on account of the large amount of first-class work that has been accomplished by this Association. I can heartily congratulate you and your fellow directors on the great improvement that you have made in your cheese and butter this season. I feel considerably like congratulating the dairymen of our whole country on the marked improvement that we have made this last year on the quality of our butter and cheese. It is very easy for one to sell a really first-class article, but it requires quite a skilful salesman to sell something of an inferior quality. Tonight I would like to draw your attention to some of the points where I think we can make some improvement in 1900. Although we have had such a successful season in 1899, and have made such a large quantity of cheese, 2,400,000 boxes, of which were shipped from the 1st of May to the 1st of January, 1900, about 16,000 boxes less than we shipped the year before, yet we received 2c. a pound more on account of being a better quality, of course the market being better as well ; but I lay stress on the fact that the quality of the goods was better, which fact brought on account for cheese in 1899, two million dollars more than we got in 1898. Now I think that is a big thing to be able to say, and I believe we can make more than two million dollars improvement in 1900 provided we can get all our people to unite heartily, on this the first month of the year, in doing the very best possible in connection with our Dairy business. I believe there is not a solitary person in this audience who, if he would take the pains to increase the quantity and quality of the cheese he makes, could not put it on the market in a finer condition than that he made last year. The United States has ruined its trade through being dishonest in sending out cheese and butter marked "first class," but really "drugged." Cheese factories should be improved and their drainage should be properly looked after, as well as their other sanitary conditions. Cleanliness is one of the greatest of virtues in making cheese or butter, and should be strictly enforced. Boxes should be of proper and regular size. Care should be exercised in transporting boxes to the cars in order that the cheese should not become tainted. If cheese were hauled to market in a wagon which had been used for hauling coal, no wonder if the value of that cheese would become depreciated. In order to make the best butter and cheese, the best cows should be kept, in the best stables, and the best and most suitable feed should be given them.

Every producer should try to make his own factory the best in the country. He should encourage the cheese-maker and co-operate with his neighbors to accomplish this one end. Mr. Derbyshire discouraged the system of endeavoring, through tendering, to secure the cheapest maker, overlooking whether or not they were getting the best maker. He then went on to give a picture of the internal and external appearance of an ideal cheese factory, where the curing-room was such that the temperature was always under control ; where the refuse was done away with in the same manner in which it would be in the home by domestics, where the surroundings of the factory were adorned with trees to absorb the poisonous vapors and gases, and where that horrible smell, too often an accompaniment, was unknown. Speaking of the economy of having a perfect factory, he said that in a factory of say 3,000 boxes a year, $330 could be saved in shrinkage by having an up-to-date curing-room, while $200 more could be saved in quality, thus making a saving in one season of more than would pay for the entire cost of the erection of the curing-room. He was delighted at the changes that had taken place in 1899, but, with the beginning of the new year, he hoped to see the inauguration of more permanent changes. He hoped to see that the people of the country would show that they have greater faith in the permanency and stability of the dairy interests, and, as a consequence, that more brick factories, where temperature could be better controlled, would be erected. To-day Canada exported $25,000,000 worth of cheese. Next year they could make it $30,000,000, but they must exert themselves, for there will be keen competition with Australian and New Zealand producers. He felt that the two Associations must work hand in hand to stimulate the work, for stimulation was needed, else the country would fall behind. They must demand clean, ventilated cars, so that we can deliver cheese in a fresh condition, mild in texture, rich in body, such as is appreciated by the British consumer. Great assistance had been given in the past years as a result of cold storage, and

by the Ontario Agricultural College of Guelph, of which latter there was no better in the world to-day. But the greatest changes lie in the patrons themselves So long as they persisted in sticking to the old factories, and to the old ways of doing things, there would be no change for the better, but he felt that in the approaching of the twentieth century, Canada would uphold her reputation in the cheese and butter markets of the world. I feel we are going to be right up with it, and that in 1900 we will have the finest goods on the British market, and receive more money than we received this year.

THE FARMING OUTLOOK FROM THE STANDPOINT OF AN OBSERVER.

By Andrew Pattullo, M.P.P., Woodstock.

In appearing before you this evening, in spite of the kindly words of my friend the President, and of some old and kindly faces that I see before me that I remember very well at former meetings of the Association, I feel very much like making, if not an apology, at least an explanation or confession, and telling you that I do not feel at home in appearing before you to-night. In the first place, it is somewhat difficult to speak after my friend Mr. Derbyshire, who, as you know, is the professional beauty of the dairymen of this country. (Laughter.) And again, it is very hard to follow a man who not only looks like Mr. Derbyshire, but who speaks as well as he does. My embarrassment is increased in the glare of these beautiful lights. I come from the sweet rural seclusion of Woodstock, where we have not got such a building as this. We have a building there that I would scarcely like to describe to you. When I looked over the programme to-night and saw the number of distinguished names, I said to myself, "Why, that is easy, I will never be missed, and of course it won't be necessary for me to say anything more than a word or two" Then my friend Mr. Hatley, the Secretary, made matters worse by writing on the envelope he sent me my invitation in stating "we have only sixty-three essays on cheese and butter making," so of course I thought that was only another channel to let me out, and therefore I am afraid I have come before you to night not prepared to give you much solid matter. I fancy one of the reasons they asked me to address you was out of courtesy to the old Presidents of the Association. I have consented to say a few words upon what I regard the farming outlook in the Province of Ontario, in the Dominion of Canada, from the standpoint of an observer, and let me say here in the beginning that I am not a practical farmer, although brought up on the farm until I was of age, and have made a life study of some of the phases of farming, yet I do not speak to you with the authority that many men in this audience before me could, but sometimes, perhaps, others can see us better than we can ourselves. I am glad to see so many of the younger element of the dairy farmers present, because I am able to speak to them in a spirit of hopefulness with reference to the farming outlook in this Canada of ours. Some years ago, through causes which I do not need to go into, there was a world-wide depression in which we shared. Things over which nobody in this country had control brought about in Canada a period of distress which was felt in other countries as well as ours. That period made an impression upon me which I have never forgotten. I may tell you that for the first time in my life I almost despaired of the future of the Canadian agriculturists, because I heard so many young men say that there was no future for them any longer upon the farm. Allow me to say that I am not one of those who believe the farmers grumble any more than any other people. They do a little of it, and I suppose we hear a great deal of it because their calling makes them so dependent upon the weather. At that time there certainly was a very great deal of grumble among the agriculturists of Canada. One instance that impressed itself upon me was a gentleman who occupies a very high position in this country, no less a person than the Minister of Agriculture, in a public address gave some figures with reference to the chattel mortgages which had been given out by the farmers of Ontario in a few years, and which startled the country. They certainly produced rather a gloomy effect upon me at the time. I mention these facts for the reason that I believe, for some years past, things have been steadily improving upon the farm, and that the outlook for agriculture is certainly very satisfactory. This is important, not only for the farmers, but for the city people as well. During the past few years, from days of gloom we have been rapidly advancing into days of prosperity, and I may say with reference to

the things that have brought this about, that I do not think all these things are of our own making. I do not think we of the Dominion have control of the things which have made us prosperous instead of being as we were some years ago. We have been extremely fortunate. Farm values have increased in the Province of Ontario, in spite of the opening up of the West and the throwing of great blocks of new land into the market. I observed the other day that this year no less than one-half million acres of land has been plowed in Manitoba more than there was last year; yet at the same time and in spite of the opening up of the West, there is a steady increase in farm values in the Province of Ontario, and there has also been a steady increase in the profits of the farm. Some years ago a stock-breeder of Ontario said that he thought the stock business had about passed out of the hands of the people of Ontario—that the great ranches of the West had destroyed it—but I venture to say there is not a stock-breeder here who does not feel that the prospects of the live stock trade in the Province of Ontario are to-day extremely bright.

My friend Mr. Derbyshire made one observation which recalled to my mind the importance of the value of organization in connection with agricultural matters. He referred to the necessity of having better freight rates. It is not many years ago since freight rates for stock between here and the North-west were almost prohibitory, but, through the organization of the live stock associations, these rates have been very greatly reduced, and are now regarded as fairly satisfactory. There is a lesson in that for this organization. Not many years ago we heard nothing about Canadian pork in the British market. We have made marvellous advancements since that time, and now one of the chief sources of profit to the Canadian farmer for many years past has been the raising of hogs, one of the by products of dairying. The production of pork is of enormous importance. I believe, after closely watching this great industry for many years, that the farmers should know how to breed the right class of hogs, to know how to feed them economically, and that they can and will take hold of this industry and make it very profitable. Now let me touch upon one or two other branches of Canadian agriculture, which encourages me to great hopes for the future. We sometimes despise the little Canadian hen, but it has made more wealth to the people of this country than you think. A few years ago, everybody thought that that bird would have to go out of business on account of the tariff in the United States. We were told that the Americans had smashed the egg industry of this country. Why, sir, you cannot smash any industry that is in the hands of an Anglo Saxon people. (Applause) The only effect of the rather unneighborly conduct of our neighbors was simply to make us determined to find some way of putting our goods upon the British market in perfect form, with the result that to-day the egg industry is extremely prosperous. Connected closely with the production of eggs is the production of chickens. I remember some years ago hearing a public man in this country speaking, and somebody asked what his business was, and received in a contemptuous way the reply, "Why he is a chicken farmer," as if that were about the smallest thing on earth. Now let me tell you that I know of no direction in which the young men can do better than in the production of chickens except, perhaps, in the fancy cow business, and if I can induce some of the young men who loaf around the towns and cities of this country doing nothing, if I can induce some of them to go out into the country and become chicken farmers, I would be one of the greatest patriots in this country. In the town of Woodstock, during the past few weeks, some of the papers were poking fun at my friend Professor Robertson, for starting an experimental chicken-feeding establishment down there. The idea of the Government teaching the Canadian farmer how to feed chickens, as if the wives and daughters of the farmers had not known that years before! But do you know that small experimental station has had a wonderful effect. They collect five hundred or a thousand chickens there and feed them, and the farmers' wives go in to see how it is done. And this feeding station has had a profound effect upon my mind, for I am sure it will lead to a great development of the industry of breeding fowls in that district. A curious thing happened in connection with it the other day. A gentleman down there, who is well known as a feeder of turkeys, came up and got a lot of pointers from this Government station. The returns from the station have been extremely good. He sent home a lot of birds fed exactly after the instructions of the Government, and he wrote on the wing of one of the turkeys sent over to England these words, "This turkey cost me two dollars and so many cents; will who-

ever eats it be good enough to write and tell me how it turned out, and how much he paid for it?" A lady in England wrote back saying "I paid for this a guinea, and something over," so the breeder thought somebody must have robbed him Now there was no robbery about it. I am telling you that for a practical purpose, and the lesson in this, there is absolutely no limit to the market in England for fowl that is properly bred and raised, and properly fed, and properly killed, and properly shipped at the right season. Not only can hundreds, but millions of dollars be added to the wealth of the Province of Ontario every year, simply by breeding chickens (Applause). That is one of the reasons I say the farming outlook of this country is bright, and I say it for the purpose of inspiring the young people of this country with hope in the future of the country, and of leading young men to stay upon, rather than to leave the farm.

Now I am not going to discuss how to make butter or how to make cheese. I have made it a rule of my life, never to talk in public on a subject to people who know more about it than I do myself, but I do want to make a few observations in reference to what I have seen in connection with the butter industry. I am a publisher, closely in touch with the farmer. Coming from the farm as I did, it was a matter of amazement to me some years ago to see the quality of Canadian butter. I could not have gone out and taught anybody how to improve it, but I knew very well it could be improved, and ought to be improved, and I knew that the farmers' wives of this country were losing hundreds of thousands of dollars, and that the country was losing millions of dollars every year by making bad butter instead of making good butter. Let me tell you a little incident in connection with making butter which happened some years ago when the travelling dairy was started. Two ladies were discussing it and one said to the other, "We had better go and see what it amounts to." The other said, "What is the use of doing that, as if a number of young professors from the Agricultural College can teach farmers' wives about making butter." Her neighbor went, and she got a lot of pointers from these young professors from the Agricultural College. She put them into practice, and a few weeks afterwards they drove into the market together, and took their butter to the grocer who had been in the habit of buying it. He looked at the butter in surprise. It was done up in parchment paper, and he said "Mrs. So and So, I will give you three cents a pound more for that butter than I have ever given you before." The other lady said, "Well, I am glad that butter is up in price three cents" He looked at her butter and he said "Oh no, it is not up in price at all, it is only the difference in quality. I cannot give you any more than before." There is the whole story. The creamery men upon one side had been teaching you how to make butter, and that little travelling dairy did a good deal in another direction. I will tell you how I, as an observer, know that the people of this country are making better butter than they did, and it is this. I remember not so many years ago that butter used to be brought in, or rather what I used to regard as the old "axle grease of commerce" used to be brought into the market, done up in cabbage leaves and cloths of uncertain age, of course always nicely washed. At the same time the butter did not look well. That is the way I remember butter in my early years. Now how do they do it? Done up in beautiful rolls, uniform in size and protected by parchment wrappers. Some years ago I got a pointer as to how I could buy parchment paper cheap, and nobody else in this country seemed to know how to do so except a few wholesalers. We started in and bought a few bundles of this parchment paper. One farmer would come in and get it as a great curiosity, then it grew a little, and, in a year or two, what do you think occurred. We in the little town of Woodstock in my business were ordering this butter paper by the ton, direct from the mill in Germany, where it is made. Could you have a greater object lesson than that? It means that all the farmers' wives in that district, were putting up their butter in a proper way, and that these men in the creameries and others who have been teaching the others in this country how to improve the value of their butter have been increasing the profits of the farmer to hundreds and thousands of dollars, and yet we are only at the beginning of the butter trade Some years ago we were supplying 42 per cent. of the cheese to England, and only 2 per cent. of their butter. There is a market in England for everything the farm can produce, provided you produce it of the first quality.

Now, ladies and gentlemen, I shall not dwell upon the subject of cheese, but will say this with reference to some observations of my friend Mr. Derbyshire, that I share with him his regrets as to the failure of the effect of work done by these associations. I have

attended these associations in years past, and heard words of practical wisdom and knowledge, and I have wondered why it is that there should be a single pound of poor cheese made in the country, and yet the great unsolved problem of the dairy business in Canada is, how to get at the men who most require to be got at. I do not believe many of you require teaching, but if you could go out and get at the patrons of the factories, get out on the side-lines of this country, and convert them to the sound gospel of dairying, then there would be a revolution indeed. How to do that is the problem you have to solve. They say the chain is never any stronger than its weakest link. That weak link in the dairy business to day is that, while there may be ninety patrons who won't send bad milk or watered milk, who won't send milk that will make bad curds, there may be one or two or half a dozen in each factory who will; and the men who do that spoil the produce of the whole factory, just exactly as the men who pack apples fraudulently, have been destroying what might be a great and profitable trade of this country. I am sometimes inclined to thank kind Providence when I hear of old cheese factories burning down. One of the things that stands against the cheese industry in this older part of the country is the old factories with all these unsanitary horrors underneath. They do infinite harm and create infinite loss, while new districts, starting and taking the advantage of your experience, have actually gone ahead of you Now, in conclusion, I want to say what I regard as two or three great problems of the Canadian farmer to-day. I believe the outlook is bright, and that there is a hope for the young farmer in Canada. What are the problems to be solved in order to have success in the future? First of all you must produce the best and only the best in every line. The farmer who goes along in the old way is out of it. Just now we are watching two nations in a death-like struggle in a certain part of the world, a struggle which thrills our British blood, as it never was thrilled in my day, nor probably in yours (Applause.) But let me tell you there is just as big a contest going on outside of war, as there is on the battle field between the nations of the world, between you and your neighbors, between the people of this country and of New Zealand and other lands. What is it? It is an industrial contest in which those who win are those who are the most progressive and the most enlightened. You have the markets of Britain to day, but you may not have them ten years hence. Others have them in some respects to-day. You can take them from them, as you have done in some directions during the past few years. Will you do it? You can only do it in one way. If you send cheese, you must send the best cheese that can be produced. If you send butter, you will ruin your reputation if you send bad butter, or anything but the best butter. If you send fowl, you must suit the fancy and the taste and the desire of the British people. You cannot shut out the light in these days. These are days of education not here only, but in the United States, and in every other country in the world. What you know to-day, somebody in some other country will know to morrow. The men from Denmark, or from the United States, will slip into your gatherings here, and take away all that you know; and he will spread the light there. You cannot shackle the brain in the end of this 19th century. What is the lesson? Simply to realize once and for all that you have to fight it out, and that you can only fight it out on the lines of progress. There is another problem you have to solve in addition to that, and I have hopes for the future, because the public men of this country are determining now as they never determined before that it must be solved. I refer to the question of transportation. (Applause). That is one of the problems of the future, how you can get it cheaply, quickly and in perfect form, on to the markets of the world. Mr. MacLaren can tell you how zealous the men of both parties at Ottawa are, and I can speak for those of Toronto, how zealously the men of both parties are taking up this problem to-day, demanding that it shall be solved. A good deal has been done during the past few years in providing better accommodation on steam-boats and railway lines We are not entire masters of the railways, but we have a good deal of influence over them, and I hope we shall have more. If we could go back a few years, previous to the time we gave them such great subsidies, I think we could give them in such form as would give us some more substantial control over the freight rates than we have now. You must, as Canadian farmers, keep this great question in view. I shall not dwell upon the subject of cold storage because it would take too long.

I desire to touch upon the question of agricultural education, and this meeting right here is one of the best educational meetings I know of. With the agricultural college I

include the experimental farms of the Dominion Government. I say at these meetings and through associations of this sort, is where the education of the Canadian people is going on. I do not take so much interest in the institutions which turn out doctors, who are already in too large numbers in this country, and lawyers without most of whom we could get on very well. I think these gentlemen should be left to get their professions and to attend to themselves, but I am profoundly interested in the education of the boys and girls of the Canadian farm, and in the Canadian workshop, and unless we make their education the supreme object, we are entirely wrong. I am glad to see that the Government is beginning to realize that we are getting more practical. We are getting admirable books now upon agriculture. I do not think we could adopt agricultural education in the public schools, in such a way as to make boys and girls farmers, but I hope to see, in the future, young men and young women who come from Guelph, from the various departments of that college, utilized in public schools. Instead of forcing the boys and girls away from the farm, we should endeavor to teach them to love the farm, and remain on the farm, where, I say with perfect assurance, there are more chances of success than there are in the towns and cities of this country to-day. I should like the teachers of this country to take the boys and girls of the public schools out into the fields and unfold to them the beauty of nature, teach them something about the flowers and about destructive weeds, teach them about insect life, teach them something about the soils and what we can produce from the soils; in other words, teach them something that will be useful to them and by which they can make their living; teach them love of the farm and of rural life; and teach them the dignity and honor of labor instead of the reverse. (Applause) If we do that, I believe we will advance the future of Canadian agriculture, which though now bright will be brighter still in days to come. We are just now beginning to realize what a glorious country this Canada of ours is, what a variety of resources we have. We talk about our great timber resources and, though there is no doubt we have the best remaining timber of to-day, and that will last us for many generations, yet the timber will pass away. You know that the towns and villages which were depending upon the timber in the old sections of the country have passed away. They same may be so in the future. We know that the fishery wealth of the country may pass away, because it may not be kept up. We also glory in the fact, that in this new Ontario of ours we have untold wealth of gold and silver which we propose to develop, but that may be dug out after a while and may to some extent pass away. The same thing may be true of all our vast resources of pulp wood and our vast resources of nickel. All these may be only temporary. But I tell you of something that is not temporary, but is eternal. The great source of wealth of this country, which will never pass away, is the farm, it is the land. (Great applause). In England, land which has been cultivated for a thousand years, produces more to-day than it did a thousand years ago. And so it is with the Canadian farm I say to the boys of this country, stick to the farm; and remember that that is the real source of wealth for the people. I say the prosperity and future of this country, and of every country, depends on its one eternal mine of wealth, the farm. As a young Canadian, I have perfect faith in this country. I believe in its resources. I believe in its destiny. But if you asked me to say in a single word why I believe in the future of the Canadian people, I would say it is, because we have a population unsurpassed in the world who are of the farm; who believe in the farm; and who are adopting progressive ideas upon the farm. I believe in the future of Canada, I say, because I believe in the Canadian farmer and the farm. (Applause.)

DAIRYING AND ROAD REFORM.

By A. W. Campbell, Provincial Instructor in Road Making.

It is with great pleasure that I appear before you, especially when I have been asked to follow the gentleman who is the father of the road reform movement in this country, Mr. Pattullo, who has so ably addressed you here to-night. About five years ago, I believe it was, when he first asked that this agitation be put on foot for the purpose of discussing whether or not the condition of the common roads of the country were as good as they could reasonably be expected from the amount of labor and money which wer

spent upon them, whether or not the system under which our roads were being made was as good a system as could be adopted, and, if not, to lay down some system by which these roads could be made. I think the time has arrived in this country when, owing to changed conditions, a changed method for the making and maintaining of our common roads is necessary. We are all aware that under the present system much work is being done, much labor being wasted, much money being practically squandered, and that the results are by no means consistent with the expenditure. At a convention held in Toronto it was considered advisable that the County Councils of our Province should be given control of the main leading roads in every county, and that the money which is now being spent upon these main leading roads by the Township Councils should be collected in one common fund, and that the money should be deposited in the hands of the County Councils and should be spent by them. That the making and maintaining of the roads in the townships should rest in the hands of the Township Council. It was also recommended that requests be made to the Provincial Legislature to assist, as well as might be in their power, by way of appropriating money to the County Councils to assist them in improving and properly maintaining these roads. Such a requisition as this is before you to pass upon. It may be objected to by local Councils that the Township Councils are in as good a position as the County Councils to maintain these roads ; that by placing these main roads in the hands of the County Councillors greater taxes would be levied, and for that reason increased burdens for road purposes would be levied. But I can assure you, by a careful study of what roads are really costing you at the present time, that it is a lack of system that is causing such poor results for the amount of expenditure. We are well aware that the statute labor system has many very commendable features. It is a system which naturally appeals very warmly to the majority of ratepayers in the townships who have had to do with the building and maintaining of roads from the time the law was enforced ; but, with changed conditions, changed circumstances and changed requirements, I think the time has arrived when we should make some change in the system of keeping up the roads that would give us better results without in any way increasing the expenditures upon them. The statute labor system is a system which I believe at one time performed a service which could not possibly have been performed by any other system in this country, when the country was a wilderness and sparsely settled, when the people had no money to spend upon roads, when they were obliged to cut down trees, corduroy the swamps, and bridge the streams and do all this work by their own labor. Then I think the statute labor system was a proper system to adopt, and I believe it was as good a law as was ever written upon a statute book. But, sir, the manner in which the statute labor was performed in those days is so entirely different to the manner in which it is performed to-day that it has almost reduced itself to a farce, and has become the laughing-stock of the progressive farmers in Ontario. It is not surprising to find that last year we spent about a million days of statute labor upon the roads of the Province of Ontario, and that in addition to this the Municipal Council spends about three and a half million dollars of money annually by making appropriations from the general funds of the municipalities. In the last ten years there have been spent upon the common roads of the country about ten million days of statute labor, and in addition to that about thirty-five millions of money. I have frequently said that if I was given these thirty-five millions dollars of cash and ten million days of statute labor, with authority to impose a proper expenditure of that labor, amounting in all to about forty-five million dollars of money, that I would undertake to gravel and macadamize, in a first-class manner, every rod of road in the Province of Ontario. Has this been done? It has not. And if it has not been done, then, gentlemen, there must be something very faulty about our system of expenditure, and as this fault exists is it not in the interests of the people that we should, in an Association of this kind, look into this expenditure and see where the weakness lies? In the county of Perth, in which we now stand, I find that at the present time there is being expended 33,200 days of statute labor, in addition to which in this county, there is being expended out of the general funds of the municipalities $33,150 in cash. This money is taken from the pockets of the ratepayers. It means only about one-third of your annual tax bill in the county of Perth. The total expenditure of money and labor is $66,651, which for the last ten years has been spent upon your roads. It amounts to an expenditure of nearly three-quarters of a million of dollars. I ask you who are acquainted with the

condition of the roads, whether or not they have improved in this county in the last ten years, and, if so, have they improved in keeping with the expenditure of nearly three-quarters of a million of money? In the county of Middlesex I find that the expenditure there has been in the last ten years 55,000 days of statute labor, and in addition to this 750,000 dollars of money—in all in that time an expenditure of 1,250,000 dollars. I happen to be familiar with the roads in that county, and can say that, previous to the last ten years, all the main roads in the county were constructed by the County Councils or by toll road companies. Since that time many of the lateral roads have been gravelled and improved with an inferior quality of material that will not stand heavy traffic, so that in the spring and fall these roads are very often axle deep in mud. Now, sir, with that expenditure of over one million and a quarter dollars upon the roads of one county, which is a very small section in this Province, I contend that the improvement is not in keeping with the expenditure. Heretofore we have considered this question of road-making as one of little importance, one not worthy of consideration, but when we come to find that the expenditure through the Province is greater than the total expenditure of the Ontario Government on its schools and public institutions and every other class of work it maintains to-day, then surely to goodness it is of great enough importance to spend at least a few hours per annum in considering and looking into. Is there any person in this audience who can tell me what the system of road-making is in the county of Perth at the present time? At the first meeting of the Township Councillors they appoint from 80 to 100 path-masters to work on road-making. They provide these men with no plans or specifications or instructions. They are simply asked to go out upon their respective beats and do the work according to their best judgment, secure as much work from the individual farmers as they possibly can, and have it performed in the best possible way; and you find one hundred different ways of making roads. One man believes in a narrow road and makes it 15 feet, another one 20, another 30, and another 40. The next year these men are dismissed and a new lot of men appointed, and the man of this year believes in a wide road where the man of last year believes in a narrow one, and so the work is thrown away. In the county of Perth each year you appoint 856 path-masters. You change them every year so that in the past ten years, leaving out a number who have not been changed, you have had nearly 7000 path-masters directing the road-making in this county. I contend it is utterly impossible and hopeless for you to expect to reap permanent, substantial, and and economical results until you have reduced this work to a business basis and have laid down some proper plan for the guidance of these people.

The question of road making is a simple one. It does not require any particular engineering skill, or the service of any great experienced people to direct this work, but it does require that your Township Council should arrive at some definite plan of action, and that they should lay down that plan and follow it. I contend that it is the duty of the Council to classify these roads. About one-third of the roads are main roads, subject to traffic by the whole community, which require to be made of a wider grade, and require to be built in a more expensive and substantial manner. Another one-third are by-roads, leading to the main roads, used only by neighbors. They do not require to be made of such liberal width or built in such substantial manner. Then another one-third are back concession roads which are subject to very little traffic and do not require such expensive treatment as the main roads. The first thing to do is to classify these roads, and lay down a plan. The main road should be 24 feet in width, the next class 20, and the next 18 feet. I have always contended that a rise of one inch to the foot from the centre to the side at the edge of the ditch is sufficient. This makes a road 24 feet in width, 12 inches higher at the centre than the side, and I contend that that grade should be made uniform. Now, then, with nearly three and a half millions of dollars spent in the Province each year on our roads, we find that the major part of this money is spent on leading roads to keep them in passable condition. A lot of time is thus wasted under the system of the statute labor. Just about the time the taxes are due, the farmers in some neighborhood ask to have some improvements made on their road, and they turn out to perform the work and you know how it is done. Not as you would perform the work, but as men who are more anxious for the money than they are for the improvement, do the work. They turn out with horses and waggons which would not be accepted by the contractor of any work. They haul loads of gravel, a wheelbarrow full and a half instead of a yard and a half, of material which is not fit to be put on the road. In this

way the money is being squandered, and in this way work is being neglected, and the best results are not being produced. Now then, if we get the leading roads constructed in first-class shape, they will serve as an object lesson for the construction of the remainder of the roads, and I contend that by placing these main roads in the hands of the County Councils, they can, if they purchase first-class material and have them properly built, and have the work done in a business-like manner, easily construct one hundred miles in each county, and have it constructed at a very much less cost than the cost of maintaining these roads at the present time. Township clerks have sent reports to me showing the amount expended in the last fifteen years upon leading roads, and the returns show that the cost of these roads is greater per mile per annum than the cost of maintaining some of the best roads in England or France at the present time. In the County of Hastings they have done the work in a systematic manner, and have made great improvement. I will make this proposition in connection with the County of Middlesex, I will undertake to take over 150 miles of road in that county to-day, and will, in the next ten years, without increasing the expenditure one dollar beyond what they are spending upon them at the present time, macadamize every rod of that 150 miles in the most substantial manner. The conditions in Perth are the same, and, from the reports I received, I will stake my reputation that if you to-morrow place these roads in the hands of the County Council and they transferred them to me, I will simply collect the money that is being annually spent upon them during the past ten years, or that they will spend upon them in the next ten years, and I will macadamize from end to end 100 miles of these roads. I have made that proposition in I suppose 40 counties out of the 50 in the Province. I make it here, and I make it knowing from the reports I have received that this money is being squandered and wasted for the want of proper methods and proper supervision and the use and application of proper material. I am not paid to come here to try and deceive you. If it is found that I make a statement that cannot be carried out, then, by making the proper representations to the department that employs me, my head would go off inside of 24 hours. But in the interests of the people I come out and am not afraid to make this statement, knowing that it is true. I contend it is for you, and for similar representative bodies, to wait upon Mr. Patullo and Mr. MacLaren and other representatives of the people and say to them, "If you have money for the purpose of assisting in the construction of railways and canals and other work, and if you can possibly spare it, we think in the interest of the farmers in this country, you should assist to some extent in the improvement of the roads," and I would net be surprised but what your requests would be granted. But I fear that the Legislature are of the opinion that the farmers do not thank them for the assistance that they give to them.

It has been referred to to-night that the question of transportation is one of the greatest problems before the people of this country to-day. I indorse that statement fully. I contend that it is in the interests of the farmers in this country that they should see that the products of the farm are taken from the farm to its ultimate destination in the least possible time at the cheapest possible rate, and in the best possible condition. In this connection steamboat companies are enlarging the capacity of their vessels, are spending enormous sums of money in increasing that capacity, and in increasing the speed; and the Government has spent millions of dollars of money in the improvement and enlargement and deepening of canals and harbors. Railway corporations are spending millions of dollars in lowering grades and in making roads hard and smooth, and while all these corporations are spending this money, surely it is for us to pay some attention to the improvement of that more important part of the system of transportation, the common roads that lead from the farm to the railway depot. What would be the use of these railways and canals if it were not for the common roads of the country, and it is to this branch of the work we should devote our attention and make the greatest improvement. I believe in removing every obstacle from the machinery of transportation, and I do believe the greatest clog is the bad condition of the common roads of this country. (Applause.)

Hon. Thomas Ballantyne: One of the most difficult matters we had in connection with the starting of our factories was the question of our roads. It is a live question to-day, I know nothing of more importance, and I think the scheme Mr. Campbell has outlined is the very best thing we have heard about. I hope every one of you will go

away impressed with the importance of this subject. There is another matter of great importance, and that is cleanliness, and I hope you will insist upon that.

Moved by Hon. T. Ballantyne, seconded by D. Derbyshire,—

That, in view of the fact that the Agricultural returns show that in 1898 75,000 patrons supplied milk to 1,280 Cheese and Butter Factories in Ontario, the value of whose output was some 12,000,000 dollars ;

That, in view of the fact that the four Inspectors of this Association continue to report annually that milk from many of these patrons is sent to the factory in a condition as regards quality and cleanliness which materially decreases the value of the output of the factories ;

Further, that inasmuch as the Annual Reports of the Inspectors show the sanitary condition of a notable number of factories to be such, in the matter of construction of floors, curing-rooms, etc., and in the disposal of the sewage and whey as to cause a notable depreciation of the manufactured products ;

Be it therefore resolved, That this Association does hereby affirm as its opinion that the the time has come when at least one scientific medical health officer, trained especially in Bacteriology and Sanitary Science, should be appointed in each County of the Province, whose whole time shall be devoted to the oversight of the public health of his district, and especially of farm premises whence come these milk supplies, and of all the factories where they are manufactured into butter and cheese ;

And to this end does hereby instruct its Executive to bring this important matter before the Provincial Government, with a view to having amendments to this end made in the Public Health Act at the next session of the Legislature.

That is the resolution I have much pleasure in submitting to you. The question of health is in its infancy in this country. They have made great advancement in the old country. It would pay us forty times over, in the improvement of the dairy products of this country, if such an officer were appointed with power to put the necessary machinery in operation to enforce it.

Mr. Derbyshire : I believe this resolution is in accordance with the best interests of the dairymen of this country.

The resolution was carried.

THE EFFECT OF LIME SOLUTION IN CHEESE-MAKING.

By Prof. H. H. Dean, Ontario Agricultural College, Guelph.

Before I take up my subject proper I wish to make a few introductory remarks on some points relating to dairying. I have done what I have never done before when addressing the Association, I have written a paper. It is a technical subject, and you can always handle a technical subject better in the form of a paper than you can in the form of an address. A number have come to the dairy convention expecting to hear something new. Now, it was said by a very wise man that there was nothing new under the sun, and so all that any speaker can do is to present old facts in a new form. I have attended the Dairy Association for ten years and I have found it a very difficult thing indeed to get anything that is absolutely new, in fact it is almost impossible. I have heard some complain that it is the same old thing every year ; but we need to be continually brushing up our ideas so as to stimulate us to do better work.

If there is one thing which characterizes the twentieth century it is the forward movement in dairying. We cannot afford to rest on what we have done in the past. One of the speakers last night referred to the fact that there was a great struggle going on among the different classes. In all life it is a struggle for the survival of the fittest, and in all dairy work it is merely a struggle for the survival of the fittest, and the fittest men and the fittest women are those who are going to survive in the struggle. In the coming century it is for us, as dairymen, to prepare ourselves for the issue in the best possible manner. If we are going to survive the struggle which is going on about us, we want to get the very best men possible in our cheese factories and creameries, and I hope the time will not come when our best men will grow discouraged. I am going to refer to one thing which I am sorry to see growing in this country. It is to some extent copying from our American friends. They have very many good things under the Stars and Stripes, but there is one thing which I think we would be very unwise to follow. I refer to the practice of manufacturing butter and cheese on Saturday night and Sunday.

In a short trip around our factories I find this to be a growing evil, but I hope we shall take measures to prevent the spread of that thing, and not on sentimental grounds at all. I believe it is an inborn principle in man that he shall rest one day in seven, and I ask you how are we going to keep our best men in the creameries if we work them from 5 in the morning till 8 at night every day, and then on Saturday night and on Sunday. This is a free country and men will not put up with that sort of thing, so I hope all those who are interested in the factory will do their best to overcome the evil. The late D. L. Moody tells a story which illustrates the question of Sunday work. He says that a man was employing another man who objected very strongly to work on Sunday, and that his employer said to him, "Does not your bible say that if your ass gets into a pit on Sunday you shall pull him out? "Yes" said the man, "but, if I had an ass that was in the habit of getting into a pit every Sabbath day, I would either fill up the pit or sell the ass." Now, sir, it has come to the point in connection with dairy business, that we should fill up that pit or do something to the men who are responsible for this Saturday night and Sunday work.

In connection with testing, the question was asked yesterday why it has not been more generally adopted in chesse factories and creameries in Ontario. I will tell you why. There is a suspicion among the patrons that either the test is not right or that it is not properly operated. I think the system of testing the milk in cheese factories and creameries in this Province will not become general until you do something to remove that suspicion. During the past season a great many letters and samples of cream have been sent to our department for testing, because the patrons were suspicious that the testing was not properly done. We will never be able to do much on that line till we remove that suspicion. How can that be done? Last week I had the privilege of attending the State Dairymen's Association in Vermont, when I met a number of keen, sharp Yankees who had made a study of this subject, and who had brought pressure to bear on the Government in the State of Vermont, and now they have a law which requires that every operator of a Babcock test in cheese factories and creameries, where money is divided according to test, must have a license from the State Experimental Station Agricultural College. I don't know whether we have reached the point in this country where we are prepared to pass such a law as that. I certainly think it is a move in the right direction. Mr. Hill, who has charge of their dairy school, told me that out of those who had applied for a license thirteen per cent. proved at the examination that they were wholly incompetent to operate the Babcock test, and that, therefore, these men are not allowed to use the instrument. They go further, they have a State law which says that all the glass work in connection with the Babcock test must be branded by the experimental station. Very many of the bottles sent out to our cheese factories and creameries are not correct, and I think it is time we had something to insure the correctness of the test. I believe the time has come when we should have a disinterested party doing the testing at our cheese factories and creameries, unless the operators of a Babcock test can show they are fully competent to use the instrument. Last year I suggested that we might have a disinterested party in charge of a central station where samples could be sent and tested. I think until we do something to remove the suspicion in the minds of the patrons it will be very difficult for us to introduce the testing to any great extent. I am sorry to admit that, in the Province of Ontario, instead of the testing being more generally adopted I believe it is being less so each year.

Another point I wish to refer to is, it is necessary in connection with our cheese factories and creameries that they should have improved drainage, and an improved manner of cleaning the drains. I don't think we can emphasize that too strongly.

A great many of the makers complain about the patrons being dirty with the milk and not taking proper care of it, but I can scarcely see how makers can have the nerve to say anything to their patrons about cleaning the cans, when the patrons visit their cheese factories and creameries and see that the factories and utensils are not nearly as clean as they ought to be. And there is no excuse for it. If there is any one thing in connection with our dairy school work which we try to drill into our boys, it is that they must keep things clean and tidy, and I believe our boys do make an honest effort to try and keep things clean. In some factories it is impossible. The maker does not own the factory, and he cannot afford to put in floors, or to improve the drainage.

I hope the time will come when the maker will be part owner. I approve of the principle of one of our makers who stipulated he will no longer engage single men, but would have only married men working for him. That means that a man will be anchored to one spot. I am afraid that we have in our factories too many of what we might call "Floating Curds" who are not anchored in any one spot. Now, on the question of cleanliness. I read recently of a colored preacher who was asking for a collection. He was a pretty cute old fellow and he said, "Now, brethren, we are going to have a collection this morning for foreign missions" and he said, "for the sake of heaven don't let the person who stole Widow Johnston's chickens last week put a cent on the plate." Now, any men who have not their cheese factory cleaned in a first-class manner, don't for the sake of heaven say anything to the patrons till you get everything cleaned up yourselves.

I believe it is possible, without any large expense, to improve the drainage about our cheese factories and creameries. As to floors, there are two materials which I prefer; first, cement floors. If properly laid there is no doubt about it the cement floor is the most durable floor, most easily cleaned, and the least likely to get out of order, but if it is improperly laid, it is one of the poorest floors possible. Of wood material, I don't think there is anything better than the best selected pine, but it needs to be properly laid. The pine should be put together with white lead, the whole floor thoroughly soaked with a mixture of linseed oil, turpentine and driers. On our own floor we use one gallon of oil, one pint of turpentine, and one pint of Japanese drier. On a new floor we give it three coats. These floors should be coated at least once every year. By doing this you prevent the water getting into the wood, and the floor will last longer. It does not cost much. Just take a whitewash brush and put in a handle about as long as a broom handle. It is surprising how quickly you can go over a big floor. You can go over a creamery floor in less than an hour, and the expense will be less than a dollar. These floors, if properly looked after, will last a long time.

One word about drainage in cheese factories and creameries. I find that in using drains lined with galvanized iron they soon become useless, because the iron gets eaten out and the dirt gets in under it. If I were making a wooden drain, I would take a solid piece of timber 8 x 8, give it the necessary slant and then connect with your drain outside. If you are using well water, you should use sewer tile for taking the sewerage away from the factory. If you use ordinary drain tile the ground soon becomes filled with sewerage from the building and gets into the well. If your factory is near a spring, I am satisfied you can best handle the sewerage by a filter bed; for an ordinary factory a place about twenty feet square and about two feet deep, using the dirt which comes out of the ground for building up the side, then fill in from three to five feet of gravel and sand. Put in the bottom under the gravel one row of six inch ordinary drain tile. It has been proven that water which comes from sewerage filtered through such a bed as that is perfectly harmless. The bad germs have been taken out through the process of filtering, and the water which runs away from such a filter bed may go into a creek or stream and cause no harm at all. I hope there will be some strong movement made to improve the drainage from our cheese factories and creameries. If you have not a proper filter bed, I would recommend running the stuff into a tank, use alum to precipitate the solid matter and then pump out the liquid. I would like the boys in cheese factories and creameries to bear in mind that although this past season has been a very favorable one for the manufacture of cheese and butter, and the price has been extra good, the probabilities are that next year they will need to use extra precaution, because we find that a good year is usually followed by a bad one. You will probably remember in 1898 a number of our boys suffered severely on account of the slow markets, and that a large quantity of cheese was rejected, for they had to put up a lot of hard money. We have not had to contend with anything of that kind in 1899.

Now to my subject proper. In all experimental work, time is needed, and you require extensive proportions. Whenever you set out to find what are the results from any particular line of work you must make all conditions equal. If you mean to find out the effect of the percentage of fat in the milk, you must make all other conditions as nearly alike as possible. Experimenters are apt to draw hasty conclusions, because they have had certain results from one single experiment that they have not thoroughly sifted. The more I look into this question, the less inclined I am to lay down any hard or fast rule. Our bacteriologists at the College have found that there are eight or ten different

germs which cause gas—probably there are 100. I hope this Association will bring pressure to bear on the Government so that we will have one bacteriologist who will devote his whole time to the dairy matters. Our bacteriologist has enlisted and gone to South Africa, so we have no man in connection with the College now. These are problems that would take up the whole attention of one man. My paper is a very short one, because our experiments have not yet been extensive enough to settle very definitely any of the questions to which I shall refer. Part of the work was done by our own cheese-makers, part of the work by Mr. Hutcheson, one of our third year students. The work is in what may be called a tentative stage.

Effects of Lime Solutions in Cheese-Making.

Lime consists of the metal calcium united with oxygen. Calcium is a light yellow metal having an affinity for oxygen. Pure lime combines very readily with water, giving off great heat, and falling to a white powder known as slacked lime. Slacked lime is but slightly soluble in water, one part of it dissolving in 730 parts of cold water.

Carbonate of lime (chalk), sulphate of lime (land plaster) and chloride of lime are other forms of calcium commonly known. According to Solner, calcium exists in milk in the form of calcium phosphate, calcium citrate, and calcium oxide in combination with casein in the proportion of 100 parts of casein to 1.55 of calcium oxide. According to the same authority the calcium oxide is not dissolved in the milk, but is held in suspension. When milk sours, or is coagulated by means of an acid, the lime is separated from the casein and the insoluble casein forms the curd. When rennet coagulates milk, it acts on the casein splitting it into two compounds—a soluble, which passes off in the whey, and an insoluble, which forms the chief part of what is commonly known as curd. Rennet also precipitates the calcium phosphates of the milk, and causes the curd to mechanically hold the milk fat. These phosphates are lost when milk sours, or is coagulated by acids.

Under the influence of high temperatures the lime salts of milk are changed, and owing to the close relation existing between the curdy matter of milk and the mineral constituents, anything which affects these salts also affects the caseous compounds. The Pasteurization of milk for cheese-making renders the curd mealy, flaky and crumbling in nature, and it does not become "meaty" as is the case with ordinary curds. (See samples.) The cheese also lack body and texture as a rule. It is claimed that milk which has been boiled again becomes susceptible to the action of rennet by treating the milk with calcium chloride, or other soluble lime salt. One authority says "I am unable to substantiate the statement of authors, that boiled milk is far more difficult to coagulate than unboiled milk."

In our experiments at the O. A. College we have found that the milk which has been pasteurized does not coagulate so readily as the unpasteurized. The addition of calcium chloride to the pasteurized milk did not render coagulation less difficult, though our experiments are too few to admit of any definite conclusion on this point.

Experiments conducted by Dr. Hillman of Germany in 1896, indicated that valuable results were obtained by adding 0.1 per cent. of calcium oxide in the form of chloride and phosphate. He estimated an increased yield of cheese equal to a value of $2\frac{1}{2}$ cents on 220 lbs. of milk in making skim cheese, and $8\frac{1}{2}$ cents per 220 lbs. of milk in making whole milk cheese. He recommended a larger amount of lime salts for milk from cows advanced in lactation. He also suggested the addition of lime to milk which had been pasteurised for cheese-making.

"The Dairy," London, England, recently summarized experiments made in Germany, on the effect of adding calcium chloride to pasteurized milk for cheese-making.

"The Dairy" reports, "the yield of cheese was in all cases greater where the calcium chloride was used than in the experiments where the chloride was not used." "The use of the chloride was also found to restore the ability of milk heated to boiling point to curdle."

During the past two years a number of experiments have been made at the Dairy department of the College, with the solutions of ordinary lime water, calcium chloride solutions, and a mixture of the two. These solutions have been used with both normal milk and milk which had been pasteurized, or heated to a temperature of 160 degrees.

The quantity of the lime solution added to the milk varied from .3 to .6 of one per cent., and of the chloride there was used about .01 of one per cent. In some cases the lime solutions were mixed with the rennet for from three minutes to twelve hours before adding it to the milk, and in other cases the lime solution was added to the milk a short time before setting.

The results of our experiments may be summarized as follows:

1. An ordinary lime water solution when mixed with rennet for ten or twelve hours before the rennet is added to the milk, destroys the action of rennet, but such an effect does not result if the rennet and lime water are mixed shortly before renneting the milk.

2. Calcium chloride solutions, so far as we have observed, do not effect rennet action adversely.

3. The yield of cheese was slightly greater in several instances where the lime solutions were used, but this difference in yield may or may not have been due to the use of the lime compounds in the milk.

4. There is little difference in the quality of the cheese so far as we have yet observed, though many of them are too green at this time to enable us to judge of their quality.

5. In the case of pasteurized milk, the lime solutions did not restore the texture and body of the cheese, though there appears to be a slight improvement in the quality as the result of adding a chloride of lime solution to pasteurized milk for cheese-making.

6. Our results are tentative at present and require further work to settle the question of the effects of lime solutions in cheese-making.

Mr. McFarlane: How soon do you test the milk after the cows have been milked?

Prof. Dean: The best time is to test it within two or three hours after it has been milked, or as soon as possible after milking.

Mr. McFarlane: Which is the better, the milk which foams up in the pail or that which is at the bottom?

Prof. Dean: There is always a certain amount of air in the milk which foams up.

Prof. Farrington: I would like to ask Prof. Dean what length of time he has kept those cheese to which he has added the lime solution?

Prof. Dean: We have the cheese yet; some are two months old and some only two weeks.

Prof. Farrington: From the test you have made you think the cheese with the lime solution is fully as good quality as that to which no lime was added?

Prof. Dean: There is not any difference, or very little difference, in the quality.

Prof. Farrington: So far as I have ever read that was the one objection to adding lime to the milk. If the cheese was kept longer you don't get the same quality of cheese where the lime has been added.

Prof. Dean: We shall look into that, as we have all the cheese yet.

CHEDDAR CHEESE MAKING.

First Prize Essay.

By Colin A. Campbell, Stratford, Ont.

In considering the art of cheese-making it will be necessary to include not only the manufacture in the factory but everything which has any influence on the results until the finished product is turned out of the curing-room. The farmer, the surroundings, the cheesemaker, the buildings, the conditions, etc., are all to be recognized.

In the first place let us consider the manner of man we should have on the farm. That he should be intelligent, industrious and honest goes without saying, but he requires these qualities in a higher degree in the dairy business than in any other branch of agriculture, for the reason of the wide variation in the profits. One man will be making 20 per cent. to 30 per cent. profit on his investment, while another is losing money and will be perfectly ignorant of the fact. This great difference is brought about by the amount

of skill and care that enter into the work. Therefore I would say that the two great requisites for the dairy farmer to possess are the same as those required in any other business, namely, brains and application.

The day has gone by when farmers can afford to be ignorant. They must study, read, learn, think ; in fact the ideal farmer must be a professional man, and not a hewer of wood and drawer of water. He must be a chemist, a botanist, a bacteriologist, an entomologist, a veterinary surgeon, a mechanic and a business man. All these and other studies are open to the farmer, and some knowledge of all is necessary to his welfare. In fact no other profession offers such a wide field for the intellect, and yet we have farmer's sons overcrowding the so-called learned professions in the cities and towns.

Having procured a man with all the virtues he should possess let us look for a moment at his farm—which is of course a dairy farm. A moist climate, good soil and plenty of pasture are necessary. We do not require a large farm, as a small one well looked after and cared for will be found more profitable than a large one which is neglected and has a big mortgage on it, as is often the case. I would recommend no fences, with the exception of those which enclose the farm, as divisional fences waste land, are an expense to keep up, and a good portable local fence will be found handy and answer all purposes.

As for buildings they should be sanitary, convenient, neat, trim, well built and always kept in good repair.

The dairy stables should be planned so that the dairy stock may be attended to with the least possible amount of labor. They should be warm, roomy and comfortable, 500 to 800 cubic feet per cow. They should be well ventilated by removal of foul air and bringing in of fresh without creating a draught. Have plenty of light and face south if possible. Sunlight is cheap, it is nature's great disinfectant, and even diffused daylight has a beneficial effect. A plentiful supply of pure water is necessary, but it should be remembered that it is for drinking and washing purposes only and makes poor cheese.

Next in order comes our stock. Keep any breed preferred but keep good ones. It need not be imagined that because a cow has a long pedigree she must be a good one, and a breed should not be condemned because it contains some poor animals. As far as my experience goes there is nothing in the dairy line so much misunderstood as the dairy cow. I have had dozens of men tell me that the Jersey cow gives very little milk, but that the quality is good. This is not entirely true Jerseys are noted for giving a large flow of rich milk, and if a Jersey does not do this something is wrong, probably the strain, and the sooner a change is made the better. I would advise all dairymen to learn the points of a good dairy cow, to study the principles of heredity, to buy and keep none but those known to be good, and in selecting a sire to look for something more than pedigree and points. Milk is your primary and final object and the record of dam, grand dam and family in general should be ascertained.

A cow should receive the best of care and attention. A good cow will respond to kindness, liberal feeding and attention to her comfort and wants in general. I would advise feeding some substance such as bran or meal in addition to pasture at all times of the year, and also the growth of soiling crops for use when pasture becomes dry. Avoid feeding anything that is likely to taint the milk, such as turnips or bad water.

All this bears directly on the profits of the farmer, and through him indirectly on the manufacturer's profits and on the quality of cheese made.

We now come to an essential point in the production of the raw material, upon the quality of which will largely depend the quality of the cheese made. This point is emphasized time and again with I fear, small results. Nor do I see how we can expect any great reform until we find some way to bring home to the farmer the weight of his responsibility. The result of his neglect should be a corresponding depreciation in his bank account.

Milk is a secretion of the mamals for the nourishment of the young. It has a specific gravity of 1.028 to 1.034. When first drawn from the cow it is both acid and alkaline in character, but the acid almost immediately gains ascendency and continues up to a certain point, when the alkaline character which has lain dormant begins to overcome the

acid, the latter having evidently worked itself out. Its composition according to the Ontario Agricultural College is as follows :

Water	87.5	per cent.
Fat	3.6	"
Casein	2.5	"
Albumen	0.7	"
Sugar	5 0	"
Ash	0.7	"
	100.00	

Water of milk is the same in chemical composition as ordinary water.

Milk fat is in the form of little drops of globules, varying in size from 1-1500 to 1-25000 part of an inch in diameter and are invisible to the naked eye. These globules are held in suspension in the liquid which form is called an emulsion.

Casein and albumen are the nitrogenous or muscle-forming part of the milk and are partly in suspension and partly in solution.

The milk sugar is in solution. It is capable of being converted directly into alcohol, and is easily changed to lactic acid by the action of at least ten different kinds of lactic acid bacteria. The effect of temperatures on the lactic acid germ is worthy of special note, as it is the means whereby we preserve the milk, and which the cheesemaker used to develop the proper amount of acid at the different stages of manufacture. On this largely depends the character of the cheese made.

The lactic acid germ does not develop below 15 degrees Fahrenheit, and increases fast from 59 to 107 degrees then diminishes and ceases at 113 and 114 degrees F. It will be seen by this that a temperature below 59 degrees F. is suitable for holding milk which is to be kept for some time.

Ash or mineral matter is mostly in solution, and consists of that portion of the milk which cannot be burned.

Milk in the udder is practically sterile or free from germs, but the moment it is drawn off it becomes contaminated with bacteria and other taints. The former come from different sources ; the teat acts as an incubator, from the time of one milking to the next large numbers of bacteria develop in the milk left in the duct ; particles of filth and manure adhere to the udder when the cow is in a reclining position or when wading through swamps, muddy streams, etc. These filth particles adhere to the lower end of the teat and from there find their way into the duct, where the conditions for development are very favorable. So it is that the first few streams of fore milk are seeded with bacteria in great numbers. The hairy coat of the cow is more or less covered with dry excrement, mud and filth from the stables, from the barn yard and muddy fields. A whisk of the tail or stamp of the foot, or in fact any motion of the animal or milker serves to dislodge them, and they fall into the milk pail. Dirty or dusty garments of the milker also contribute to the supply. Particles of dust floating in the air have germs attached to them and these fall into the milk. This occurs frequently in a barn where dry and dusty fodder and bedding is used. Perhaps the most common source of all is the use of unclean dairy utensils.

How, then, one may ask, are we going to keep our milk free from germs ? We cannot. Nor is it necessary, as many of them are useful and we are obliged to enlist them in our service in the manufacture of both cheese and butter. What we can do however, is to reduce the number to such an extent that they will give little or no trouble, and the cheesemaker will have a chance to develop those kinds he requires and crowd out the undesirable forms.

Bacteriologists tell us to throw down the first few streams of fore milk and to moisten the sides and udder with a damp cloth, but a good many practical men take exception to this because throwing the milk on the stable floor creates a nuisance. It might also be mentioned that the majority of the germs found in the fore milk belong to the lactic acid group, and as a certain number of these are required we may safely let them go into the milk pail. As for the damp cloth, a cow should first be kept clean, after which if a soft dry cloth is used on the udder it will be found sufficient.

All vessels brought into contact with milk, such as cans, pails, strainers, etc., are a prolific source of germ life, and the most thorough scalding will not serve to sterilize the m

although it will greatly reduce the greater number of germs in them. Wash with cold or warm water first to cleanse them from particles of milk, then scald or steam thoroughly. Taking the bye-products back to the farm in the same set of cans used for the milk is to be condemned, owing to the rich germ life found in these products and the filthy condition of many of the whey tanks throughout the country.

Do not buy cheap or poorly soldered tinware, as the milk gets into the cracks and crevices and is difficult to remove. It will be found a good plan to take all utensils to the tinsmith and have soldered the ears of the pails, all the joints, and any place where milk or dirt can lodge. Remove milk from the barn immediately after milking, and strain in a pure atmosphere. Aerate milk immediately after milking, and cool to only the temperature of the atmosphere. An ordinary tin dipper will do for the purpose, but there are many excellent aerators on the market, which save labor, and where they are in use the work is not likely to be neglected.

Having produced a first-class article on the farm it is ready to hand over to the maker, and we now make the acquaintance of our friend, the driver who forms the connecting link between the farm and the factory. This gentleman seems to be pretty much the same the world over, and never improves very much. Perhaps it is that about all we can tell him to do is to keep clean, and as different people have different standards of cleanliness he takes his own and is satisfied. His waggons should be supplied with springs, should be kept painted and washed, his horses should be clean, and above all he himself should be clean.

The factory, building, machinery, etc., are important, as a large part of the difficulty in making good cheese results from poorly built and poorly equipped factories. In selecting a site, it should be central, with good roads, drainage and water supply. A factory should not be built on a side road where an apparently generous patron presents the company with some marsh land for the purpose of getting the factory near his own place. A factory on a side road is like a store on a back street. It adds to the expense of hauling and interferes with the patronage. In building, foundations should be solid and framework strong. Walls should consist of a first and second wall with an air space between built of two thicknesses of lumber and one of building paper enclosed. The floors should be tight and built of hardwood or cement, and with gutters large enough to carry off all the whey that is likely to run into them. This last is an important and much neglected point, and one that I should like to emphasize. In many factories these gutters—or pipes which are sometimes used—are too small and the consequence is that the whey backs up and runs over the floor, making a sloppy factory, wet feet and other undesirable conditions.

The boiler-room should not be too small, and if possible the engine should have a separate room, away from the dust where it could be kept clean.

The curing-room should receive special attention in the shape of an extra air space, double windows, shutters, and a sub-earth duct, to enable control of the temperature. This means money in pocket when it comes to curing cheese.

In fitting up the factory get the best of everything; besides cleanliness have an eye to the saving of labor.

The boiler should at least be a half size larger than is actually required. Engine, vats, weigh cans, scales and power curd mill should all receive attention. As for agitators, in my opinion, no factory should be without them, although they are objected to by some good men. The too often forgotten wash-sink should be considered a necessity. It is easier, cleaner, more effectual and better in every way, to wash things in a sink than on the floors or in some old tub. For presses I would recommend the horizontal press with steel frame such as is manufactured in St. Marys. Water and steam for general purposes should be conveniently placed, with hose attatchments, so that all parts of the building could be reached.

One thing I want to suggest, but which I have never seen tried, is a washing machine. Many a time have I stood pounding away at sink cloths, head cloths, etc., watching the machinery overhead and wondering if it could not be made do this work. I am satisfied that it can and at a very small cost. The machine I would suggest is simply a hollow cylinder, something like a disbrow churn with half round strips nailed along the sides the length of the churn about one foot apart. This I feel sure, would do all the washing in the factory much better than it is usually done by hand.

Curd sinks are in use in most factories in western Ontario, and I believe there is room for improvement here. They are mostly built of wood, with racks and a hole bored in one end for the whey to escape, which it does generally and runs all over the floor. This makes a sloppy factory ; to say the least this is unpleasant. They are also difficult to keep clean, as the whey collects in the cracks, soaks into the wood and becomes foul and dangerous. I saw a curd-sink this summer which I thought a great improvement. It was simply a wooden frame, inside of which was set a zinc pan about the same shape as the ordinary sink, with a tap at the end instead of a hole. This is handy, as whey can be kept back until it is ready to be run into the gutters. This plan is also convenient for putting hot water under the racks to keep the curd warm when necessary.

Almost the only thing required in the curing-room is a heater. The favorite and perhaps the most suitable is one with a sheet iron covering made to conduct the heat above the cheese and distribute it evenly round the room. I might add that wood stoves are totally unsuitable and should be thrown out.

We now come to the much abused whey tank, and certainly it deserves all the abuse it gets ; but I firmly believe that its construction has a great deal to do with the neglect it receives. It should be built with a view to being easy to get at and easy to clean. It should be elevated ; a tank sunk in the ground is an abomination. Have steps leading up to it, a platform around it, and water and steam pipes run to it from the factory.

In the morning when the milk arrives the cheese-maker should be on hand, with his nose clear and his head level to receive it. One should be careful to give the farmer credit for every pound of milk he sends to the factory ; a representative sample for the Babcock tester should be taken, and all milk that is not in good condition should be returned. Here is one of the great difficulties that any cheese-maker has to contend with. Sometimes it may be that the milk is cold, and bad odors are hard to detect ; sometimes it may only be a suspicion, and even when it is a certainty he runs the risk of offending some unreasonable patron whose nose is not sharp enough to detect what the maker knows is there. About the best way out of the last difficulty is to save some of the condensed milk and give it to the patron to smell ; when it gets old it will smell badly. In any case the maker should be alert, and if any milk gets in of which he is suspicious he should note its development in the vat and act accordingly.

Cheese-making is a process of fermentation from beginning to end. The most important point is knowing how to control the lactic acid.

Ferments are divided into two classes. Organized, or those in which the change takes place as the result of the presence of living organism, and unorganized, or those in which the change is caused by a chemical substance. Among the former is the lactic ferment, with which we have to deal very largely. The amount of acid developed at the different periods varies with the conditions and seasons. The amount laid down by the Ontario Agricultural College for the season is as follows, but these vary with conditions :

	Dipping.	Milking.
Spring	1-16 to $\frac{1}{8}$ in.	$\frac{3}{4}$ to 1 in.
Summer, about	$\frac{1}{4}$ in.	1 to $1\frac{1}{4}$ in.
Fall, about	$\frac{1}{4}$ in.	$1\frac{1}{4}$ to $1\frac{1}{2}$ in.

In order to ascertain the condition of the milk we take what is known as the rennet test, which should be taken as early as possible. By means of an eight ounce graduate take eight ounces of milk and heat in warm water provided for the purpose to 86° Fahrenheit ; place a small chip in the glass as an indicator, then measure one drachm of rennet in a smaller graduate, stir the milk, then add the rennet, noting the time at which this is done ; continue to stir for ten seconds, then withdraw the spoon and watch to see how long it takes to coagulate. This will be seen by the chip indicator, which will suddenly stop still and appear to start back in the opposite direction.

From twenty to twenty-two seconds is about the proper time to set normal working milk, but will vary with the season, locality, and condition of the milk.

If the milk is over-ripe it must be set as soon as possible, and if it is slow, bad flavored or gassy, it should be matured more than usual before setting. Great care should be taken at this point, as it decides the way in which the curd will work all through the process. If milk is set under the proper conditions everything else is likely

to run smooth enough. It is always well to keep a good pasteurized starter on hand to hasten ripening if required, and assist in overcoming bad flavors.

It is well for the cheese-maker to understand why it is that he adds the starter and ripens more than usual, etc., to overcome bad flavors, as a man who understands what he is doing, and why he is doing it, can work much more intelligently than the man who simply follows a rule.

The lactic acid germ, of which I have spoken before, is one of the desirable kinds for cheese-making, and is antagonistic to those forms which cause bad flavors. So it is the cheese-maker's business to introduce and encourage this class of germ, always bearing in mind that it is a good servant but a bad master; for if these germs get the upper hand the cheese is probably done for. Thus in ripening milk we are growing lactic acid bacteria, which act on the milk sugar and turn it into lactic acid, and in adding a starter we are adding millions of bacteria of a desired kind which will help crowd out those not wanted.

Stir milk gently while being heated to 86°, and when ready for setting use three ounces of rennet for one thousand pounds of milk. If quick-curing cheese is required use more rennet and less salt. In the case of over-ripe milk it is well to use about an ounce more rennet per thousand pounds, as the curd will cut quicker and that much time is gained; it will also expel moisture and help firm up the curd. If making colored cheese, use one and one-half ounce of coloring to one thousand pounds of milk, and add as soon as you get the weight of the milk in the vat. Dilute rennet in about one-half gallon of water; have milk in motion, and commence pouring in at one corner of the vat, and walk round it so that it will not all be poured into one place; then continue stirring for about three minutes.

Curd is ready to cut when it breaks clean before the finger and does not leave milky, but clean, whey in the break. Use the horizontal knife first, cutting lengthwise and taking plenty of time. Then use the perpendicular knife, cutting across, then lengthwise again with the same, and if the curd is a quick-working one it is well to cut once or twice more, as the smaller cubes are easier to cook.

Curd should be stirred gently with the hands, or with agitators, for ten or fifteen minutes, before turning on any steam.

Rough handling here means loss of butter fat, which should always be considered. Heat curd to 98°, taking thirty-five or forty minutes to do so, and continue stirring for about fifteen minutes to insure uniform cooking. If the curd is a fast-working one it cannot be handled just as one would like. "You are between the devil and the deep sea" and are likely to lose butter fat in any case. The object here is to have the curd cooked firm enough before too much acid develops, so it must be cooked more quickly, and as soon as the vat is heated up the acid may be checked by drawing off part of the whey; and if this is not sufficient, draw it all off and complete the firming by adding water. It is a good practice to heat a fast working curd higher than usual, say to 102° to 104°. It is usual to dip a curd with from one-eighth to one-quarter inch of acid, then stir sufficiently to expel the surplus moisture. Experience alone will teach one the proper amount of stirring in the sink. The better the cook the less stirring is required, as heat expels moisture. As soon as the curd is matted sufficiently to turn without breaking, cut into strips from four to six inches wide, and turn every fifteen minutes, or often enough to keep the whey from gathering, and after the second or third turn pile two or three deep, according to the condition of the curd.

Curd is milled with acid from three quarters to one and one-half inches, according to circumstances, but it is important that it should be meaty in texture and tear like a chicken's breast at this period.

Between dipping and milling one will be sure to find out if the curd is gassy, if not apparent before. If gassy, of course the maker has been working all along to get rid of it, by maturing milk more than usual, by retaining more moisture to encourage the development of the lactic acid, and using a good starter, etc. After dipping, pin holes will develop, and in order to get rid of these the curd is piled before and after milling. I find more good done just after milling than at any other period, by piling curd and leaving it till it is matted again so close that it is difficult to tear it apart.

After milling, air and mature well before salting. It is ready for salting when it has a soft silky texture and smells like newly made butter. The salt should be well

mixed, and enough time allowed for it to dissolve before putting to press. It is usual to use about three pounds of salt for one thousand pounds of milk, but this is subject to change.

The question of salt is worthy of attention. Salt adds flavor to the cheese and checks fermentation; cheese without salt would cure very quickly and develop gas, while too much salt would spoil the flavor. We therefore give a bad flavored curd a little more salt to a good one. We also salt a moist curd liberally, not only because the moisture is expelled, but because the salt is thus carried off in solution.

About 84° is about the right temperature for putting to press. Make your cheese uniform in size. A pair of scales to weigh curd will be found an advantage. Tighten press slowly at first and let the whey out gradually. A small stream of brine should be kept flowing, and when this stops tighten again.

In 45 minutes (not earlier) the cheese is ready for bandaging, when it is taken out of the hoops, the bandages neatly pulled up and hot water liberally applied. After they have been replaced they should be tightened the last thing at night. First thing in the morning they should be turned in the hoops, and then left in the press as long as possible, after which they are placed on the curing-room shelves and turned every morning until ready for shipping.

The curing-room should be kept between 65° and 70° Fahrenheit, with about 60 per cent. of moisture. There are several ways of supplying moisture to curing-rooms, but none that I have heard of appear to me any better than throwing water on the floor or letting in a little steam through a pipe put in for the purpose.

CHEESE MAKING.

Second Prize Essay.

A. J. Wagg, Guelph.

The reputation of Canada for producing good cheese, although well established, is not immovably fixed. Canadians cannot rely on the quality of the cheese produced in the past for the future reputation, even though it has been the means of placing them the foremost cheese-producing people in the world. The sooner we can get cheesemakers and patrons to realize this fact the better for the industry. With these facts before us, it is plainly evident that very great care must be exercised in order to retain what we have recently gotten within our grasp, viz., a good reputation.

It will not do for us to become careless, or stand still and rejoice in our success, for if the cheese industry of Canada is to be maintained at its present high standing we must continue to make improvements or we shall find ourselves occupying the lower position which some of our rivals now hold.

I shall in this essay only discuss the manufacture of cheddar cheese, which is the only kind made in Canada to any great extent.

Unlike the buttermaker, the cheesemaker finds that there are hardly two days in the whole season when the milk must be handled exactly alike to obtain the best results. For this reason a man cannot learn to make cheese in a week, a month, or even a year; but he requires the inborn skill of long, practical experience to enable him to handle milk judiciously to make good cheese under the varying conditions which he meets.

I believe the present methods of cheesemaking are about right, but what we are sorely in need of to-day is the carrying out of these methods. Some cheesemakers carry out the best methods in the best way possible, but in some factories the work is done in a very slip-shod manner.

Another drawback, especially in Western Ontario, is the lack of proper curing-rooms, facilities whereby the temperature and moisture can be controlled, but as this will be touched upon under the curing of cheese, we shall not dwell upon it now.

Cheesemaking starts not in the factory but on the farm with the patron, therefore it is necessary that the cheesemaker and the patron work harmoniously. The maker, who should understand all about the care of milk, should educate the patrons along that line, for without pure milk we cannot expect a good finished product.

Immediately after the milk is drawn from the cow it should be strained and then aired, either by stirring or pouring, until it rid of its animal heat. It may put in an airy place where the temperature will not fall below 60 degrees nor run above 75 degrees. Milk is better not kept in very large quantities over night nor put in cold water, except in very hot weather, or when it is to be kept over Sunday; even then, before putting it in water, it should be freed from its animal heat. Some patrons kept the milk in pails, hanging on a beam in an open shed, which seems to be a satisfactory plan. The morning's milk should also be aired, and if possible sent to the factory in a separate can.

When it arrives at the factory it should always be sampled by an experienced man man on the weigh stand, and any that will not produce good cheese should be sent home again with a note of explanation. After the milk is poured into the weigh can, a sample should be taken into the composite test bottle—that is where payment is made according to quality, and all factories should run on that basis.

In weighing in the milk the cheesemaker should give the patron the up-beam weight. The practice of docking each patron two or three pounds to raise the cheesemaker's average is one which invariably brings dissatisfaction, and should be condemned.

In spring and fall the milk comes in so sweet that the use of a starter is necessary, at least highly desirable. If a starter is used judiciously it is certainly advantageous, but if its use is abused it becomes a curse to the cheese industry. Where a starter is needed, none but a first-class one should be used, and of it not more than one per cent. The best material to use for a starter is skim-milk, but as this is not obtainable in most factories whole milk should be used. Whey is used by some makers, but as it is often badly flavored its use should be strongly condemned. If whey is used it should always be pasteurized.

To prepare a whole milk starter, select several samples of milk from your best patrons; put them into sealers which have been previously sterilized; heat the samples to ninety degrees, and allow them to sour at a temperature of about sixty degrees. From these select the sample which has coagulated into a firm, white mass, with a pleasant acid taste and smell. If a good mother starter cannot be obtained in this way, as is sometimes the case, it is advisable to procure a commercial pure culture or lactic ferment. Then take as much milk as you will need as a starter the next day, add about fifteen per cent. water and pasteurize. This consists in heating to 160 degrees and stirring continuously, allowing it to stand for twenty minutes and then rapidly cooling to seventy-five degrees. Add a small quantity—about three per cent.—of the formerly prepared mother starter; set in a pure atmosphere at about sixty degrees, and the next morning it will be sour and fit for use. Always save a little of the old starter to propagate the acid in the starter for the succeeding day. All utensils used in the preparation of the starter should be sterilized before being used.

Unless it is very cold weather, when the milk is known to be sweet the starter should not be added before a rennet test is made. By making a rennet test it can be determined whether or not a starter is needed, and if so, how much. If normal milk will set in one hour from the time it is heated up, a starter should not be used. If the milk is gassy or over-ripe use a starter if at all possible. If the milk is not over ripe steam may be applied, and the temperature raised almost to setting temperature and maintained at that until the vat is full; it can then be raised to eighty-six degrees, at which temperature the vat should be set.

If colored cheese is being made the color may be added as soon as the weight of the milk is ascertained. Pour the coloring into a dipper of milk, and draw the dipper along under the surface of the milk from one end of the vat to the other. Then stir it well into the milk. Milk should be stirred frequently while ripening to prevent fat rising to the surface. Immediately before setting the vat a rennet test should be made. It is a serious mistake to set a vat by guess, as milk will sometimes ripen faster than it will at other times. Without the rennet test being used carefully and judiciously it is impossible to make cheese uniform in quality.

The amount of rennet used will vary according to the season and the strength of the rennet. In the spring you may use from three to five ounces, and in the summer and fall from two to three ounces per 1,000 pounds of milk. This should be diluted with water and distributed evenly from one end of the vat to the other, and stirred with the milk for four or five minutes.

In cold weather it is well to cover the vat during coagulation. Coagulation fit for cutting will take place in about twenty minutes in the spring, and from thirty to forty minutes in the summer or fall, if the right amount of rennet has been used. Be careful to let the coagulum get firm enough before commencing to cut. If cutting is commenced when the curd is soft there will be a loss of butter-fat and caseous matter which would otherwise be retained. The whole mass should be so thickened that it will break clean over the finger.

In cutting, use the horizontal knife first, holding it vertically, and passing from end to end of the vat very carefully. Be very careful in inserting and removing the knife to make it cut its way through the curd so that it will not jam or bruise the curd. Then cut with the perpendicular knife once across and once lengthwise of the vat, being careful not to lap or miss cutting any of the curd. This will usually be sufficient, but in summer it may be cut once more with the perpendicular knife. In the fall some makers cut four times with the perpendicular knife, but I believe so much cutting chops the curd up too much. I believe that in the near future two sets of knives will be found in most of our factories so that when it is desirable to cut finely a set of finer knives may be used.

After cutting it is best to leave the curd standing for about five minutes before commencing to stir, as this will allow the surface of the particles to heal over so that they will not bruise by stirring. Stir gently for ten or fifteen minutes before applying any steam, being careful not to allow it to become lumpy. Then turn on the steam and cook slowly; one degree in five minutes is fast enough at first, but as the temperature rises to above ninety degrees it may be cooked faster—two or three degrees in five minutes. Normal curd should not be cooked above ninety-eight degrees, and some of the best cheese made in our country to-day is not cooked above ninety-six degrees. Stirring should continue for fifteen or twenty minutes after ninety eight degrees is reached, to insure uniform cooking, and then a hot iron test should be made. If the acid is developing too rapidly, part of the whey should be drawn off and the curd stirred well. Stir occasionally until it is ready to dip. Aim to get the curd so cooked that a handful after being squeezed will readily fall apart. The amount of acid should be from one-eighth inch in the spring to one-quarter inch in the summer and fall, and this should be obtained without leaving the curd in the whey more than three hours.

As the acid develops very rapidly at this stage, great care should be exercised by the maker in order to get the curd out before too much acid has developed. In spring it is necessary to start the whey running at one-sixteenth in acid in order to get it dipped with one-eighth inch.

In most of the eastern factories the cheese is cheddarded in the vat, but in our western factories it is dipped into a curd sink. The amount of stirring in the sink depends on the condition of the curd, but if it has been properly cooked it will require very little stirring. It is of the utmost importance to have the curd cooked properly. Too much stirring causes loss of butter-fat and loss of moisture, which will give a dry harsh texture to the cheese, without the silkiness which is so desirable. Enough moisture should be retained to keep the acid developing continuously, but not too rapidly. Spread the curd evenly over the racks and leave it to mat, being careful not to leave it long enough for pools of whey to form on the curd. When matted so that it will turn without breaking it should be cut into strips and turned. After leaving it for ten or fifteen minutes it may be cut down the centre and piled two deep if it has been properly cooked. If the acid is developing slowly the curd may be piled more as it becomes firmer. Pile every ten or fifteen minutes until ready for milling. The temperature should also be kept up until milling.

A curd is ready to mill when it becomes flaky and shows about three-quarter inch of acid in spring, and from one inch to one and one-quarter inch in summer and fall. Try to use a mill that will cut the curd into cubes of uniform size without bruising them.

Immediately after milling the curd should be stirred three or four times, and then stirred every ten or fifteen minutes until salting. Stir and air until it ceases to improve in flavor. It is ready for salting when it becomes mellow, is of a fine meaty texture and smells like newly made butter. Use the best dairy salt which you can get, which should be of medium fineness and free from impurities Salt at the rate of about one and one-

half pounds for fast curing cheese in the spring, and from two and a-half to three pounds per 1,000 pounds of milk in the summer and fall. The best way to apply the salt is through a fine sieve, scattering it evenly over the surface. Put it on in at least three applications, stirring in each before the next is applied. When the curd has become mellow again, and the temperature reduced to about eighty degrees, it is ready for the hoops. Have the hoops clean, and the press cloths smooth and clean. It is better to weigh the curd into the hoops so as to get the cheese more uniform in size. Pack well in the hoops, making the centre the firmest, as this will give a closer cheese. Apply the pressure slowly at first, to save butter-fat and caseous matter. If white whey presses out it is an indication that there is a loss of fat and casein. Increase the pressure gradually and press for three-quarters of an hour, when the cheese may be taken out and bandaged. Draw the bandage up and trim, leaving about one inch at each end of the cheese. Be sure to have the seam straight, as it shows very plainly when dry. For cap cloths the circular one may be used, but as they are somewhat expensive light square cotton ones will probably do as well. If cotton ones be used cheese should be well cured before shipping, as the cap cloths are removed when the cheese are shipped. In putting them under pressure again do not press heavily for a few minutes, as it is likely to form collars around the edge of the cheese. In the morning they should be taken out and turned. Never let a poorly finished cheese go into the curing-room ; if necessary leave in the press for two days. Cheese should be under pressure for at least twenty hours, and it is better to leave them in until you wish to prepare the hoops for the succeeding day's cheese. The modern spring-head gang press is much to be preferred to the upright wooden press.

So far, we have been discussing cheese-making under normal conditions, but the cheese maker finds that he must often handle gassy, tainted or over-ripe milk ; therefore we shall mention the main points of difference between handling normal and abnormal milk.

Gas in the night's milk can can easily be detected, but if in the morning's milk, or if the milk comes in cold, and sweet, it may pass undetected into the vat. If you find your milk ripening very slowly you may be suspicious of gas. If so, use some clean flavored starter, and allow it to get two or three seconds riper by the rennet test before setting. This will give the acid a good start, and will also allow the curd to be dipped sooner than usual. In setting use an extra amount of rennet so as to retain more moisture and to give a little more time for cooking, as it is to be dipped a little earlier than usual. Cut so as to leave the cubes larger, and stir longer before applying any steam, than with normal curd. Cook slowly to 96 degrees, and then if the acid is developing fast enough, draw off part of the whey. In stirring, keep the particles of curd apart, well, so that they will cook properly. Try to manage the curd so that at dipping it will have a little more moisture and more acid than normal curd. Just before dipping raise the temperature to 98 or 99 degrees. Dip with about one-quarter of an inch of acid.

The amount of stirring in the sink will call upon the good judgment of the maker. He should try to have his curd firm but not too dry. If he stirs too much moisture out of it he will check the acid and destroy what he has been working for. Some makers recommend washing the curd at this stage, but a better time is after milling. If washed at dipping there is a tendency to check the acid, which we want to help along.

Gassy curd should be piled higher in the tank than normal curd unless it is soft. Be careful not to allow whey to form in pools on it

Mill when it becomes flaky and shows about one-quarter inch more acid than with a normal curd. Immediately after milling it should be stirred well to get rid of the bad flavor. Good results have been obtained by washing. If it is to be washed use plenty of pure water at a temperature slightly above that of the curd. In very hot weather use water colder than the curd. It is rather doubtful if the practice of washing curds will come into general use, as it should never be done where the water is impure, and it involves considerable trouble.

Air and mature well before salting. It is customary in some factories to pile after milling, but it is not necessary if the curd has been well piled before milling. At any rate it should not be piled for two hours after milling, as this is the time to get rid of bad flavors and you cannot do it by piling. Use a little less salt, especially if the curd is losing butter fat, as most gassy curds do. After salting let it lie for about half an hour before pressing.

If the milk comes in tainted, and not gassy, as is sometimes the case, heat it up to 88 degrees, and air well by stirring and pouring. Allow it to ripen so that it will dip sooner than a normal curd, but do not ripen it so much as you would gassy milk, as the lactic acid does not have gas germs to fight against here. If a good clean flavored starter is available use a little extra with milk of this kind. When cooked to 98 degrees, run the whey down about half way in the vat. Dip with a small amount of acid. The sooner you can get the whey from the curd the better, so long as it is fully cooked. Turn often in the sink, air and mature well before salting. After salting, allow it to lie half an hour before pressing.

In the hot months of summer the milk often comes in over-ripe. When a maker anticipates over-ripe milk, he should have everything in readiness for a race with lactic acid. A good way to test over-ripe milk, to find out whether or not it should be taken in, is to heat up a little of it in a pail to about 90 degrees. If it does not thicken, you know it will stand heating up to setting temperature in the vat.

Do not apply any steam until enough milk is in sight to fill the vat. Then apply the steam fast enough to have it up to the temperature for setting as soon as the weight of the milk is ascertained and the color added. Make a rennet test to know just how fast you will have to work.

In setting, use an extra amount of rennet so that you may gain a few minutes by the quicker coagulation. Commence cutting early and cut finer than usual. Commence stirring immediately after cutting, and apply the steam as soon as you have the curd in circulation and the sides and bottom of the vat clean. You may cook an over-ripe curd faster than a normal one, as it expels whey faster. Cook to 98 degrees, draw off part of the whey and stir well. If the acid is still developing much too fast, draw off the remainder of the whey and add water to finish the cooking. This will aid wonderfully in checking the acid and in firming the curd. Acid development is due solely to the milk sugar, which is found almost exclusively in the whey; therefore, if the whey is drawn off the acid does not have a good medium in which to develop.

Dip with less acid if possible and stir drier in the sink than with a normal curd.

Mill when it is flaky and shows about three-quarters of an inch of acid. After milling, air well and hold longer than usual before salting.

When cheese are put into the curing-room they are only half made. Our present methods of curing cheese are not just what they should be. In most of our factories we cannot control the temperature of the curing-room as we would like to. I shall not here go into details concerning the building of a curing-room. The main requisites are that it should be well insulated, so that it will not be affected perceptibly by changes of tem perature outside. For controlling the temperature, the sub-earth duct is becoming quite popular among our leading cheese makers, which shows it is an effective means to that end. By this method cool fresh air can be brought in from the outside, thus giving the room plenty of fresh air and at the same time keeping the temperature where it should be. Another method is by the use of ice; but as this requires a great deal of attention and makes considerable muss, it can only be recommended in case of emergency until a sub-earth duct can be built.

The ice method is cheaper, but in the long run the former method is cheaper on account of its durability and more efficient work with little attention.

Every curing room should be supplied with a maximum and minimum thermometer, so that the maker will know the extremes of temperature which his curing room reaches.

The above mentioned methods of controlling temperature will supply enough moisture to the room except where artificial heat is necessary. For supplying moisture some have recommended hanging up wet sheets, but a better plan is to keep water in the curing room in a large shallow pan. For measuring moisture, a hygrometer should be kept in the curing-room.

To cure cheese properly it is desirable to have two curing-rooms. When the cheese are first taken from the press they should be put in a room at a temperature of about 70 degrees. After about a week they should be removed to the cooler room at a temperature of about 60 degrees.

If cheese are taken from the press at 80 degrees or above and put into a room at 60 degrees, there will be a tendency to develop bitter flavors. However, if fast-curing

cheese are wanted one room will do, which should be kept at a temperature of about 68 or 70 degrees.

Cheese should not be shipped until they are at least two weeks old, and they are better if left for three weeks or a month in the curing-room. One of the greatest drawbacks to the cheese industry is that salesmen, tempted by present high prices, will ship cheese altogether too green. These will probably go into cold storage and there develop bitter flavors.

Throughout the entire process of cheese-making the cheese-maker should be characterized by having himself and factory as clean as hot water and scrubbing can make them.

In conclusion, allow me to urge all makers to have their factories put in proper shape before commencing in the spring, and to keep them so throughout the entire season. May I also urge on all factory owners the necessity of better curing-room facilities, so that we may still enjoy the enviable reputation of being the best cheese producing country in the world.

KNOWN AND UNKNOWN THINGS ABOUT BUTTER-MAKING.

By Prof. E. H. Farrington, Madison, Wisconsin.

The statement is often heard that "What one does not know will make a great deal larger book than what one does know." This is a truism which applies to butter-making as much as it does to any other subject.

In Wisconsin we always welcome every opportunity we have for reducing the size of the larger book, and this was one reason why I was especially pleased to receive your invitation to be here.

I once heard a professor of agriculture who had taught for twenty years urge an audience of farmers to send their sons to the Agricultural College. He pleaded particularly for the young farmers. "Send your sons and your daughters" he said, and I won dered at the time why the older men and women were not also included in the invitation. This question was not asked, however, and I cannot say what answer the professor would make to it, but I do know that a teachable disposition in a butter-maker, be he young or old, is very much to be welcomed. When a man starts out with a self-satisfied idea of the training or the teaching that he has had, either as a helper to some expert butter-maker, or as a student at some dairy school, and he seems to think that this training has furnished him with all he needs to know about the subject, there is very little prospect of his advancement. A training of this kind ought to be merely the starting point of his education. From it, he should have learned how to think for himself so that he may make good progress in the future without a teacher.

The best opportunities for learning reveal to some people an almost hopeless amount of unknown things when they are compared with the little that is known.

If any one will read the 52 weekly copies of some good dairy or creamery paper he will find that what is already known about making fancy butter, is not such a formidable amount of information after all. I do not mean by this statement, that a paper will give in one year all there is known about butter-making, but the subject will be discussed and written upon by so many different people, that some information is very apt to be given on all the essential features of the process. There is one thing especially that every dairy paper will probably repeat several times during the year, and that is that with absolutely extra pure milk, a butter-maker will not find it a very difficult problem to turn out butter of quality every day. This, of course, is assuming that he understands the influences which different temperatures have on milk and cream, and that he has had some practice in the manipulations of skimming and churning.

At the present time enough is known about butter making to predict with considerable accuracy the quality of the goods that will be made under certain conditions. Defects in butter can generally be explained, and a fancy quality can now be depended on in something more that a haphazard way.

Since this is true, it must be admitted that ignorance of what is already known about butter-making is the cause of its poor quality. What is lacking in the butter-maker is not the knowledge of some profound and mysterious secret that is known only to a few experts, but rather the every day common sense necessity of keeping milk clean.

If a butter-maker is on a farm or in a private dairy where he has control of everything from the cow to the consumer, there is no excuse except ignorance or carelessness, for the defects that may appear in his butter. Such a butter maker might say, however, that his ignorance renders him guiltless But ignorance of the law does not avail in the criminal court, and why should it be accepted as an excuse for poor butter? The man who makes inferior butter should be sentenced to attending every session of the dairymen's meetings, and compelled also so read a dairy paper regularly. If this does not have the desired effect, then send him to a dairy school for at least three months at hard labor. If this sentence is too severe and the judge is disposed to give the victim of ignorance some good advice, his first charge would be in regard to protecting the natural purity of milk.

A butter-maker who is hungering and thirsting for information must always keep in mind the elementary principles of the business. The milk, cream, and butter must be protected throughout all the processes of their manufacture so that they may arrive at at the Queen's table in as pure a condition as a healthy cow can produce the milk from sound feed.

Milk ought not to be made from musty or decayed feed, or to be contaminated with any solid, liquid, or gas after it leaves the cow. Pure milk must be kept clean. This fundamental dairy principle is the secret of the dairy success. It has been preached over and over again, and the bacteriological reasons for it have been studied until we have obtained a scientific demonstration of the necessity for having absolutely pure milk.

If a gardener had it within his power to obtain weedless soil, we cannot imagine him doing anything else than making every effort possible to protect this soil from contaminating weeds. It would seem much more sensible for him to try to do this than to defer his labors until the weeds began to grow.

Although this ideal condition of the soil may never be anything but a dream with the gardener, the dairyman's opportunity for getting free milk can be realized. Success in butter-making depends largely on a persons ability to protect the natural purity of the milk from the weed like bacteria that lie in wait for it.

Investigations have shown that healthy cows produce germ-free milk, and when a butter-maker understands this fact and realizes the advantage it is to him, he has made some progress. He has learned a great deal. The men that milk the cows must now shoulder the responsibility of some of the defects in dairy products which were formerly laid to the scape-goat cow. This is well understood by some men, and the milk producer, the milk dealer and the manufacturers ought to keep themselves informed in regard to what is known about milk. If they did they would undoubtedly find that some things which they once considered as unknown are now very satisfactorily explained. Enough new information is brought to light every year to make it profitable to keep posted.

One of the discouraging things in the dairy business is to see what little interest some men take in their own welfare. A Wisconsin creamery owner once distributed among his patrons 500 copies of one of the best dairy papers published, and he only got five subscribers out of the 500.

Ninety-nine per cent. of these milk producers apparently did not feel the need of knowing any more than they already knew about dairying. This is a good illustration of the truth there is in the statement that "The farmer's mind as well as his acres needs to be seriously considered by investigators." I think this is something that creamery butter-makers will do well to study over. Try to think of ways by which the men who milk the cows can be helped.

Some things that you know about milk may be entirely unknown to them, and if you can induce them to produce more and purer milk you are helping them as well as yourself.

An enthusiastic young creamery operator once said that, "It will be a good time for butter-makers when every one of the patrons keep everything, barn, cows, milker, milk pail and milk can clean, when the milk cans are kept uncovered where no bad odors can get into the milk and when farmers go into dairying by selecting cows for the purpose. This" he said, "can be written in a few words, but it has proved hard to learn."

This practical man realized that it was not entirely the unknown about butter making that is responsible for any faults in his butter, but that the defects are caused by the failure to do something that is already well known he ought to do.

Some of the little things like airing the milk and scalding the cans are so important that failure to do them will often prove fatal to the fancy quality of butter.

We do not need to study up new methods or make new discoveries to show why and how milk ought to be cared for; there is enough already known about the kind of care that milk needs. What we do want, is to have every one apply the knowledge we already have about the subject. Butter-makers must expect to be teachers, and the most successful ones will be the best teachers.

Some creameries always make good butter and others never do, but the operator of the latter factory does not know the reason for his failures. The successful operator could probably tell him and as the knowledge he has is not beyond any average man's comprehension, it is the unsuccessful man's own fault if he does not find out where the trouble lies.

A butter-maker was quoted in one of the dairy papers as saying that he was advised to lay science aside and use a little horse sense, and he said he found this was good advice, but he further stated with great emphasis that the most essential thing about the business was to keep everything clean.

It has been stated in Chicago Dairy Produce, that only 25 per cent. of the butter made in the United States is of extra quality which brings the top market price, and a contributor to that paper also shows from a record of about two days receipts of butter held in the cellars of sixteen Chicago commission merchants, that the losses on this butter on account of the inferior quality of some of it amounted to over $16,000. In other words, if all this butter had been of a quality that would receive the top market price it would be worth sixteen thousand dollars more than it actually was worth. The figures on which this statement was based were the following:

Grade of Butter.	No. of Packages.	March Quotations.	Loss per Pound.	Total Loss.
Firsts	665	17½	½c	$199 50
Seconds	495	14½	3½c	1,039 50
Thirds	632	11	7 c	2,554 40
June	380	10	8 c	1,596 00
Dairies	1,300	10	8 c	3,120 00
Imitations	450	15	3 c	405 00
Ladles	1,635	7	11 c	5,395 50
Roll	165	7	11 c	1,815 00
Packing stock	192	6	12 c	691 20
Total loss				$16,816 30

Taken from Chicago Produce, Vol. 1, No. 42, page 10.

At the time of this record only seven per cent. of the total stock of butter on hand was of extra quality. This is a startling statement, and I hope is not often true that the best butter is so scarce, but it goes to show what an enormous loss there is from poor butter. Some of it is doubtless due to excusable circumstances such as remoteness from market and age of butter, but a large part of this loss comes from someone failing to put into practice what is already known to be essential for making the best butter.

It seems from this to be plain that in order to bring this enormous amount of inferior butter up to the standard of the best there is a wide field of labor for teaching what is already known about butter making. Such instruction will be needed for a long time to come, and the fact that some butter of extra quality is always being made shows that some one knows how to make it. The methods employed are not secret, neither are they complicated, and it is very encouraging to know that there is a constantly increasing number of men and women who can give the latest and best information on this subject.

There are some problems in milk and in butter making however, about which a great deal seems to be unknown. The secretion of milk is not thoroughly understood by the most profound scientist. Up to about 1840 it was generally taught that milk was secreted or merely filtered from the blood through the milk glands. At the present time this theory is not accepted, as it has been shown that there is no casein in the blood, and in fact the milk sugar, ash and butter fat are not the same in both the blood and the milk. Another thing that puzzles us all is the influence which feeding has on milk. It it were

true that milk is merely filtered from the blood, there would not be any difficulty in changing its richness by changes in feed, but it is a well established fact that the quality of cow's milk is a natural characteristic, something that is born with her, like the color of her hair, and all careful experiments show that so long as you give a cow sufficient nutriment, changes in feed will not perceptibly influence either one of these peculiarities. The effects of some feeds, however, can be plainly noticed in the butter fat of milk; "full grass" butter is decidedly different in flavor and in texture from that which the same cows manufacture from hay and grain. It is also a well recognized fact that cottonseed meal when fed to cows will influence the hardness of their butter, and clover hay can be depended on to increase its yellow color, but I doubt if any one knows why it is that the color of the butter fat from different cows will vary so much as it does even when they all receive the same feed.

No satisfactory explanation of this fact is known, and the same might be said of many other things in regard to butter making, but the little that is known needs to be taught in all the different ways imaginable so as to reduce the enormous loss which the producers of poor butter have to suffer.

A MEMBER: I would like the Professor's idea as to how we can get these things into the minds of the farmers. It seems the most difficult thing in the world to get men to listen to anything in reference to the making of butter.

Prof. FARRINGTON: I think, perhaps, that is a question which each locality will have to answer for itself. I tried to impress it on our dairy students to keep themselves loaded well so that, when they meet the farmers at their factories, they can be a walking encyclopedia, and distribute their information to the farmers. I think any man who operates either a creamery or a cheese factory can do much good in that way. A short time ago a minister in the town where I live gave the results of an investigation in regard to the saloon people of Chicago. It was supposed to be a scientific investigation. They went to work to investigate the damages that come to humanity from the saloon, and they found in giving the results of this investigation that the saloon-keeper was the best posted man in the community, and that everybody liked to go in there and see him. The saloon was the poor man's club. The saloon-keeper was posted on the latest news in every particular, and I have told our students, as they come to factories, they want to be as well posted a man as any saloon-keeper, and that the patrons ought to be as anxious to see them as the patrons of the saloon do the saloon-keeper. Of course that may be a bad comparison, but the idea of the creamery or cheese factory operator being a man who is posted with regard to the new things that come out in the dairy line and is able and willing to give it to the farmers, is one of the best ways in which you can spread this information, and get them interested in their work. (Applause.)

Mr. DICKSON: I came here to learn and not to give my evidence, as I am not well enough posted in expressing an opinion to any one here. I am interested in seeing the quality of our butter improved. I want to see it take the first place in the world, for I believe we can make it the best butter in the world if we only get the proper product from the farmers.

A MEMBER: As our friend has just stated, we have come here for information, as our last speaker has stated the subject of his address was the "Known and Unknown about Butter-making." Now we butter-makers in this gathering want to find out a good many things which we do not know. Now, as far as the discussion has gone, the biggest fault is, I see, laid upon the farmers not taking into consideration perhaps the faults of the butter-maker. The question I would like to ask is, after we have received from the farmer the milk, what is the best process to get the best results from that milk which we have received? Outline the process which you would adopt.

Prof. FARRINGTON: My name is three times on the programme. I believe the last time it says "Discussion on Butter-making," and I presume the topic which this gentleman has mentioned will be brought up at that time. You can write a book on butter-making. If you took up the whole subject of butter-making it would take the time of two or three professors in writing the book. I don't know where you would stop if you started in on that subject. If there are any particular parts about the process that you want to take up and discuss, I should be glad to help the discussion along; but as to talking on the subject in general, I am afraid it would take too much time. There are other speakers besides myself.

THE BACTERIAL CONTENTS OF CHEESE AND THE CURING PROCESS IN CURING ROOMS.

By Dr. W. T. Connell, Kingston.

This address will be found in the Report of the Eastern Association. (See page 30).

Prof. Dean : Dr. Connell mentioned several theories concerning the curing of cheese. I would like to ask him whether he considers rennet has any influence on curing cheese.

Dr. Connell : I cannot answer that question accurately. I do know when we had more rennet the cheese seemed to cure more rapidly. I do not think anyone can answer that question yet.

Prof. Dean : When we use a larger quantity of rennet we find the cheese cures more rapidly. I know the bacteriologists generally say rennet has no effect on curing cheese.

Mr. Sleightholm : In Dr. Connell's judgment, what in a general way would be the cost of putting an ordinary curing-room in proper condition and putting in ice-boxes to control the temperature ?

Dr. Connell : I cannot answer that question. I expected Prof. Robertson here who has full details of these matters, and I did not pay any attention to that point at all. I was to examine the bacteriological contents of cheese, and cannot give any idea of the cost.

Mr. Sleightholm : One point brought out as to the control of temperature was the putting of a commercial value of three-quarters of a cent per pound on to the value of cheese where the temperature was controlled. Supposing you said one-half cent per pound. I think even one-quarter of a cent per pound on a season's make of cheese would amount to such a sum that the factory-men would certainly put every factory in proper condition.

Prof. Dean : We have figured out about what it would cost to insulate the ordinary curing-room in good condition. I think from $100 to $125 would do the work in most cases. As for the ice-boxes, Mr. Bothwell and Mr. Bell should be able to tell you. I should say from $5 to $6 apiece would be the cost of an ice-box, and a sub-earth duct may be put in for $60 to $100. That would be additional of course to the lining of the room.

A Member : The doctor has shown us to-day that the ripening bacteria are the lactic acid bacteria, and probably if you would give us the temperature and the condition of moisture under which these bacteria thrive best, it would help very much to solve the question, which is a very important one to the cheese industry of this country, and very important to every cheese-maker. It would solve the question that they have to contend with in developing most rapidly the acid-producing bacteria, the lactic acid bacteria, or the lactic acid ferment, and altogether he does not go into the mechanical part of it, at the same time the conditions under which these bacteria are developed most rapidly would help to solve the question.

Dr. Connell : In taking up the question of the best development of the lactic acid bacteria, we have also to take into consideration the fact that in cheese we do find other forms of bacteria, and while in good cheese these are practically insignificant, we must always remember that we will find a certain number of cheese not of this character. We find a temperature of between 55 and 65 very favorable ; from that up it is favorable for the development of lactic acid bacteria. As we come higher the lactic acid bacteria flourish well. These higher degrees produce forms of taints and gases, consequently cheese kept at this temperature, 55 to 65, cures better. The higher temperature might develop taint forms, and that may be an important point in the factor of cheese-curing. I have only done one season's examination. In the cheese I examined none of these forms were present, and I didn't have to contend with them, but if we raise the temperature above 65 it becomes more favorable for the development of certain taint forms, consequently I think the lower temperature would be more suitable for the development of lactic acid germs.

A Member : The higher we develop the bacteria, the flavor is not so good. A temperature of 80 would develop rank flavors, the lower temperature developes a better flavor.

Mr. Ballantyne: How would you suggest keeping out this bacteria that produces bad flavor?

Dr. Connell: Their sources are generally in the process of milking. We would have to take thorough care to keep the milk clean and away from dust. That is the chief source of taints in the milk, keeping the milk in dusty places.

Mr. Ballantyne: They usually come from some kind of putrefacation.

Dr. Connell: Yes. The most common source has been dust, particles of manure, in and about the stable, and hairs and the like falling from the animals. All these usually show marks of bacteria, some good, some bad. In manure particles we have a large number of very small forms which produce stink—stink producing forms, and gas, producing forms.

A Member: Can the doctor tell us what make the milk become bitter?

Dr. Connell: I think bitterness develops in milk kept at a fairly low temperature at 50 and 55. In the samples of bitter milk, I have found that it is due to the development of the acid forms. It is a bacteria form and low temperature favors its growth.

Mr. Ballantyne: Would it be possible for the taint form of bacteria to get in after the curd is made—after you have the milk into curd?

Dr. Connell: I think it certainly would. I can speak with experience of one form, which perhaps is not a real taint. In 1896 I examined some cheese which was made in a factory which showed rust discoloration, from the size of a pin point up to a split pea. These rust spots were due to a growth in the cheese. They did not appear in the cheese until after five or six days, and they were due to the development in that cheese of bacteria, which got into it from the dry dust on the edges of the gutter leading out from the factory. This cheese was affected during the process of manufacture. This was an instance of where we had the curd tainted. That might have got into the milk, but we found it present in the cheese made on a certain day, and not present in the milk, consequently we said it must have got in at the factory. As we had the growth there in the gutters, we thought it was evidence as good as we possibly could bring forward, to prove our statement.

THE INSECT ENEMIES OF FODDER PLANTS.

Dr. James Fletcher, Dominion Entomologist, Ottawa.

The subject I have chosen to speak on this afternoon, is one which all of you ought to know about, and probably do know about, but I find that a good many fodder-growers of Canada do not know quite as much as they ought to know for their own good about the different insects which attack the crops from which they get their milk, cheese and butter, gilt-edge products which bring in so much money to the country. During the past year, fodder crops in various parts of Canada have been of a very spotted nature. Crops of hay and fodder have been very excellent in some districts and poor and short in others. In some parts of Western Ontario there has been a shortage in some of our summer crops and early autumn crops.

Most people know that there is no grass or fodder crop in Canada, which can compare with the quality and quantity that you can get from an acre of Indian corn; yet, on account of the failure of this in some parts, some people have considered it advisable to give up growing that crop. Wherever you can grow corn I would never advise you to give it up. It will give you more good feed to the acre than any crop you can grow, and where you develop your dairy industry in the way you have in western Ontario, you must not give up growing Indian corn. As a rule, shortage in Indian corn, is due to a lack of proper agricultural methods and proper farming, because Indian corn, being a tropical plant, is certainly better suited to stand drouth than almost any other crop we can grow, and as to those who have failed, the failure is greatly due to not using the cultivators often enough. The use of the cultivator is now so well known, that almost every farmer knows that its use will enable the land to hold moisture better than anything else you can do. In the North-west Territories and Manitoba, this has been recognized to an extent that every farmer summer-fallows his land more frequently than

he used to do. Summer-fallowing in the west is not summer-fallowing in Ontario. It is done here with a different idea to that adopted in the west. Summer-fallowing in the west is almost entirely a method to hold moisture in the soil. Around Indian Head, Moose Jaw and Regina, where farmers gave up their farms some years ago because they said it was too dry, the land is selling now at a higher figure than in other part of the North-west Territories, because the farmers have learned and are practising improved methods of summer-fallowing, which means the plowing either deep or shallow and harrowing very quickly afterwards. Another method which has been adoped during the last year or two is to use a light harrow or weeder on their grain crops, not only for the purpose of destroying the weeds, but because it acts as cultivation on the growing crop. Throughout the west a few years ago, there was here and there an odd man who had a weeder. There were no less than four carloads went in one week last year, so you see the use of the weeder must have been adopted in the west with good effect. Where the country is given up year after year to the growing of wheat, it must be expected that those weeds which live on the land with the wheat, and ripen their seeds before that crop, must keep on increasing, and that has been the case.

There are many fields in Manitoba where nothing but wheat has been grown for twenty years, and these fields have gradually become weedier and more weedy. The new method which they have adopted is the use of light harrowing till the grain is from four to six inches high, with no injury to the wheat, and they get very good results. They break up the thin film on the surface, and make a dry blanket which holds the moisture in the land. Indian corn is going to be the backbone in this part for cattle feed for many years. There are some substitutes, such as growing green feed, peas, oats barley grown together—a bushel of each to the acre. These are early crops, and the only reason they have succeeded better than corn is that you can get them in very much earlier. You put them in nearly a month earlier than you do corn, and consequently they get advantage of the winter rains. They are often done with before the corn feed comes in, but do not suppose these will ever take the place of Indian corn, which, as I said before, is one of the most important fodder crops we have to do with. Indian corn is not attacked by very many insects; cut-worms, of course, are serious early in the spring. It is well for every farmer to know something about cut-worms, as every year they destroy so much. Cut-worms are of three different kinds, so when a man says: "I want a remedy for cut-worm," he must give more information about it. There are different kinds of them, varying a good deal in their history, and in the way they do their work. There is one general principle with regard to all these cut-worms which every farmer should remember. If he leaves his land dirty in the autumn he may be sure he is going to have cut-worms next year. A great number of these different kinds of cut-worms are caterpillars hatched from eggs laid by this moth. These moths come out in the autumn and lay their eggs upon plants. They are not particular as to the kind of plant they lay eggs on. Most of these that feed on Indian corn are caterpillars of insects which fed upon different kinds of grasses. If we leave our corn field, or any other field, in a dirty condition in the autumn, we may expect that these moths will fly to the plants and lay their eggs on them. Caterpillars pass their time in the winter in two ways, either as eggs which don't hatch till the spring, or as caterpillars which pass the winter in a torpid state ready to go forth early in the spring and attack any green plant which comes up. Therefore, it is important to know that our fields should be kept clean in the autumn, because those moths will lay eggs wherever there is a thick growth of weeds or any other plant. They will not lay their eggs where there is no plant, because there would not be any food for the young caterpillars. Clearing up the weeds in the autumn is not so much to make your farm look pretty as it is to save money from your own pockets, which you will certainly lose next year if you leave your farm dirty. Why is it that Indian corn is more frequently destroyed on grass sod than it is where you plow down clover? Because as a rule these insects which feed on clover do not feed upon different kinds of grass, and sometimes you sow your corn on a meadow plowed down and sometimes on clover sod. You will notice that the plants sow on clover are cleaner from attacks of cut-worms than those where you have plowed down meadows, that is because these insects which feed on clover do not always feed upon grass. There are some which do. You will always expect some cut-worms where you grow corn. If you find you have a bad attack of cut-worms you can do something, but it will cost you labor and money. If

a farmer has any reason to suspect cut-worms he can, before the corn appears above the land, make an application that will destroy them. Where cut-worms are abundant put bundles of grass around the fields.

A successful experiment was carried out by taking a cart-load of this green material and pitchforking it on the field of corn that was green, and that part of the field was perfectly free and made a good crop, whereas, in the other part of it, it had to be resown. Another method where corn is grown in drills is by making a mixture of bran and Paris green—a pound of Paris green to every twenty pounds of bran—and then distribute that across your field with your seeder, the wheel-hoe or small Planet junior seeder. Run it over the field and along the drills. Many fields of turnips were saved in this way by making a mixture of bran and Paris green.

Cut-worms vary very much in their nature. You may find it necessary to have definite information with regard to some certain attacks, but, if the fields are kept clean in the autumn, they will be freer from attack than those left dirty. If caterpillars are present in large numbers the sooner you attack them the better. It does not pay as a rule to let your crops take chances and trust to Providence, because Providence expects us to help ourselves a little.

During the last summer a new insect appeared in Canada, and did a great deal of harm. The pea crop as a rule has generally been free. Among insect pests, the old pea weevil and the pea worm and the lots of other enemies we should not have. The pea weevil is much worse a pest in Canada to-day than the farmers in Canada ought to allow it to be. The farmers in Canada are responsible for the loss which takes place from the pea weevil. Seedsmen systematically fumigate the seed and so get rid of the weevil, but farmers throughout the country are saving their own seed, and as truly as seedsmen are treating seed and killing the weevils the farmers are not doing so, and there is no reason why they should not. The matter is extremely easy. If every farmer in the country would treat his seed before it is sown there would be a very decided decrease in the number of these insects. The destruction during the past season was enormous, yet many farmers have given up treating their own peas because they take it as a hopeless case, so they sow their peas and are glad for whatever crop they may get. We have found that a sure remedy to get rid of the weevils is to take a coal oil barrel and put five bushels of seed into it. Whether that seed is infested with the pea weevil or not, if you are living in a district where that insect appears, it will pay you every year to treat your seed. After you have put the peas in a barrel place on top of them a soup plate. In that put three ounces of bi-sulphite of carbon. Take a couple of sacks, dip them in water and place them over the top of the barrel, then cover it with some boards, leave it for 48 hours, and the peas will be ready after that time to sow and they will be perfectly dry. The liquid evaporates and becomes a gas heavier than air, which falls down through the seed and destroys every insect in them, and then you have only to contend with the insects that may fly from your neighbors. In Prince Edward County when they were shipping peas in barges, after the barges were filled there were several inches of insects on top of the peas, they had become such a pest in that district.

Ten years ago we had not a spraying pump to each county in Ontario. I do not suppose there were 100 pumps in Ontario while now there are 100,000, and every man who grows fruit knows he must treat his trees. He knows that for every ten cents he puts on in spraying his trees he receives from three to four dollars more money in fruit; consequently the fruit growers have wakened up a little sooner and they are doing more in that way than the ordinary farmers are doing in fighting the small insect pests. The pea aphis that appeared this year on the pea has been destructive. I received a great number of letters from farmers asking what this new thing was. Here is the pea aphis, the same as the one was on the apple trees. It has wiped out whole crops, field after field being utterly destroyed. Not only did it grow in Canada, but right down to Maryland in the Southern States. In the State of Maryland it destroyed three million dollars worth of peas, and no one knew anything about it. It is not an insect that can be easily treated. The tent caterpillar also did a lot of damage last year. In the Province of Quebec where sugar was one of the best crops there will be very little crop next spring, because the leaves have been eaten out of the trees, the stomachs of the trees have been eaten out, and they have been so injured that there will be a great loss in the crop next year. We cannot do much to an insect that attacks a crop such as a forest or a wheat field unless

we know something about it before hand. This was an entirely new insect. No one had ever studied it before. It had never been abundant enough to draw attention to it, but wherever it occurred in pea fields it swept them out. First, we considered the fact that it had never appeared before, and therefore we might hope it was not likely to appear again ; but it was necessary to have something to substantiate that fact. We then found that its enemies develop in very large numbers, and therefore it is plain it will not occur in the very large numbers it did this year. On wheat and oats, particularly some years, we have an occurrence of green plant louse. This very seldom occurs two years in succession because it is wiped out by its enemies, and we hope next year the pea aphis will not be abundant as it was this, but I would advise you not to put in so many peas this year as you have formerly, though I would not withdraw peas altogether, because they are of such value to your soil. They belong to the same family as clover and very much increase the value of the soil by the nitrogen which they collect. Another method of getting rid of the pea weevil is to keep your seed over a year. Put the seed in paper bags, and hang them up so that the mice and rats cannot get at them. The weevil cannot gnaw through the paper bags and they will be dead before the second year. Peas that are required for the table should be sown as early as possible. Sow only the earliest varieties. Every one knows you can sow peas directly the frost is gone from the top inch of the soil, and that peas will stand more cold at their feet than almost any crop you can sow. If you sow your early varieties you get your peas ready before the first of July, and that gets rid of this insect.

The next insect which does most harm to crops, is the army-worm. It occurred in almost every county in Ontario last year. These caterpillars appear in large numbers and sweep the whole country. They are not generally noticed until some time in July and then all of a sudden, they appear in very large numbers and sweep through the timothy fields, and very often through oat fields, and do a great deal of harm. They do not attack clover, and when timothy and clover are grown together the clover is left alone. The army-worm does not give us much warning when coming. It does not spread from its natural haunts except in damp seasons. It lives in swampy ground. But when we get a wet season, these caterpillars come from their own crops, and go forth and attack the crops of the farmers, and it has been found that they will attack crops more than they will the wild grasses. Even in the West, where the locust is a native insect, it attacks the crops in preference to native grasses. The farmer has every year to fight against insect enemies. If it is known exactly what to do, most men will do it. With regard to the army-worm, there are many means by which they can be prevented from coming on the land. They are generally so numerous, that they attract a great deal of attention for they sweep everything before them. I have seen a timothy field that looked very well on Friday evening, and on Tuesday of next week there was nothing but bare stems showing in the field. They went on from that field and got into an oat field next to it. They were entirely stopped by plowing three furrows down the middle of the oat field, throwing the soil away from the direction they were coming from, and leaving an upright edge that they could not climb over, so that when they ate up to this part of the field, they soon filled the furrow up, and finding this edge against them, they began to wander along this furrow. They were prevented from passing that by digging pits every twelve feet along the furrows and these they filled in the very short space of a single day. They were then killed by throwing coal oil upon them and were shovelled out. An insect which occurred four years ago last autumn, and appeared in some numbers, is called the black army-worm. It is black with white stripes down the back. This can be treated exactly in the same way as the true army-worm. It very seldom occurs in such large numbers. Instead of feeding chiefly on the grass crops, it attacks many kinds of bushes. In places where it is destructive, it must be poisoned with the bran mixture or the poisoned weed traps. Clover is a good thing to use against this, because it lives on clover. In years of great abundance it spreads from the clover fields and appears in the gardens. It is velvety black with fine white spots along the sides. Where cabbages or tomatoes are used, a piece of paper wrapped around the plant will prevent it. Do not roll the paper around the plant tightly, but simply wrap it around the plant.

Many farmers feed off their first crop of clover before the third week in June. If hey do this they reduce the occurrence of the clover seed midge in the second crop, and, where that is done, second crops of seeds are secured. You can either turn your cattle

in on your fields so that they eat the clover down, or you can cut the clover and feed it to the stock. There is enough seed in the first crop for this insect to feed upon, and for it to destroy the second crop of clover seed. If the method be adopted of cutting the first crop before the third week in June you destroy the insect, but if you allow it to stand until the first of July you allow the insect to grow.

Grass-hoppers have done a good deal of harm during the last year or two, not so bad during the past season in Ontario, but every year grass hoppers do a certain amount of injury. In hot, dry seasons they are worse than in the wet seasons. The reason of this is, that they are to a large extent killed off in dull wet weather when they are young. The eggs are laid in the autumn and do not hatch until the following spring. When the young grass hoppers are hatched they are less than a quarter of an inch in length and very delicate, and if there is wet weather at that time, many of them are killed off. Of course, when they become very numerous they produce parasite insects, and one of the most abundant of them, is the grey or black blister beetle which sometimes attacks potatoes. A farmer finds this on his potatoes some fine morning, and does not know where it came from. If they are not attended to at once by poisoning the plants, they will do more harm than the old Colorado potato beetle. They come out of the ground fully formed. Up to that time they were good creatures, and were doing us good, but when they take on their black coat they put on bad manners. Before that they were feeding on grass-hoppers' eggs. There is no insect which brings down the number of grass-hoppers more than the blister beetles do.

There is a little red mite, a bright scarlet spider. This is a parasite of the grass-hopper. It is not a true spider. It is a mite, and it lives entirely on the eggs of the grass-hopper.

Another curious parasite is the hair worm. It just looks like a horse hair. Boys will tell you that if you throw a horse hair in the water, it will come to life and turn into a worm. It is a worm that lives inside of other animals. Its eggs are laid in the water. The mites swim about in the water and attach themselves to some of the water insects, chiefly May flies, that are so abundant, and chad flies. They penetrate right inside their bodies through some joints in the legs, and they live inside these insects until these are eaten by fishes. Where they are not eaten by fishes the parasites die inside them. All those that are eaten by fishes live inside the fish for a certain time, and then leave the fish and crawl ashore, and attack grass-hoppers. In the last grass-hopper year you could hardly catch one of the large grass-hoppers that had not one or two of these worms coiled up inside its body. We find that with the parasitical insects where there is a great number of them one year, there will not be so many of them the next, and afterwards will pass away altogether. You may say, if that is the case, why should we do anything? The answer is, because we live in an artificial manner. Nature has its own ways of doing everything, and they are sure to be slow. It does not do things quickly. We know that we have an average of forty or fifty years in which to live, and that all we are going to be, is going to be in these years, and so we want to know the quickest method of getting returns for our labor. The farmer has to learn the best thing to do under certain circumstances, and therefore he seeks to destroy these insects and parasites as rapidly and as quickly as possible. (Applause.)

BENEFITS OF SOILING COWS IN SUMMER.

By W. C. Shearer, Bright.

I am going to speak to-night on the soiling of dairy cows in summer, from the standpoint of a cheese factory patron. We all know the benefit that we derive from having a full supply of milk. To obtain this you must have a good herd, and then abundance of proper food to get milk. I will give you an instance of two patrons. One has an A1 herd which he soils, and the other has an indifferent herd, to which he pays no attention. Now you know that, in the spring, cows do their best without any extra food, as long as they are supplied with an abundance of good, clear, pure water, but that after the spring grass is gone, you must have something to keep up the flow of milk. In preparing for soiling, manure the land well, then work it up in good shape and sow about a bushel of peas to a bag of oats, mixed. If you have too many peas, it will pull down

your crop. As early as you can, get half an acre ready, and sow it at the rate of two and three-quarters to three bushels per acre. Sow it thick, because it takes the same work and labor to produce five tons per acre as two tons per acre. Sow this before the 1st of May. In 10 or 12 days sow another half acre of the same, and 10 or 12 days later, another half acre If it is a good showery season, you may not need to use anything until it is ripe, which will be about the first week in July. Top-dress an acre or two of your clover land with a light coating of manure in the spring, and have that prepared in case you need it. Feed the clover first if it is required. As early as you can get in a couple of acres of corn, put it in drills or hills. I prefer it in drills. We put in about two acres and keep that well cultivated. It will be ready for use by the 1st to the 15th of August. There is one benefit of these oats and peas mixed. Whatever you do not require you can keep for hay. If you have only used part of the first half acre keep using it when the next is ready, and keep the balance for next winter's food. I do not like the idea of hauling out feed to the field to feed the stock, for the reason that cattle getting food outside, whenever they see you out with the team, run to you thinking they are going to get some feed. It is best to feed them in the stable. In the fall if it comes very dry, we scatter a little cornstalks once or twice a day in the pasture field, but it is better to give them the main bulk of their feed in the stable. By feeding in this way you keep your cows up to the full flow of milk which is the great secret of making money out of cows. If you let them run down to one-half it will take as much money to bring them up again as it is worth. There are a great many dairymen who have a pair of these light spring balances, and every cow's milk is weighed once or twice a day in order that they can detect immediately if a cow is going down. If you keep track of your cows you will find some that do not pay at all and others are two or three times as good, and that the poor ones are eating the heads off the good ones. Another great benefit of this soiling system is that you clean the land. The soiling crop is all cut before the weeds are ripe and is off in time for you to put in the fall wheat if you want to, or it will be in good shape for next season. Now then, I will give you an instance of two dairymen in my neighborhood, One is about the best, and the other is not the worst, but amongst the poorest. They have each one hundred acres. Last season was very dry, the dryest I have ever come through. We had not a good soaking rain from the time the snow went off till October. This good dairyman had fourteen cows to which he attended thoroughly. He had about an acre of oats and peas and put in two and one-half acres of corn early, and he fed his cows right through the season. Both these farmers sent to the factory for seven months and the good dairyman received in the seven months an average of 6,007 pounds from each of the fourteen cows in the herd. The other dairyman who did not provide anything received an average of 2032 pounds each. Then when it came to money, the man with the 6007 pounds got $49 per cow, the other man got $18 per cow. The poor dairyman's cows averaged $2.59 per month and the other man $7.00 per month. Now the fault was at home. One man prepared against the drouth in case he need it, and the other man prepared nothing. He hoped it would be a wet year and that there would be plenty of grass, but if it was a dry year he expected to have no money. He received about $162 for these nine cows and the other man received $441, making a difference of $280 to the man for his farsightedness. The good dairyman's cows were all purchased at sales except four. Two had part Holstein in them, two had Ayrshire, and the balance were part Shorthorns. I looked through his cows and found they were all of a splendid dairy stamp of a cow. Some men think the breed is the whole thing, but it is not. In all breeds there are splendid good dairy cows. This man told me he considered himself a pretty expert judge of a cow. I said to him, "You would not buy a $25 cow if that was all she was worth," and he said "No, I always like to pay $40 and $45 and $50, and I like to buy a cow pretty young for fear the other fellow spoils her before I get her." Some cows are made by the dairymen who break them in, and other cows are spoiled by the same men. He told me he found some cows when he first bought them that could only consume and digest so much feed. After he had them a few years they could consume a half more, and it all went into the milk where he wanted it. Now if we could only get the patrons of cheese factories to believe there was that much in their cows it would be a great benefit. If some of the cows owned by patrons belonged to me I would make a sale of them, and if I could not do any better, I would hire in cows at a dollar a month.

FARM TESTS OF COWS.

By Professor Farrington, Madison, Wis.

At the present time there is not much necessity for urging creameries to use the Babcock test. Within the past five years it has become almost universally adopted as a just and satisfactory means of determining the value of all milk delivered to both creameries and cheese factories, and creamery patrons can no longer sell milk to the factory by weight only, neither can the factory buy it in this way. It is very generally agreed that milk ought not to be bought simply by the pound any more than a cow or a horse. We would all think it absurd to see or hear the statement, that horses were quoted in the market at a certain price per pound, but such a statement is not much further behind the times than the practice of buying and selling milk by weight without testing it.

Since the practice of testing all milk at butter and cheese factories has become so well established, the justness of the plan has led many farmers to apply the same test to their cows. This, it seems to me, is the direction in which the use of the test should be pushed at the present time. Every farm that supports cows for the purpose of selling milk, ought to be provided with a pair of scales and a Babcock test. By weighing and testing the milk of each cow a sufficient number of times, the owner can keep himself informed of the actual performance of each cow. Records of this kind show the relative value of the cows as milk producers, and aid in determining the actual profit or loss which should be charged to each cow annually.

The farmer who wishes to keep cows that will support him, and does not intend to work for the purpose of supporting his cows, needs to understand that:

First—If 150 pounds of butter only pays for the yearly feed and care of a cow, then one producing only this amount, or less, is not paying a profit.

Second—One cow is often worth twice as much as another, or more than two cows, although there may not be a very marked difference between the total annual production of two cows. This may be illustrated by comparing the record of a cow that produces 152 pounds of butter with one producing 151 pounds. The former yields twice as much profit at the latter, provided 150 pounds represents the amount necessary to pay for feed and care; and a 250 pound cow makes twice as much above expenses as one with an annual production of 200 pounds of butter.

This is a side to the dairy cow question that a good business man will consider carefully. There are some dairymen who have become convinced that the time and money spent in weighing and testing the milk of each one of their cows is a profitable investment for them, and they could not now be persuaded to abandon the practice of keeping records of the quality and quantity of each cow's milk. There are others, however, that have not yet reached this stage of development, and it was with the hope of reaching them that the writer undertook the testing of some forty cows on six different farms. The owners of these cows had been sending milk to the Wisconsin Dairy School Creamery for several years. None of them had a Babcock tester, and some did not have a suitable pair of scales for weighing the milk of each cow at milking time. By paying each one of these farmers one dollar per cow tested, I was able to induce them to weigh and sample the milk of each cow they owned for one day per week during an entire year.

The tests made on the different farms were all conducted on the same general plan. The milk of each cow was weighed and sampled at the morning and night milking one day in each week. The testing day was selected by the patron. Each dairy was supplied with a pair of scales for weighing the milk of each cow at milking time, a box of bottles for milk samples, a small one ounce tin sampling dipper and a record book. Each cow was given a number, which was also placed on the label of a two-ounce sample bottle, the cow being known by this number throughout the test. About one-half gram of potassium bichromate was added to each sample bottle to keep the milk sweet until tested. The box of samples and the record book containing the weights of both the morning and night milk of each cow were sent every week to the University creamery, where the samples were tested; the tests were recorded in the patron's book as well as in the permanent record at the creamery, after which the book and box of sample bottles were returned to the farm. This weekly sampling, testing and weighing was continued throughout the year. The records thus obtained furnish data for determining the value of the milk produced by the different cows.

The accuracy of such records as these is necessarily influenced by conditions common to nearly all farms. Milking is usually done with more or less haste, especially at the planting, haying or harvesting seasons. The milkers, as a rule, are not accustomed to the use of scales and often consider a weight within one pound of the true figures to be "near enough." They do not understand the necessity of promptness in sampling milk after it has been poured from one pail to another before the cream has begun to separate. In spite of these and other disturbing factors, our results show that tests of dairy cows can be made by the farmers themselves with sufficient accuracy to give a very satisfactory knowledge of the performance of each cow.

As these same farmers sent their milk to the creamery daily, the creamery weights and tests of the milk can be compared with the farm figures on testing days. Although this is a comparison of one weight at the creamery with the sum of twelve to twenty-four weights taken at the farm, according to the number of cows in the heard, the figures in the following table give the results of a one-day trial made at four of the farms, and show how close an agreement was obtained.

Comparison of farm and creamery weights and tests at four farms:

MILK OF ONE DAY.

Farm.	No. of Cows.	Farm lbs.	Creamery. lbs.	Difference.	Farm Test.	Creamery Test.	Difference.
A	8	130	115	15	4.56	4.5	.03
C	11	231	211	20	4.3	4.3	
D	6	118	113	5	3.8	4.0	.2
E	4	79	73	6	4.5	4.4	.1

It is to be expected that the farm weight would be greater than the creamery weight on any given day, because a certain amount of milk is always kept at home for family use, and even if that is not the case small errors in making twelve to twenty-four weights are unavoidable in handling the milk at the farm.

The total annual production of a cow was found by multiplying the average of the four or five daily weights of milk and of butter-fat taken each month by the number of days in the month, and adding the products together.

The money value of the milk of each cow was found by multiplying the monthly weight of butter-fat by a certain figure, which was one half cent less than the average Elgin market price of butter for that month, and adding the products together.

Feed and Care of the Herd.

The cows at each farm were fed and cared for during the entire year according to the usual practice of their owners. As far as we could ascertain, all the cows at one farm were fed in the same way, no attempt was made to vary the amount of feed which each cow should have, excepting that where grain feeding was practised it was usually stopped while a cow was giving little or no milk.

At farm C the owner kept a careful record of all grain bought and fed to his cows during the year. His estimate of this feed is given below:

Estimated Feed Costs and Receipts from Twelve Cows.

*Grain bought during the year		$180 00
30 acres corn stalks, $2.00 per acre		60 00
10 tons clover hay, $5.00		50 00
10 acres good pasture and 15 acres woodland		65 00
Total cost of food		$355 00
Received for milk at Creamery	$572 00	
Sold 12 calves at $5 50	66 00	
	$638 00	
60,000 lbs. skim milk, 10 cts. per 100 lbs	60 00	
Receipts exceed feed cost		343 00
	$698 00	$698 00

*The grain feed consists of corn and oats ground together, corn meal and bran, or about fifteen tons of grain, at $12.00 per ton.

This shows that the estimated cost of feed at farm C was nearly $30.00 per cow, and the total receipts $698.00, which divided by twelve, the number of cows in this herd, gives a little over $58.00 as the average receipts per cow. Assuming that the manure will pay for the care of a cow, the owner of this herd received an average profit of $28.00 per cow.

Each cow was fed about the same amount of grain and hay during the period of stable feeding—November 1 to May 1. The grain was fed dry just before milking, 10 to 14 pounds per head being fed per day, excepting the dry cows, which received very little grain. Hay was fed the last thing at night after milking. During day time the cows were turned out into a sheltered yard, where they were fed cornstalks that had been stacked near the barn at husking time. The cornstalks were well eaten, and it is possible that the cows satisfied their differences in appetite on the cornstalks, if, as stated, each one was given the same amount of hay and grain. The cows had access to well water during the entire year, and were in pasture from May to November. When cows were fresh the calf was allowed to have its mother's milk for about three weeks, then it was sold for veal.

No exact feeding records could be obtained, except at farm C. At the other farms corn, bran or shorts, ground oats, pasture grass, and a very little hay were fed in uncertain amounts, and apparently with no definite plan. At farm A no money was spent for feed during the year, but the corn and oats raised at home supplied all the grain the cows received, except that some oats were exchanged for bran to give the cows a variety of feed.

Although there was quite a contrast in the feeding and management at the different farms, the methods of weighing and testing the milk of each cow was the same in each case. About $10 should be added to the factory value of the milk of each cow as given in the table. This represents about the average value of the skim milk, 5,000 pounds at 10 cents per 100 pounds, and a veal calf three weeks old.

The extreme variation in the butter value of the cows on the different farms is shown in the following table :—

RANGE IN VALUE OF ANNUAL PRODUCTS.

Received for milk of.	Farm A.	Farm B.	Farm C.	Farm D.
Best cow.....	$53 35	$58 20	$60 72	$55 49
Poorest cow	28 72	44 83	37 96	39 60
Average cow.....	36 30	50 00	48 83	44 12
No. of cows in the herd ..	12	5	12	4

Since each farmer fed all his cows in the same way there is no evidence to show that it costs farmer A any more to feed the cow that paid $53.35 than the one that paid $28.72. But these figures do not mean that cow No. 1 is worth $53 00 and No. 9 $28.00, because if the feed of a cow for a year costs $30, the profit or loss from each cow is shown by comparing the value of her annual product with this figure. If a cow produced $53.00 worth of butter from $30.00 worth of feed she made $23.00 profit, but another cow producing only $28.00 worth of butter on this same amount of feed was a loss of $2.00 to the farmer.

An inspection of the receipts from the twelve cows on each of the two farms A and C, shows that at farm A there were three cows which did not produce milk enough to pay for their feed. The entire herd only paid a profit of $75.00, and three of the twelve cows paid $50.00 of this amount, while the combined profit of the other nine was only $25.00. In this case three cows earned 100 per cent. more money in a year than was earned by nine other cows on the same farm.

On farm C the twelve cows earned a total profit of $228.00, instead of $75.00 as on farm A, but even at farm C there is considerable difference in the cows. One earned only about $8.00 profit, while another earned nearly $31.00, a difference of about 400 per cent. in the annual butter value of these two cows to their owner. The record further shows that six of these cows paid 60 per cent. of the total profit for the year, and the other six paid only 40 per cent. of it.

A few of the cows tested were such persistent milkers that their owners had som difficulty in drying them off. These cows were all among the greatest producers. Th cows that were dry the longest were generally the smallest producers. This is shown b

the records at farm A, where several of the cows were dry for three or four months in the year.

Most Profitable Month for Fresh Cows.

The market price of butter and cheese goes through approximately the same range of variations each year. During the past two years—1897 and 1898—the lowest prices for butter were in May, June and July, and the highest in September, October and November. This fact convinces many farmers of the profitableness of winter dairying.

The records obtained from these cows furnish some interesting evidence on this subject, as they include cows which were fresh in every month of the year. One cow was fresh in October, and her 262 pounds of butter brought $43.40, while another fresh in March produced more butter, 274 pounds, but it brought less money—$41.04. The average price paid by the creamery for the butter-fat produced by the first was 19.3 cents, while that of the other was 17.4 cents, a difference of nearly 2 cents per pound, due to the season of the year when the cows were fresh.

The method of calculating the factory value of each cow's milk has already been described—the average value per pound of fat for each cow is obtained by dividing the total value of her milk by the total butter-fat which she produced in a year. This figure is naturally raised or lowered by the market price of butter when each cow was producing her maximum yield. As a rule the cows gave the most milk during the first two or three months after calving.

If we group together the prices received per pound of butter-fat for all cows fresh in the various months, we obtain the following table:

AVERAGE PRICE PER POUND FAT RECEIVED FOR THE TOTAL BUTTER-FAT PRODUCED BY COWS FRESH IN THE DIFFERENT MONTHS.

	December.	January.	March.	April.	June.	July.	September.	October.
	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
	17.4	18.	17 7	18.	18.2	18.6	19.	18.4
	17.1	17.5	17 5	17.7	18.6	18.7	18 5	18.8
	17.6	17.	17.4		18.9		19.2	19.3
	17.7	16.5	17.7				19.5	18.
	16.7	18.	17.9				20.	
Aver.	17.3	17.6	17.6	17.8	18.6	18.7	19.2	18.6

Although there is some variation in the figures for the cows that were fresh in any given month, the agreement is sufficiently close to show that the highest price per pound was received by the cows fresh in September and the lowest by the cows fresh in December.

Previous to making the tests here described, the owners of these cows had little, if any, accurate idea of the relative value of the cows, but the records show that the information is worth to every cow owner many times the cost of a Babcock milk test and the time necessary to use it.

Prof. Farrington then gave a number of stereopticon views, illustrating the benefit of weighing the milk, from each cow in order to ascertain whether it was doing profitable work or not. He also exhibited photographs of typical dairy cows, giving the records of each cow. The exhibits were very interesting, and Prof. Farrington was listened to with rapt attention by the large audience present.

PRESENTATION OF WINDSOR SALT COMPANY'S PRIZES.

The Chairman then called upon Mr. A. F. MacLaren, M.P., to present the prizes given by the Windsor Salt Company.

Mr. MacLaren then presented the prizes to the following prize winners, making a few happy congratulatory remarks in each case.

Industrial Fair	Cheese,	M. Knechtel,	Dorchester Station.
	Creamery Butter,	I. Wenger,	Ayton.
	Dairy Butter,	Jos. Dalson,	Alloa.
Western Fair	Cheese,	M. Knechtel,	Dorchester Station.
	Creamery Butter,	I. Wenger,	Ayton.

PRESENTATION OF PRIZES FOR ESSAYS.

Mr. Ballantyne then presented the following prizes for essays on cheese making:

First Prize Essay, Cheddar Cheese Making, Colin A. Campbell, Stratford, Ont	$50 00
Second Prize Essay, Cheese Making, A. J. Wagg, Guelph, Ont	25 00
Third Prize Essay, Cheese Making, F. H. Brooks, Lynden	15 00
Fourth Prize Essay, Cheese Making, Thos. E. Nimmo, Ripley, Ont.	10 00

Hon. Thomas Ballantyne: Various influences have been at work to improve our butter. Canadian butter had the worst reputation of any of our articles of commerce, but we have made great strides and the quality of our butter has greatly improved, I dare say, a great deal through the agency of the travelling dairy. The butter we formerly used, nobody would think of using to-day. I have no doubt these essays will help on the work greatly.

Mr. Ballantyne then presented prizes to the following successful competitors for essays on butter making:

1st Prize, J. M. Livingstone, St. Marys	$50 00
2nd Prize, Wm. Waddell, Strathroy	25 00
3rd Prize, W. F. Baskerville, Strathroy	15 00
4th Prize, T. B. Marshall, Tiverton	10 00

INFLUENCE OF THE BUTTER AND CHEESE MAKER ON HIS PATRONS.

By Miss Laura Rose O. A. C. Dairy School, Guelph.

The word "influence" comes from two Latin words meaning, "to flow into," which implies the pouring out of something from one thing to another. The power of influence acts much like the power in nature. How quietly the rays of the spring sun break the bands which have bound the rivulets, and with what gentle voice do the same rays call forth the snow-drop and clothe in tender green each hill and tree.

So it is with that strange power—influence—we possess, each person coming in contact with another makes some impression. It may be but slight; on the other hand the effect may prove deep and lasting. We do not realize this to the full, else many of our actions would be different.

That which must influence the patrons of a butter or cheese factory, is having confidence in the integrity of the man in charge. No matter how expert a maker a man may be, no matter how many other good qualities he may possess, yet, if he has not the confidence of his patrons, his influence over them for good is null and void.

The other day a gentleman in speaking to me of a man, said, "I don't know of another man I think so much of." I wondered at it, for the man in question was what one might term quite an ordinary man. I better understood the reason, when my friend emphasized his remark by adding, "There isn't a more honest, upright man in the country, he is just as true as steel." There was the secret, and what a power for good such a man is in a neighborhood. The cheese or butter-maker who has a reputation such as this man, dispels all doubt as to whether the milk is properly weighed in, whether the sampling and testing are accurately done, and the returns equitably divided. Such a man exerts a reflex action. Even a rogue shrinks from cheating a thoroughly honest man, while he may consider it quite the proper thing to get even with a sharper.

First and foremost then should be a character for honesty.

Next to this, if you want to inspire confidence in your patrons, you must be a skilled workman. The day is past when old methods, ancient apparatus, and a total lack of scientific principles will do. The men who make themselves felt are the up-to-date men, men ever ready to grasp new ideas, test them, and if found practicable and an improvement on the old style, adopt them. Science has done much for the manufacturers of dairy products, and it is the men who take advantage of these discoveries, who rise in the estimation of the patrons.

If you want to be a power among your associates you must be punctual. Punctuality is the key-note of character, and the very soul of business. If you have an appointment endeavor to be there on time; if the milk arrives at a certain hour, be there to take it in. If the accounts are to be rendered on a certain date, have them ready even though you may have to sit up late to accomplish it. Punctuality is a habit we can all acquire. A student noted for always being on time came into class one morning and found the lecture had commenced. The Professor, noticing him, took out his watch, and asked of the class the time, and was told it lacked three minutes of nine. "My watch is then five minutes fast; we have commenced too soon." How many of us could regulate a professor's watch, and who can deny the influence of that student?

The loiterer who wastes his own time and that of other men, can neither be respected or depended on. Nelson owed his success in life to a habit of always being fifteen minutes ahead of time.

General Washington had a secretary, who on one occasion came late to an appointment, and gave as his excuse that his watch was out of order. "Then," said the General, "you must get another watch or I another secretary." Some one has said, "Do all you promise to do, and all you are rightfully required and expected to do, as certainly, so far as depends upon yourself, as the sun rises and sets, so that the hearts of all with whom you are in any way connected, may safely trust in you; then you will become pillars of support in the family and in society instead of broken reeds."

Promptness creates an atmosphere of briskness which stimulates and has a tonic influence on all who come within its radius. Those who are unpunctual and procrastinate are usually in the end flustered and hurried; working spasmodically without method or order, and the result is often disastrous to their own interests and perhaps more so to those working with or depending on them.

If one wants to influence those about him and hold their confidence, he must have faith in the business he is at, talk about it in a cheery hopeful way, and not get easily discouraged, even if things do not go along as smoothly as desired and prices drop to an alarming extent. Make those bringing milk to your factory believe it is a good thing and that there is money in it. To enthuse others you must be enthusiastic. Without enthusiasm a life of industry is a dreary, monotonous prospect that will never rise above the level of discontent. What a depressing influence a man without any "go" has, one feels like shoving him along.

Enthusiasm was the distinguishing characteristic of Gladstone. The fire glowed in all his words and actions, and made him the great man that he was. The wide difference between the feeble and the powerful, the great and insignificant, is energy and an invincible determination—a purpose once formed, then a deathless struggle for victory. Many think because they are poor and obscure they have no influence and so become careless and neglectful. Their very poverty may be their safe-guard and means of advancement. It is not the men born rich, but those who by their industry and perseverance have acquired riches, who stand out as landmarks in the commercial world.

Honesty, energy, industry and hope make a four-in-hand, capable of riding over any difficulty and carrying in its train the minds of many.

That which has about as telling effect as anything is the manner of a person. When manners are more than vaneer, when they are part and parcel of the inner man and true self, they indicate the possession of some of the very best and loftiest qualities of heart and mind, as Tennyson expresses it:

> "Manners are not idle, but the fruit
> Of noble nature and a loyal mind."

Manners to some extent may be instinctive, but are usually acquired, and when practised constantly become habitual as the following illustrates: A son of Lady Mansfield's was very ill at his boarding house; his mother went to see him. There was only one chair in the room in which the sick boy was reclining, and a friend who was with him was sitting on the coal scuttle. When Lady Mansfield entered the room, the lad who was sitting on the coal scuttle got up, and with perfectly natural politeness and good-breeding, offered it to her ladyship to sit down upon.

Manners to a great extent make the man in the world's eye. To be polite does not infer a weak surrender of one's convictions to another. It should be the wish and aim

of every man of true courtesy to lend every assistance in his power to those around him, and to show a general, kindly interest in their welfare. It will help him in his dealings with men—for it is hard for a person to be either rude or angry with a courteous, civil man. A soft answer turneth away wrath. If the cheese or butter-maker would acquaint himself with the conditions of the patrons supplying milk so that he could make suggestions, rectify errors, give timely advice or warning, what an influence he would be. For this very reason, it is well for the maker to have as broad a knowledge as he can, not merely along his own special line, but of the general care of cows, of the effect of different foods, of the best methods of handling milk and many other points, that he may be able to direct and instruct his patrons when opportunity occurs. But much tact must be exercised in imparting information else it will be rejected. The "I know all" manner must be guarded against; let the person see you have at heart his best good and prosperity and and depend upon it your words will bear fruit.

Closely coupled with good manners should be careful attention to personal appearance. They go hand in hand. The effect of dress on one's self and those one comes in contact with cannot be estimated. How can a man advise and insist on cleanliness and care in the handling of milk, when his dress, his utensils, his factory and surroundings indicates a total lack of the practice of what he preaches. This is a case where actions speak louder than words. Nothing carries with it such force as a personal application of the theories one advances. A milk driver will be ashamed to drive up to a clean platform on which stands a clean man, and ask him to lift dirty cans from a dirty wagon. I would like to urge upon you all to be as clean and neat in your person, factory and surroundings as is possible. Have your standard of the highest in this regard as it is the most important factor in connection with the dairy industry.

A German, whose sense of sound was exceedingly acute, was passing by a church a few days after he had landed in this country, and the sound of music attracted his attention though he knew nothing of the language. The music proved to be a piece of psalmody sung in most discordant fashion, and the sensitive German would fain have covered his ears. As this was scarcely civil, and might appear like insanity, his next impulse was to rush into the open air, and leave the hated sounds behind him.

"But this too, I feared to do," said he, "lest offence might be given; so I resolved to endure the torture with the best fortitude I could assume, when lo, I distinguished amid the din, the soft clear voice of a woman singing in perfect tune. She made no effort to drown the voices of the companions, neither was she disturbed by their noisy discord; but patiently and sweetly she sang in full, rich tones. One after another yielded to the gentle influence, and, before the tune was finished, all were in perfect harmony."

The spirit that can thus sing patiently and sweetly in a world of discord, must indeed be of the strongest as well as the gentlest kind. One scarce can hear his own soft voice amid the braying of the multitude, and ever and anon comes the temptation to sing louder than they, and drown the voices that cannot thus be forced into perfect tune. But this were a pitiful experiment; the melodious tones, cracked into shrillness would only increase the tumult.

Stronger and more frequently comes the temptation to stop singing and let discord do its own wild work. But blessed are they that endure to the end—singing patiently to the end—singing patiently and sweetly, till all join in.

What better illustration could I use of the influence which one cheese or butter-maker of the ideal type exercises in a community. Let each man before me aim to be just such an influence in the position he holds, not merely doing what he has to do, but doing all in his power to advance the general good of man.

I would urge upon you, to be honest, be competent, be punctual, be hopeful, be courteous, be neat, be clean—then will you be a power among men, and long after you have shuffled off this mortal coil, your influence, like Tennyson's Brook, will flow on and on forever.

The president then introduced Mr. Seaborn, the American Consul.

ADDRESS.

By Mr. Seaborn, American Consul.

I ought not to respond and take up your time at this late hour, but I promise you I will be brief. I was born on a farm, and, to me the dearest spot in my country is my little farm down in the east part of south Pennsylvania. I have driven over the roads of this fine county, and seen your splendid fields, how well they are tilled and cleared of woods, how well they are fenced, and how splendid your buildings are everywhere. There is one thing I would like to call your attention to, and that is, that you ought to beautify your homes, that you ought to plant trees and clean up around your butter factories and creameries. I want you to paint and whitewash your buildings. It will pay. It will pay you in dollars and cents. The boards on the barn will last twice as long. One of the speakers last night spoke on the decoration feature of the farm. He gave a splendid description of your farm life. The crowning glory of your farm is not the acres, the barns, the buildings, the cattle and horses, but your boys and girls. I want you to educate these boys and girls on the farm so that when they came in contact with nature they will love it—and where as the drift now is from the farm to the city, if this right kind of education is instilled in these boys and girls, it is only a question of a few years when they will drift the other way, and they will come to the farm from the city where they ought to have stayed before. The best thing that I have heard at your convention is the talk you have had on honesty, and let me tell you, that the man who is dishonest, whether a merchant or lawyer, or any other person, he who is dishonest, is a disgrace and ought not to be permitted to do business.

The men from New York who made this dishonest cheese and sent them to England are driven out of the market by you to-day, who have an honest article, (applause) and it serves these dishonest New York rascals right to be driven out of the market. "Honesty is the best policy," not only in cheese and butter-making, but in all business; therefore let me repeat that there is nothing I have heard here that has pleased me so much as this constant strain, "Whatever you do, be honest in your work." I have had the pleasure and honor of being in many halls, but I have never been in any hall more suited to the purpose than the one in which you are now meeting; therefore let me repeat, that you ought to congratulate yourselves in the fact, that you have the honor of meeting here for the first time, and let me congratulate you that we are here in the last year of the greatest century the world ever saw, and that we can live in this year of the century in an era of such good feeling, when the relations of the two greatest English speaking nations of the world are so cordial. (Applause). May the Star and Stripes and Union Jack ever hang for freedom and liberty on this vast globe. They are flags that forever stood for humanity, civilization and a better Christianity over the world. One is now fighting to subdue the people in the islands of the great East, and the other in the darkest of Africa, is practically doing the same. It is carried there as a banner to represent a better civilization, and better humanity, and better Christianity. I thank you for your kind attention. (Applause).

THE SUB-EARTH DUCT.

By J. N. Paget, Canboro.

I feel, in coming before you this morning to discuss the subject that has been assigned to me, that it is one of so much importance, that I am incapable of dealing with the question as it should be dealt with. There is no question to-day that is of as much importance to the cheese manufacturer throughout the Province as that of controlling the temperature in our curing-rooms. The sub-earth duct is to some extent a new thing, as the President has told you. They have only been in existence in our country a short time, the Ontario Agricultural College putting in the first that was used in Ontario. They have now used it for two years.

There are now only six sub-earth ducts in the Province, five of them, are I think, in the Western portion of Ontario and one in the East, so in speaking of the sub-earth

ducts, I wish it to be understood that I speak from the experience I have had during one season only. Perhaps that is hardly a sufficient length of time to speak definitely with regard to the value of the sub-earth duct, particularly on account of the season we had last year, which was not considered by cheese-makers one of the worst seasons by any means. We did not have the long period of warm weather that we had the previous season. The nights were usually cool and it was not so difficult to control the temperature in our curing-rooms as it had been during the year of 1898. Prof. Dean, who had a sub-earth duct in 1898, speaks very highly of it; and the season of 1898 was, as most of the cheese-makers in this part of the Province know, one of the most difficult we have had in a number of years. We had them extremely warm weather extending night and day without intermission, for a period of nearly three weeks, when the temperature of a great many of the curing-rooms went up to 90 degrees F., (I was in one curing-room, where the temperature was 88 to 90) and you all know, that where cheese is stored with a temperature such as that, even if put in there in first-class condition, the quality will deteriorate. At several factories ice-boxes are now being used. I have frequently been asked the question, how does the sub-earth duct compare with the ice-box? That is a question I am not prepared to answer, because I have not had any experience with the ice-box, and I only wish to speak of what I know. I wish to point out, that the sub-earth duct is an excellent thing, and is, I believe, the best thing available to-day for controlling the temperature of the curing-room. I wish to say, that a sub-earth duct will not control the temperature in all kinds of curing-rooms. The first thing to consider is the curing-room itself. During the past season, while I had a sub earth duct, and while it reduced the temperature some thirty or more degrees, I did not perfectly control the temperature of my curing-room, for the reason that the curing-room was not properly constructed. A curing-room should be so constructed as to prevent any hot air, or any air, coming into the curing-room except that which comes in through the air duct. You can get cool air from the sub-earth duct, but where you have a curing-room that has openings through which hot air can get in, the benefit of the cold air from the sub-earth duct is counteracted. Therefore, I say, do not depend altogether on the sub-earth duct or on the ice-box, to produce the quality and kind of cheese that the British Markets are demanding. They require a mild-flavored, soft-textured cheese, different to what they did some years ago, and that kind of cheese requires to be kept at a lower temperature during the curing process than the cheese that is harder and firmer. Therefore, I would say the first necessity is to have some proper insulation for our curing-rooms.

The curing-room I used last year has been burnt down, and now I propose to construct a different kind of curing-room. I believe, with a properly constructed curing-room, I can so control the temperature with the use of a sub-earth duct, that it will not go higher than 65 degrees on the warmest day we may have.

Last season we tested the temperature outside. When it showed 92 degrees F. at the base of the pipe, at the base of the intake the air coming into the curing-room was at a temperature of 58, so I believe that, if the curing-room is so constructed that hot air is excluded, the air coming in at 58 degrees will certainly keep the curing-room at 65 or 70.

I wish this morning to speak along the line of the construction of these sub-earth ducts. I have been asked many questions relative to the manner in which the sub-earth ducts are put in. For that reason I had this chart made, and have brought it here in order that I might be better able to convey to you the idea of the construction of a duct. In the first place we dig a drain to the depth of 6½ feet, extending 150 feet from under the factory to the intake; this drain therefore is 150 feet long. I started the drain three feet wide at the top and narrowed it to two and one-half feet at the bottom. In the bottom of that drain I put four rows of 5 inch tile. I think at the College they used 6 inch tile. I put in four rows of 5 inch tile on the bottom and three on the top.

Some people seem to have the idea that it is necessary to put clay on top of the tile and then the other tile on top, but that is not the mode of construction, the tile being placed one on top of the other. At the intake there is a well which I constructed of brick, and the tile came along the drain and about two inches into this well. It is three feet across, and extends to the surface of the ground. Then on top of that I constructed a stand pipe, or intake air pipe, 35 feet high. At the College they used galvanized iron

in the construction of this stand pipe. At my factory I used wood, because I found I could make this kind of a box cheaper than I could procure a galvanized iron one, and I think it answers the purpose equally as well. It is three feet, I think, at the base extending 35 feet in height, and is 20 inches at the top. At the top of the wooden pipe I put a galvanized iron cowl 20 inches across, five feet high, the base of the cowl being made to fit tightly over the top of this pipe, and then, on the top of the cowl, this opening here swings round to the wind. I would advise that the cowl be not less than 3 feet or 3½ across the face. I think this is necessary, though my own was not as much as that, but I believe if it had been that size I would have got better results. Whatever direction the wind is blowing from it will blow into the mouth of the cowl, then the air passes down this pipe into the drain which is where the cooling process takes place. Another important feature in connection with the construction of these air ducts is the length of the drain. There is no doubt the longer your drain is the cooler will be the air coming into your cheese factory. The length of the drain at the College is 90 feet; mine is 150 feet. I believe the longer your drain the more cooling surface you get, and consequently the cooler the air will be as it comes into the curing-room. In my factory I had this drain extending under the building, and then I had a wooden box. I am now going to build a stand box extending into the curing-room above the floor about one inch (so that in reaching the curing-room floor the water would not get into the box), with a slide that can be opened to regulate the amount of air coming in which you can open or close as the temperature of the curing-room requires. There is an opening in the ceiling at the opposite side from that at which the air enters. I have an air-tight box constructed coming down through the ceiling with a slide to regulate the amount of air passing in and out that extends up through the roof and above the ledge. Some people attach a considerable importance to the height or length of this outlet. From my experience I do not consider that of much importance. Some claim this outlet ought to be considerably higher than the inlet. I do not think that it is necessary, but I do think that it is necessary to have the outlet extending above the ridge of the roof sufficiently high that there may be a draught. On the top of the ventilator I have a galvanized iron pipe, with a covering on top to prevent rain and storm coming down, with sufficient opening to allow a current of air to pass through. The cost of an air duct will vary according to the locality in which it is constructed. The greatest amount of labor in connection with the construction is in the digging of the drain, varied by the character of the soil. In some places it would be worth a good deal more to dig a drain 6 or 7 feet deep and 150 feet long than it would in other kinds of soil. The soil in which I made my drain is a heavy clay and pretty hard digging, and I think it would be a fair average of any part of this Province. The total cost of my sub-earth duct was about $80, counting the cost of digging the drain, procuring the tile, putting that in, constructing the intake pipe and all the work connected with it. Of course, that is more than an ice-box would cost but, on the other hand, if you have an ice-box you have to put in a supply of ice which is, in some localities, very difficult to get; where I live we would have to draw ice six or seven miles. With the air duct you have it there all the time, and to my mind it is a better means of controlling the temperature. With an ice-box in the curing-room you are apt to neglect to try to control the temperature until the room becomes heated, and the probability also is you will neglect putting in the ice until the room becomes too warm; but with an air duct all you have to do is to open a slide allowing the air to pass in. It is always ready to be used, and I believe that, in the next five years, there will not be a cheese factory in Western Ontario that will not have an air duct. If you will insulate the curing-room as it should be done you will have no trouble in keeping it cool. Prof. Dean has had greater experience with the sub-earth duct than I have, and no doubt he will be able to add to what I say, but I wish to say, as far as my experience goes which is only one year, I would recommend to every cheese-maker and to every proprietor of a cheese factory to give his attention to the curing-room. I believe that the sub-earth duct is the best means for controlling the temperature that we have.

Mr. DERBYSHIRE: And the moisture in the curing-room is better.

Mr. PAGET: That is an objection I have heard raised frequently to the sub-earth duct, that it brought in air that was too moist. I have only had one year's experience, but I most emphatically say that during the season of 1899 I never saw one particle of mould in my curing-room. I do not think the sub-earth duct is a means of creating mould.

Mr. Derbyshire: You take the ordinary curing-rooms and you have not sufficient moisture.

Mr. Paget: I believe the sub-earth duct will regulate the moisture better than an ice-box, because I believe the ice-box has too much moisture. I was in curing-rooms last year where the cheese were moulded very much, and in my own curing-room I never saw a bit of mould. The year before we had an ice-box and had a good deal of mould. We merely controlled the temperature as we could, trusting to the weather not to get too warm. I do not think the cheese industry can afford to trust to this kind of method any longer. I believe we ought to be able to thoroughly control the temperature in our curing-rooms. I would like there to be a thorough discussion of this matter because in that way we get pointers, and there are, no doubt, many points that I have not touched upon this morning, so I trust there will be a thorough discussion on this question. (Applause).

Prof. Dean: There are in the Province of Ontario, so far as I know, sub-earth ducts, at Dunboyes, in Lincoln County; Lyons, Elgin County; Caledonia, Woodburn, Caistorville, and Mr. Paget's own factory at Canborough, all in the section where our worthy president lives. There are also two or three in Eastern Ontario. These sub-earth ducts, so far as I have been able to look into their working, have given entire satisfaction. I have either visited them, or have had letters from persons who have used them during the past season, who all speak of them and their work very highly indeed.

As to that question of moisture and mould I would say that in 1899 we were not troubled with mould to any great extent, that while the sub-earth duct does bring in air which is loaded with moisture, the moisture simply makes the cheese favorable for the growth of mould, but does not, and therefore the sub-earth duct does not, cause mould. In the different factories different sized tile is used, varying from 4 inch up to 10 inch. Instead of having 6 or 7 or 8 inch tile Mr. Williams, at the Lyons factory, has simply two rows of 10 inch tile. He has, I consider, a marked improvement over these cisterns or wells, at each end. He connected the tile with an elbow and used a tile for taking the air from a duct up into the curing-room, simply cut a hole in the curing-room floor and allowed the tile to project into that room four or five inches.

That is much cheaper and to my mind a more satisfactory way of taking the cold air into the room. I made some observations at Mr. Paget's factory on the 15th of August last. He said the soil about his factory would be about the average, but from what I have seen of the earth at different factories, I consider Mr. Paget had one of the worst kinds of soils in which to dig a drain. It was a clay material that caved in and gave a lot of trouble. On the 15th of August, the air outside was blowing at 200 to 500 feet per minute. I used an anemometer for determing the rate of the air outside. The rate of air coming into the curing-room was from 80 to 110 feet per minute. The friction on the tile reduces the rate of speed of the air. The faster it comes through the tile the less cool it will become. Some have become discouraged because they could not feel a strong draught of wind, but if you simply have a moderate flow of air through the tile it becomes cool and will give good results. The temperature on that day, outside in the sun was 92, in the shade 78. The temperature of the air in this curing-room was 64. Mr. Paget has already told you the curing-room was not insulated. The air outside, on the sunny side of the factory, would come through. I considered the results were very favorable indeed, considering that the building was not properly insulated. I visited the Lyon's factory on the first day of August last. The temperature of the day outside was 70 degrees in the morning at about half-past eight. The temperature of the air inside was 67, and Mr. Williams told me that the temperature of the air in his curing-room never went above 70, and most of the time was 64 or 65.

Mr. Elliott, who was a former maker, told me in his report, that frequently the air in that room was up from 75 to over 80 during the hot weather. At the time of my visit, the air outside was blowing from 200 to 300 feet per minute, the air coming into the curing-room from 70 to 110 feet per minute. At another factory I found the whole length of the tile was about 60 feet and only three feet deep; and in another factory, the tile were laid in a sand knoll, and the sand, of course, would warm up quickly. The air coming into that factory was just about the same temperature as the air outside. The temperature outside was 73 and the temperature inside 69.

You must have your outlet pipe high enough to be above all trees. At Woodburn they found on account of the high elm trees on the bank of the creek, that they did not get good results, until they put they intake pipe up 65 or 70 feet. I would say, 1st, be sure and have your intake pipe high enough, and 2nd, have the cowl, which catches the air, with a wide mouth. The cowl should be at least three feet in diameter, four feet is better, and should have the sail so that it quickly responds to changes in the direction of the wind. Have the length of the tile at least 100 feet if you can get it. 150 feet to 200 feet is better. Place them at a depth of at least six feet, eight or ten is better. The temperature of the earth is fairly constant when you get down six to twelve feet.

In the summer time the top of the earth down to three or four feet becomes warm; when you get down six or eight or ten feet the tile does the work you want it do. Put the "intake" of the air into the curing room, so that you can regulate it in the fall and spring You can just make a slide in the floor. I think it is the best to build a little box around the opening, and have a lid on hinges that you can raise up.

The difficulty we found with the slide was, owing to the air being moist, the slide will stick in the floor or grooves where you have it working. Take air in at one side of the curing-room and the warm air out on the other side. If you can bring the air in at two or three different points, it would be best to take the air out at the centre, but if you bring it in at one side then take it out at the other. We have pipes of different lengths, and I find that the draught of air is just as good into the curing-room with a short outlet pipe, as with the long one. It is a simple matter of getting an outlet for the warm air. A sub-earth duct can be built for from $60.00 to $80.00 and I believe will pay for itself in a very short time.

Where you have proper control of the temperature in the curing-room there is less shrinkage of the cheese and less loss of fat. When cheese gets above 70 degrees the butter fat runs out from the casein and is lost, the body and texture of your cheese is destroyed, and loss in weight is caused, while the high temperature is favorable for the development of bad flavors. It has been estimated that the value of cheese is $\frac{3}{4}$ of a cent per pound greater where the temperature is properly controlled, for by having proper control of the temperature you lose less in shrinkage, less butter fat, and have a better quality of cheese. (Applause).

Mr. Bell : Is it necessary to have a drain away from the tile to take away any surplus water that may come into the tile ?

Mr. Paget : Yes, I think it is. That is a very good point, for, unless you have proper drains to carry away water, (because there is no doubt that a certain amount of water will come down from the earth to the tile), the water will accumulate around the tile and will certainly create too much moisture in the drain. It is very important to have proper drainage. I drained from the end next to the building. I do not think it is material which end of the drain you take your water from. I have a very great fall from the factory end of the drain, and so no water accumulates in my drain at all. I use 3 inch tile and have the water drain about 6 inches deeper than the air drain, and in the bottom of that I placed three inch tile, so that all the water that gets into the air drain immediately passes off. It is important to keep the air in the air drain as dry as possible.

Mr. Bell : Then you did not make your sub-earth duct perfectly level ?

Mr. Paget : No, I have a fall. Where I take of the water is about one foot lower than the other end. It gradually inclines from the upper end to the lower end, sufficient that any water that might accumulate would pass down into the drain and be carried off.

Prof. Dean : The disadvantage of having a water drain near to the factory is that you have a short water drain which connects with your sub-earth duct in which the warm air will enter and to some extent counteract the influence of the cooling of the duct. So I say, wherever possible, have your water drain from the inlet end of the duct, but, if it is more convenient to put it next to the factory, during the very hot weather when there is no danger of the water accumulating, I would recommend blocking up the water drain. At Woodburn they have the water drain in the centre of the duct.

Mr. Edwards : I used a sub-earth duct last season, constructed pretty much on the same principal as Mr. Paget's. There was a difference in the length of the tile my drain being 80 feet long. The only trouble I found with the construction of my duct was in the cowl. I found if the wind went down to a calm it left the cowl sitting at a position

where it did not respond to the next rising wind, perhaps in the opposite direction, the effect being that it brought the air out of the room in place of putting it in. I recommend that that the cowl should be put on so that it will respond to the least breath of air. One morning I went to the factory expecting to see it at 65 or 66, and found it up to 80, which was because the cowl did not respond to the air. As far as I am concerned I would not pretend to make cheese without a sub-earth duct. It saves a great deal of unessiness at night because you know that your curing-room is cooling while you are sleeping, and it makes it so that you can have your cheese retain as much moisture as you desire. In the old days we had to make the cheese hard and stiff because we did not know what moisture we might have in our curing-rooms. I consider the sub-earth duct will pay for itself in a year in the ordinary factory.

Mr. Bell: Sometimes on a very hot day there is very little air.

The President: I was not always a maker, but worked into the business. At one time I was apprenticed in a factory in the old country. The great question at that time was the question of ventilation, and I remember, on the top of the room where I worked, they had something that worked in the turbine principle and that the very least puff of wind would keep it going and that the ventilation was perfect. Sub-earth ducts are new things, but there is no doubt there are men who can manufacture something that will make them work when there is very little wind. What was done in England thirty years ago can be done again.

Prof. Dean: My observation is that when there is no perceptible wind blowing outside there is no cool air coming into the curing-room. That is one of the disadvantages. I have had correspondence with a manufacturing firm and have seen them personally. They claim they had an arrangement to put on ventilators which when once started will create a current of air right through the curing-room, no matter whether the air outside is blowing or not. They have promised to put one on for us, and I hope before next summer we will have such an arrangement and give it a thorough test. They claim, when they put this arrangement on, you will secure a current of air no matter whether it is placed outside or not.

Mr. Smith: Are there not a great many factories in this country, in which it would be impossible to put sub-earth ducts on account of not being built so that you can get the proper drainage—factories situated on level land?

Mr. Derbyshire: Supposing you had a factory on the solid rock, and there was nothing but rock around the factory, what would you do?

Mr. Paget: I think there are not many factories constructed upon a place where you cannot have drainage. In erecting cheese factories throughout the country, an elevated position is selected, where there will be some drainage facilities about the factory. Although you may have some exceptional cases of the kind, they would be very few, and I think we ought not to stop because of a few hindrances, or if one or two factories, or even a dozen factories, could not have proper drainage. I believe some means could be provided for draining in almost every place, because, under ordinary circumstances, there is not a large amount accumulates. I have very seldom seen water running from my air drain, only once in a while after a heavy rain.

Prof Dean: Our water drain is altogether 250 feet in length, on account of the level ground where the factory is constructed. The remedy is very simple indeed. You can use a sewer tile and cement the joints so that the water cannot get in. Where you have a solid rock there are other systems besides the sub earth duct that can be used. I believe the system that is introduced by Mr. Newman, the use of compressed air, will overcome that difficulty. He bought a Westinghouse Air Compressor, and connected it with his engine, and purchased an old boiler to use for storing his compressed air. On visiting his factory, I found that the compressed air was giving entire satisfaction. It costs about the same as the sub-earth duct. The disadvantage of compressed air is that it means continual expense to run the compressor. Where you cannot get the sub-earth duct, I believe the air compressor will give satisfaction. During the process of compressing air it is cooled, and being let into the curing-room, it drives out the warm air and cools the room.

Another way of cooling is by the use of cold water. If you have an abundant supply of cool water, I would recommend putting four or five rows of inch pipe around two or three sides of the curing room, or between the shelves. By pumping the cool water into

these pipes, or where you have a spring, simply letting it run through, they will cool your room. You can also use these pipes for the purpose of warming the curing-room, by having proper facilities and connections.

Then another system they are about to use, is a fan such as is used for blowing sawdust away from machines and factories. It is claimed that the run of this fan will cool the curing-room, so you see we are not restricted to the sub-earth duct, and the man who has a little ingenuity about him, can overcome any difficulty in connection with the cooling of the curing-rooms.

BUTTER-MAKING.

(First Prize Essay.)

By J. M. Livingstone, St. Marys, Ont.

The butter-making industry in Canada is a growing and hopeful one. Compared with some countries the business is in its infancy. But we have at our backs almost unlimited resources which in the future should make us one of the greatest butter producing countries in the world.

Butter consists chiefly of carbonaceous or fatty substances of the milk. Water, salt and a small amount of curd, constitute the remaining portion. The elements extracted from the milk in making butter have very little or practically no value for maintaining the fertility of the soils. Hence where a judicious use is made of the valuable products, it fosters the land more than any other branch of dairying.

So much has already been written in regard to the cleanliness in all the stages of this business that it is almost needless to mention the necessity of it, both as regards the production of the raw material and the finished article. But there is evidently room for improvement in this important and absolutely essential factor in the production of butter. Bacteriologists have informed us that millions of germs are swarming in the air, the air and the water of the planet, some friendly and others of the most inimical nature towards the butter-maker. It is impossible for us to conceive of their numbers, and as milk is an ideal medium for the development and reproduction of most germs great skill and care is necessary to guard against their entrance. The sources from which they come are many, therefore, everything with which the milk is to come into contact should be cleaned and sterilized. In addition other precautions should be used, such as brushing the sides of the udder of the cow before milking, having the hands and the clothes of the milker clean, and keeping the milk in a pure atmosphere. Where slovenly or careless habits are practised, dust, hair and small particles of manure, laden with germs, find their way into the milk and give rise to bad flavors. From the foregoing it is evident that a great deal depends upon the habits and principles of the people engaged in this pursuit.

It is impossible to lay down any hard and fast rules to be followed, as circumstances are so variable. Under normal conditions the process is much the same from day to day; but the inborn skill of practical experience is necessary to cope with the difficulties that beset the path of the butter-maker.

Much has been done to educate the patron as well as the maker, but as the foundation for the good qualities of the butter is made or marred while the milk is in his hands, his actions are worthy of consideration. Under the patron's supervision the process is liable to be carried on under divers principles. Some are conscientious and painstaking. Others either from lack of knowledge or carelessness, do not give the milk the proper care. As there is no dearth of information on the care and production of milk, the patron should be given such or referred to works issued by the various experimental stations.

It is necessary that the cow be kept in a healthy and comfortable condition and have access to plenty of pure water. The feeding of foods which injure the quality of the butter should be avoided. As already mentioned, scrupulous cleanliness must be observed by the patrons from the time the milk leaves the udder of the cow until it is delivered to the creamery, where like precautions should be exercised by the maker.

The milk should be removed from the stable as soon as possible to a pure atmosphere, strained, aerated, cooled and gently agitated at intervals to prevent the cream from rising. It is advisable to use a wire strainer, as it is easier to keep pure and sweet. If milk has been allowed to freeze, the flavor will be injured and it will be harder to separate. It is a bad practice to mix the morning's milk with that of the previous night, until cooled to the same temperature, as it has a tendency to cause souring.

There are two systems of butter making in Ontario, the "cream gathering" and the "separating cream." The latter system is more modern and is superseding the former, not that good butter cannot be made by the old system, but because the new is more economical, and on the whole the product is of better quality, and as the cream is all under the supervision of one man.

It would pay the patrons of cream gathering creameries to invest in hand separators, as the cream would be of better quality, and less would be left in the skim milk and the skim milk would be fresh and sweet. There is much less expense in hauling raw material in the cream gathering system, and as this improves the system it will be on a more equal footing with the separator creamery.

In localities where there is a thick cow population and good roads, with outlying districts, where the roads are bad, or the cow population is scattered, a combination of the two systems would probably give good results.

It is necessary for the man who weighs in the milk to have an acute taste and smell, that he may reject all milk that is liable to injure the quality of the butter. If a patron's milk is rejected, the maker should explain the circumstances, and if possible give information that will lead to the removal of the evil source. The most reasonable method of paying for the milk is according to the per cent. of fat contained in it. The method of paying according to the weight of the milk, is based on a fallacy. It retards progress in breeding dairy cows for richness of milk, and discourages dishonesty. In regard to the testing, strict business principles must exist between the maker and the patron. Two great factors which cause disfavor of the Babcock test is the ignorance of the patron and incompetency of the man doing the testing. It has been suggested that a number of creameries secure the service of an expert to do the testing. This appears to be a step in the right direction, as at present there is great dissatisfaction. Composite samples should be taken and tested monthly during the winter, and bi-monthly in the warmer weather. Seven parts bichromate of potash to one of corrosive sublimate give good satisfaction as a preservative. Shake the samples slightly every day to prevent the cream from rising; keep in a cool place during the summer and do not allow to freeze during the winter. If the samples are to be carried any great distance to be tested, as from skimming stations, the samples must gauge the amount taken each day, so that the bottles will be full to prevent churning while being moved.

The milk should be strained into the receiving vat. During the summer it is advisable to heat the milk in a tempering pan to about 82 degrees; but during the fall, winter and early spring, the milk is more tenacious of its fat, and must be heated higher. Heating decreases this tenasity, and gives a better separation. At present it is a disputed point, as to whether heating increases the difference between the specific gravity of the fat and the other constituents of the milk. The main points to be observed in separating milk are the rate of inflow and the temperature of the machine. Some machines give the best results by heating the milk between 95 and 100 degrees; others at a much higher temperature. It is best to skim the cream containing between 30 and 35 per cent. butter, as it takes less labor to handle rich cream, and it also allows a low churning and ripening temperature. Samples of skim milk should be tested to determine the thoroughness of the work. During the summer months it pays to heat the skim milk to 160 degrees, as it increases its keeping qualities, thus making it better food for calves. The whole milk may be pasteurized, but it is more economical to heat the skim milk by passing steam directly into it. There is a diversity of opinion as to whether pasteurized cream or milk gives a better quality of butter than the unpasteurized. Pasteurization has a tendency to destroy the fine aroma of the raw cream butter, and gives very mild uniform flavored butter of increased keeping quality. It has a tendency to free the milk of bad flavors, and may be practiced to advantage where any difficulty is experienced with bad flavors. It also greatly reduces the germ content of the milk, thus leaving it as a clean seed-bed ready for pure seed, which is the lactic acid germ. I think that for some markets, if not

all, a better quality of butter could be made without pasteurization, if we could get a uniform and good quality of milk at all times of the year. But as a whole, considering the difficulty there is in securing the best quality of milk, pasteurization is beneficial. The Danes have almost entirely adopted this method, and their enviable position on the British market speaks well for it.

A good starter is indespensable in the manufacture of butter. This may be made by pasteurizing a quantity of the skim milk, and adding about one-fourth of pure fresh water. Ripen in a pure atmosphere by adding a little of the previous day's starter if it is good flavored. Good results have been obtained by securing a pure culture of the lactic acid germs, as a mother starter. In the course of time, the starter is liable to go off in flavor. In such cases a new culture should be secured. Some have secured good results by ripening different samples of milk in sterilized sealers, and selecting the best as a mother starter. The best method is to get a pure culture from a bacteriological laboratory. A good starter has a pleasant, sharp taste, acid and smell and should be firmly coagulated.

The cream should be cooled to the ripening temperature, which is between 60 and 75 degrees. A low ripening temperature gives a better body and texture to the butter, but as this means a long ripening period, a deterioration in flavor is liable to take place as the cream is subjected to contaminating influences, for a longer period. The utility of a good starter comes in here, as by means of it we can ripen the cream in a comparatively short period at a low temperature, and the flavor of the starter will generally predominate in the butter. The amount of starter used varies according to the length of time in which the cream is to be ripened. About 10 per cent under normal conditions gives good results. When the cream has developed sufficient acidity, it must be cooled quickly, to the churning temperature, and held at that temperature for at least 5 to 6 hours before churning. When cream is ripened sufficiently, it has a smooth, thick, glossy appearance, and a sharp acid taste and smell. The alkali test is the most accurate method of determining the acidity. The acidity at which the cream is to be churned should vary universally with the richness and directly with the demands of the market for which the butter is intended. Prof. Spillman, of Washington Expt. Station, claims that for every 5 per cent increase of butter fat in the cream there should be a decrease of .04 of one per cent in the development of acid. I think most of our butter-makers develop too much acid in their cream to suit the British market. The Danes churn their own cream with very little acid in it, and some of our best creameries are adopting this method. The butter-maker should aim to have the cream of uniform quality from day to day. The cream must be stirred occasionally during the ripening process to secure uniform temperature and ripening, and again just before straining into the churn. Coloring should then be added if the market requires it.

The object of churning and separating is to reduce the butter fat from a solution to a solid. In churning, the temperature, amount, richness and acidity of the cream should be such as to bring the butter in from 45 to 60 minutes. Too high or too low a churning temperature will cause a deterioration in body and texture ; if too low the mass will be raised by friction to the temperature at which the fat globules will adhere to each other, and if too high it has a tendency to make the globules break up into oil. Under ordinary circumstances a temperature from 48 to 52 degrees in summer, and 52 to 56 degrees in winter gives good results. When the butter begins to break, cold weak brine should be added, as it gives a better separation of the buttermilk and has a tendency to retard the gathering, thus giving a most exhaustive churning. Stop the churn when the granules of butter are as large as wheat grains or slightly larger and draw off the buttermilk.

Have the washing water a few degrees colder than the butter. Instead of washing the butter twice, it is a good practice to leave the faucet of the churn open and distribute water over the surface of the butter until it runs away fairly clear. Then close the faucet, and add as much water as there was cream. Give the churn eight or nine revolutions and draw off the waste water.

The butter may be salted in the churn, or after it has been placed in the worker. If salted in the churn add about one-eighth of an ounce extra salt per pound of butter. Distribute a portion of the salt evenly over the butter, and then give the churn a quarter turn and add the remainder or another portion, and finally the remainder. After giving the churn a quarter turn the butter may then be gathered by giving the churn three or four revolutions. There is less danger of mottles in the butter, and it requires less work-

ing when salted in the churn. The amount of salt varies with the moisture of the butter, and the market for which it is produced. After salting, the butter should be left in the churn until the salt has dissolved.

The excess of moisture is extracted from the butter and salt evenly incorporated by working.

In order to secure a good body and texture this must be done with as little friction as possible. The butter should leave the worker with a firm waxy consistency. An even distribution of the salt is indicated by the color, and should not contain much free moisture. It should not be too cold and hard on entering the worker, as it will require a great deal more working to get an even distribution of the salt, and the butter is liable to be mottled. During the winter the room where the butter is to be worked should be of a moderate temperature and warmer than the butter One working is sufficient if the operator knows his business and can tell when the butter is worked enough.

An article which has been done up in a neat and attractive form will generally find a ready sale, other qualities being equal, and in packing and finishing our butter it is well to bear this in mind. For export, pack in 56 pound boxes or 112 pound barrels, which have been well paraffined, and lined with heavy parchment paper which has been soaked in brine. Pack the butter solidly and have no air spaces. Pack from the centre towards the outside, as in this way you expel the air and leave no holes. About a pound extra for each box is sufficient for shrinkage. Level the top off the butter being careful not to make it greasy, cover with a piece of parchment paper, and put on a thin layer of salt paste to exclude the air and prevent moulding. If the butter is not intended for immediate consumption put it in cold storage, as no matter how perfect it is when made, it soon deteriorates if left in a warm atmosphere. Hence it is necessary for every creamery to have a cold storage which may be kept as low as 40 degrees. The air of the cold storage must be pure and sweet as butter is very susceptible to bad odors.

It is necessary that the creamery be centrally located, and that the sanitary conditions be of the best. It is essential that there be plenty of good water and that the creamery and the utensils be as clean as a scrubbing brush, warm and hot water and steam can make it. If the maker takes any pride in his work this place will be neat, attractive and orderly. The demand for a first-class article is likely to increase as many of the European countries have almost reached the limit of their capacity for production. The consumers will increase and may be expected to increase, but the land which is necessary for the production cannot increase.

This business, like all others, is carried on purely for the profits that it returns. The greater we can maker our profits, the most successful the business. Therefore, we must study to increase the profits. This may be done by cheapening the cost of the production and by making goods of superior quality. We must seek to get the largest possible return for the labor and capital invested. There is too much idle capital in this business. Too many of our creameries are running at half capacity, and in many cases shut down for a part of the season. Undoubtedly, one of the greatest causes of this idle capital is the lack of raw material. The manufacturer is dependent upon the producer of raw material, and must stimulate him to produce first-class milk. The manufacturer must turn out the best finished article in the market, which means the top prices and the greatest profit both for the patron and himself.

This will induce the patron to produce a better quality and quantity of raw material, as he will realize that there is money in the business. If we could pay patrons according to the quality of their milk it would have a tendency to make them take better care of it. For any degree of success it is necessary that the patron and manufacturer work together, as neither can produce a superior article independently.

There should be a mutual good will and understanding between them. It is evident that neither can shirk, but success depends equally on both. If we can run our creameries up to their full capacities it will cheapen the cost of production, and will be more profitable both for the producer and the manufacturer. Both must be alert, as these are days of strong competition. A course at a dairy school is to be highly recommended as it gives a broader and more intelligent knowledge of dairying.

At present the Danes bear the standard in the world's markets. We must discover the secret of their success and adopt their methods or originate new ideas. Possibly many in Ontario produce butter of as good a quality as is produced in Denmark, but our

butter lack uniformity. We have not the name. The creamery on the skimming station plan turns out a large quantity of butter of uniform quality, thus gaining a reputation. I think that if a number of creameries would carry on the same process in manufacturing, and ship under the same brand they would gain a reputation and secure a higher price. If such a case a reliable inspector should be appointed. A small amount of butter sent out under a certain brand never gets an established name in the old country markets. Above all things the butter should be shipped out of the country under its true colors. If it is first-class, it should be branded such, and no inferior article should be sent out under that name. It is only by honesty and intelligence that we can build up a name for ourselves in this business.

BUTTER-MAKING.

Second Prize Essay.

By Wm. Waddell, Strathroy.

As flavor is the essential point in determining whether butter is first-class or otherwise, it is of first importance that the butter-maker should look well after the manner by which the milk he is to handle is produced and cared for, before reaching the creamery as well as after.

Milk should be received only from cows that are in good health and breathing good air. This is especially necessary in the winter season, when cows may be kept in poorly ventilated and foul smelling stables, but it is also important when cows are on the pasture, as foul odors in the pasture, caused by decaying matter of any kind, will injure the flavor of the milk and make it unfit for manufacture into a first-class article.

Cows must not be allowed to eat any kind of a food that is injurious to the quality or flavor of the milk ; especially must all kinds of decayed or musty food be prohibited. Abundance of pure, wholesome water must be supplied, and free access to salt at all times. Cows' udders should be carefully brushed with a soft brush, or washed before milking. Loud talking, unusual noise or rough handling of cows should not be allowed while milking.

If bad flavored milk is being received from any patron it will be the duty of the butter-maker to visit that patron and examine carefully the cows as to health, their food and water, if it is pure and wholesome, the surroundings as to the purity of air. The cleanliness of pails, strainers and cans, dippers and utensils used in handling the milk, also as to whether milk is properly aerated and cooled to a proper temperature, and kept over night where air is pure and circulating freely. Milk for butter making should not be kept over night at a temperature above 70 degrees, and should never be cooled to a temperature below 60 degrees unless to be kept for a longer period or over Sunday, as the ripening process is to some extent going on all the time, and the germs that produce that kind of flavor required in the butter do not thrive at a higher temperature.

Milk wagons should be kept clean and free from any impure odor that might impart a bad flavor to the milk. When the milk arrives at the creamery it should be taken in as soon as possible and carefully sampled, weighed, the weight recorded, and the milk strained. Samples should be taken as soon as the milk is poured into the weigh can and before any cream has had time to rise. Samples may be conveniently taken with a half oz dipper with a long handle and a hook to hang on the inside of the weigh can. Preservative should be added to sample bottles previous to the addition of any milk, and if samples are to be kept for a month, should consist of chloride of mercury one part to bicromate of potassium eight parts. As much of this can be conveniently lifted on a ten-cent piece should be added to each bottle. Samples should be carefully shaken every day (Sunday included), care being taken not to churn the sample, or leave any cream sticking to the sides of the bottle. Samples should be kept at a temperature below 60 degrees in summer and above freezing in winter.

Heating and Separating.—Milk for separating should be heated to a temperature of from 70 to 100 degrees, F., according to the season of the year and the kind of separator to be used, but should be separated at as low a temperature as possible to

get good results. Care should be exercised in heating that the milk may not be scorched or burned. The heating of milk food and running of separators should be regulated so that the loss in skim milk will not exceed .05 of one per cent. The per cent. of fat in cream may be varied from 25 to 40 per cent., according to the season of the year. A rich 40 per cent. may be taken in summer and will have less bulk in cooling, can be churned at a lower temperature, giving a more exhaustive churning and better grain in the butter. A thinner cream, 25 to 30 per cent., may be taken in winter, and as a greater proportion of skim milk in the cream will assist in the development of acid at a season when the cream is like to be sweet. If flavor of cream is not good, it may be improved by pasteurizing or heating to a temperature of 156 to 160 degrees, F., and cooling to a ripening temperature. Heaters for this purpose may be obtained, requiring very little steam for heating. Coolers may also be obtained that will easily reduce the cream to ripening temperature while passing over them with a fair amount of cold water, without the use of ice.

Cream should be well stirred as soon as separating is completed to mix in any froth that may be on the top, and which will not mix if left till later. As soon as possible after separating, cream should be cooled to a ripening temperature, which should be as low 70 degrees, F., or under, and starter added.

Starter should never be added to cream at a temperature higher than 70 degrees, as the germs producing the rich creamery fresh flavor so essential in butter, will not develop at a higher temperature, but germs developing a flavor not desirable, will grow very rapidly. The grain of the butter will also be injured, if cream is held at too high a temperature. The amount of starter to use will vary from 3 to 15 per cent., according to condition of cream, and the time required to ripen.

It is an advantage to use starter in cream at all times. If the flavor of the starter is good (and no other should ever be used) the flavor of the butter will be improved and same flavor will be retained from day to day. If acid is well developed when cream comes from the separator less starter should be used, and cream held at a lower temperature, so that the ripening process will not be developed beyond the point desired when ready to churn. Care should be taken to have cream well cooled down to a churning temperature before it begins to thicken, as it is very difficult to cool a thickened cream. A proper churning temperature is a temperature at which cream will churn readily in from forty minutes to one hour. If cream is so cold that butter does not gather readily, the loss in buttermilk will be much greater than if churned at a higher temperature.

If butter is put up in prints for Canadian trade, the ripening process should be farther advanced than if intended for the export market. If the right flavor is in butter for export at time of churning, and butter is kept at a low temperature till it reaches its destination, flavor will go on developing, and when it reaches the consumer, will have reached just the point desired. Whereas, if making butter to be consumed immediately, we must develop the flavor in the cream to that stage which will suit the taste of the customer.

The expert butter maker will easily detect the proper acidity of his cream for churning by its consistency and glossy appearance, and by raising in a dipper and pouring into the mass.

The proper acidity may also be found by using alkaline tablets or tablet solution The amount of acid on cream will depend on what market the butter is intended for, and will vary from 5 to 6 per cent. A rich cream, well ripened with churn not more than two-thirds full, will churn readily at a temperature of 50 degrees, F., and give a loss in the butter-milk of less than 1 per cent. And if a loss greater than this is found at any time, something is wrong. Cream may be too thin or not properly ripened. Too much or too little in churn, temperature too high or too low, or not properly handled in some other particular.

Churn should be carefully scalded with boiling water and well cooled. Plenty of cold water should be used, especially in hot weather, that all heat from the hot water may be taken out of the wood. Cream should always be strained into the churn, to take out any lumps or curded matter, and prevent white specks in the butter. If the market demands it, color should be added before the churn is closed. The amount of color to use will depend upon the season of the year, kind of color, and requirements of the mar-

ket. Churn should be stopped and gas let out several times during the first ten or fifteen minutes.

When butter begins to form, one or two pails of water, with about one pound of salt with each pail of water, should be added. Temperature of water to be regulated by the temperature of the cream. If the weather is warm, and the cream has risen in temperature while churning, water should be as cold as possible. If cream is cold and butter is likely to be firm and difficult to gather, water may be as high as 58 or 60 degrees F. Cream should never be churned at so low a temperature that warm water has to be added, as it will injure the grain of the butter. If difficulty is found in getting the butter granules large enough, a portion of the buttermilk should be drawn off. When granules are the size of large clover seed it is churned enough. If left too small, they lie so close that buttermilk will not drain or wash out readily, and if too large the granules will enclose a portion of the buttermilk that will not wash out.

When churning is completed, churn should be allowed to stand three or four minutes, till butter has all risen to the top, when buttermilk should be all drawn off and allowed to drain for 15 minutes. As much water as there was buttermilk should then be added, and the churn revolved twelve to twenty times, when the water should be drawn off. Temperature of water for washing will depend on the condition of the butter. If weather is very warm, and butter is likely to be soft, water should be as low as 45 degrees F. If weather is cold and butter is likely to be too firm, water should be as high as 55 degrees F.

If butter is only to be kept for a reasonable length of time, once washing is preferable. If butter is to be kept for a longer time, it may be necessary to wash twice. But twice washing always destroys some of the choice richness of the flavor but may add sometheng to the keeping qualities of the butter.

Water should be drawn off and the butter allowed to drain 15 or 20 minutes, when it is ready for salt. Only some brand of first class dairy salt should be used. The amount used will be regulated by the market the butter is intended for, much more salt being required by the Canadian trade than for the export market, and the amount may vary from 1-8 of one ounce per pound to 1 1-4 ounces per pound of butter. If a room is convenient where butter can be held at reasonable temperature (55 degrees F.) the salt may be added to the butter and partially worked and put away for four or five hours, when the working can be finished. This method will give a better grain in the butter, as the mixing of the salt will be accomplished with less working. If churn is not immediately required for a second churning, butter may with advantage be salted in the churn, and the churn slowly revolved a few times to mix the salt, then if left standing for an hour or two with the churn closed to control the temperature, the mixing of the salt will be accomplished with less working and the grain of the butter preserved. Butter may also be taken from the churn, weighed, placed on the worker, and salted and worked immediately, care being exercised to work enough to thoroughly mix the salt and remove all streaks, but not to overwork and destroy the grain of the butter. No more butter should be handled at one time than the capacity of the worker and the skill of the operator can handle efficiently. If butter is to be printed it will be found to print better two hours after being worked if held at a proper temperature—50 to 55 degrees. If butter is to be packed it should be put up in packages to suit the market. The most convenient and suitable for export is perhaps the 56 lb. box.

Boxes should be strong, light and neat, and clean, and made from timber that will not impart flavor to the butter. They should be well paraffined inside and lined with heavy parchment paper, which should be soaked in brine for at least six hours before being used. Butter should never be packed in a box made from green wood, and never in a very dry box. Care must be taken not to pack too much into the box at one time, as butter should be perfectly solid in the box. Boxes should never be allowed to stand after being lined to allow paper to dry, and immediately on being filled should be trimmed off smooth and papers neatly laid on top while still wet; a neat covering cannot be made if papers have become dry. A heavy paper should then be placed on top, and if your market demands it, a salt paste put on top, which will help to preserve the top of the package, and exclude the air from the butter.

Boxes should be placed in jute bags to keep them clean that they may reach the market in good condition. Butter in hot weather should be placed at once in cold storage, and for best results kept at a low temperature till it reaches the consumer.

The method of selling and disposing of the butter should be left to the good judgment of the man in charge, who should always endeavor to obtain the best possible price and make returns as regularly and as promptly to patrons as efficient management will permit.

To get a ferment a commercial pure culture may be used, but as good flavor may be obtained by getting some milk from a good healthy cow, fed on wholesome food with plenty of good, pure water, and regularly salted. A cow that has been milking about two months is preferable. The milk should be carefully strained and well aerated and cooled to a temperature of 68 degrees F., and held at that temperature and kept where air is pure until acid develops.

To Make Starter for Ripening Cream.

Take skim milk, quantity required, heat to a temperature of 156 to 160 degrees F., carefully stirring while heating to avoid burning. Hold at this temperature for twenty minutes, then cool to a temperature of 70 degrees or under. Take ferment previously prepared, skim off one inch from top and discard, mix balance thoroughly by pouring back and forth and add 1 per cent. to 5 per cent. to pasteurized skim milk, and also add 10 per cent. to 15 per cent. of cold water. If there is any doubt about the purity of the water it should be added to the skim milk and pasteurized along with the milk. This should be carefully mixed, placed where it will not be moved or jarred.

When wanted for use the top should be taken off and discarded and the balance carefully broken up by pouring back and forth. This may be repeated from day to day for an indefinite period as long as the flavor remains good.

The great secret of making and preserving a good starter is never to expose ferment to a temperature above 70 degrees F. Add just enough ferment that starter will be well thickened when wanted for use, but acid not too far developed.

When starter is to be kept over Sunday, milk should be cooled to a lower temperature and less ferment used.

BUTTER-MAKING.

By Professor Farrington, Madison, Wis.

The subject of butter-making is one about which a good many people could write a book You have already seen there are a great many men here who can write long essays with regard to it. So, rather than go into a resume of butter-making, I would prefer to ask some questions. I will ask first if there are any butter-makers here who make any attempt to test the purity of milk as it comes to the factory. Of course I know you all smell it and test it; have you any test with regard to it?

Prof. Dean: Fermentation tests are in use in our factories as a rule.

Prof. Farrington: If you haven't used these tests I think you should. You may be convinced yourself that the milk is not fit to use, too sour, or has a bad flavor, but unless you have some test besides your own senses you may have considerable difficulty in convincing the farmer. It is just a question between two people as to whether the milk shall be taken or not. If you have a means of testing the milk right before the farmer, and can show him that the milk is tainted in some way, that it would spoil your butter, I think it would help a great deal in getting pure milk.

Mr. Ballantyne: What is the process of making these tests.

Prof. Farrington: One test is an acid test, and another is the fermentation test. We call it the Wisconsin Curd Test. It would take almost as much time to describe one of these tests as to write a paper. The fermentation test takes twelve hours to make, but these tests will help to convince the farmers that the purity of milk ought to be improved.

Prof. Dean : The difficulty about these fermentation tests is that you may test the milk to-day, and it may be bad, and to-morrow it may be all right, and it may be right for several days. We have tried that at our Dairy School, but have not found it satisfactory for that reason.

Prof. Farrington : I wish to call attention to the fact that these tests exist, and that in some places they are used with a great deal of effect.

Mr. Wagg : I tried the fermentation test this summer, and found the same trouble Professor Dean speaks of, but I found it a good way to convince the farmers that their milk was bad. I sent one man's milk home twice, and he came back to the factory intending to tell me that he would not send his milk to the factory any more, but when I showed him that his milk was bad, we discussed the different methods of keeping the milk, and he continued to send the milk. In several other instances it proved satisfactory in showing the patrons that their milk was bad.

Prof. Farrington : It helps the man who is receiving the milk in his arguments with the patron. It gives him something beside the mere statement that the milk is bad. This fermentation test is used in Wisconsin by the travelling instructors almost entirely. If they have found trouble at the factory the first thing they do is to take a take a sample of the milk of each patron that is being sent to that factory and make the fermentation test of it, and so they will locate the trouble at some farm. Then they will go to the farm and make a test ot each cow, and there have been instances in which it was found one cow was responsible for the entire difficulty of the cheese at the factory, she was sick and the milk she produced was impure. Are there any butter makers here that heat the milk by forcing the steam directly into it ?

Prof. Dean : No, we do not use it.

Prof. Farrington : I am glad to hear that. A great many factories in Wisconsin are equipped for heating the milk by forcing the steam right into it. That is not a good way to heat the milk ; it should be heated by passing over a hot surface, and not by heating it with direct steam. How many times during one run do you test skim milk ? Do you just take one sample while the separator is running in good condition and consider that a test for the day ?

Mr. Paget : Generally take two.

Mr. Brodie : We generally take two or three times during run.

Mr. Ballentyne : Customary to take it every day, or only just occasionally ?

Mr. Paget : We used to take it every time. Now we have got careless and only take it every day or so.

A Member : We have adopted a system of having a little drip-cock attached to our skim milk pipe, and fixed so that you will just occasionally get a drop.

Prof Farrington : That is a point on which I think some people have made a mistake. When everything is running in good style, the separator up to full speed, and the milk heated to the right temperature, they will take a sample at that time and say, that is what the separator is doing, and the test of the skim milk may be away down. I think if you would make some such arrangement as this gentleman speeks of, so that you would take a composite sample during the whole run, you will find the skim milk will not test so low as it does when you test only one sample during the run.

With regard to the ripening of the cream, that is a question on which we could discuss a great many points. But I think there is one thing everyone should bear in mind with ripening cream, and that is to ask for what purpose are you ripening the cream ? Will some butter-maker tell me for what purpose you ripen the cream ? First, we would say you are ripening the cream to get the best flavor in your butter. Another purpose is to get an exhaustive churning. I won't stop to discuss either of these poirts. I want I want to impress that one point upon your mind, to think for what purpose you are ripening the cream, and after you have thought of that for a while, try to think of the different things that influence the rate at which the cream ripens.

A Member : I would like to ask a question in answer to your question. What are the keeping qualities of butter ?

Prof. Farrington : I think that depends a good deal upon the amount of curd left in the butter.

A Member : Doesn't the ripening of the cream give you the keeping qualities of the butter ?

Prof. FARRINGTON: Certainly, that is one of the purposes for which you ripen cream. The rate at which the cream ripens after it is in the vat has on influence upon the thickness of the cream. Thin cream will ripen faster than thick cream. The rate at which the ripening progresses is also influenced by the time at which you hold it at a certain temperature, as it is also by another thing, the number of bacteria left in the cream, and the condition of the milk. The bacteria in the milk are carried into the cream, and then a number of bacteria get in the cream through the starter, and perhaps the most important influence of all is the temperature of the cream. I presume all these factors are familiar to the butter makers here. There is one more point I want to mention, that is the churning temperature.

Prof. DEAN: Have you decided what you think is the best temperature at which to ripen cream? Would you recommend any particular temperature?

Prof. FARRINGTON: No; I think the temperature it influenced by so many conditions. The thickness of it is one thing, and the condition of the milk from which the cream is made is another thing, as also is the amount of starter that you add to the cream in order to ripen it, so that I do not see that there can be any hard and fast rule laid down as to the proper temperature for ripening cream. The way we ripen cream is to test the acidity of it. When it has reached a certain acidity we know we ought to at once commence to cool the cream and hold it until we churn it.

Mr. BALLANTYNE: At what temperature do you hold in the early stages?

Prof. FARRINGTON: After the cream comes from the separator, at a temperature of 75 to 80, we cool it down to 50. Then if you can heat it up to 70, and hold it five or six hours at 70, I think you will develop the flavor during that period; then after holding it five or six hours at 70, immediately cool it down to about 50, and hold it at a temperature of 50 until you are ready to churn.

Prof. DEAN: Why the first cooling?

Prof. FARRINGTON: I do not know that it is always necessary, but we think that it hardens the fat globules and gives them plenty of time to crystallize, and helps the man with the butter.

Prof. DEAN: If you warm it up again, you simply have undone what you did?

Prof. FARRINGTON: Actual experience has shown that it does have some effect on the body and texture of the butter.

A MEMBER: About how much acid do you develop before commencing to cool?

Prof. FARRINGTON: We adopt about four-tenths of one per cent. acid as the amount we develop in the cream before we cool.

Mr. SMITH: How long do you give it to cool?

Prof. FARRINGTON: Generally allow four-tenths per cent. of acid at six or seven in the evening, and allow it to cool all night before churning the next morning. I think perhaps two hours would be the minimum time you should allow cream to stand during the cooling process.

Mr. SMITH: What length of time from the finishing separation till the four-tenths of acid would be developed?

Prof. FARRINGTON: That would depend entirely on the temperature at which you held the cream. If you held it at a temperature of 75, and had starter enough, you might get up this four-tenths in one or two hours.

Mr. SMITH: Do you prefer to ripen cream quickly, or take all day to ripen it?

Prof. FARRINGTON: I think it very much better to ripen it quickly, although I do not think it is a hard and fast rule that you can always follow.

Mr. SMITH: Don't you think we better control the flavor of the cream by developing the acid quickly and preventing any other flavor from developing?

Prof. FARRINGTON: Yes, that was the statement I made, that I should prefer to develop the acid up to four-tenths as quickly as possible, ripen at a high temperature for a short time, rather than at a low temperature for a long time.

Miss ROSE: If a low temperature produce the best flavor in cheese, why would not it produce the best flavor in butter?

Prof. FARRINGTON: I think, perhaps, one reason is that in the curing of cheese you hold it a much longer time at a low temperature. If you held your cheese at this high temperature it would spoil. Curing cheese takes days and weeks and months, and ripening cream is done in the twelve hours.

Prof. DEAN: If you had ideal conditions, don't you think the same principle applies? Don't you think you would develop better flavor by ripening at a low temperature, and taking a longer time?

Prof. FARRINGTON: I do not know that I can answer that question. I think you will get a good flavor either way. I do not think you can say you will get a better flavor by ripening it a long time at a low temperature. I think if you have ideal conditions you get good flavor in your butter either way.

Mr. SMITH: Is not one of the benefits of ripening quickly and cooling down early, that the butter-maker has the cream at a churning temperature for a greater length of time before churning, and you have your work done before you leave in the evening, and you get a better body and texture in your butter?

Prof. FARRINGTON: Yes, I should think it would be a good plan to begin your cooling in the afternoon and let the cream stand at this low temperature of about 50 over night. I think it is a good thing for the butter to hold it at a low temperature as long as possible.

Another point is the churning temperature. If you were going to report the temperature of the churning when would you take that temperature?

A MEMBER: I think it is very necessary to take the temperature when you are putting the cream in, and also when you have finished.

Prof. FARRINGTON: I want to emphasize this point, because it is one in which our students have difficulty. They put the cream into the churn and put the thermometer into the cream, and they say that is the churning temperature, but that is not so. The churning temperature is the temperature of the butter-milk at the time the churning stops.

A MEMBER: What amount of acid do you develop at the time of churning?

Prof. FARRINGTON: We like the cream, at churning time, to have acidity of between five-tenths and six-tenths of one per cent. I think there are times when cream is so poor, and you have so poor a starter, that you can run the acid up to nearly seven-tenths of one per cent., but as a rule we adopt five-tenths or six-tenths.

A MEMBER: Will the friction in the churn raise the temperature?

Prof. FARRINGTON: I think it will. I do not think any butter maker has a thermometer that will measure the temperature that is caused by the friction in the churn. There is only one more thing I want to mention, and that is the result of some experiments we made with regard to the amount of water left in the butter.

Mr. SMITH: Is there any great difference in the amount of fat left in the butter-milk as the result of the different temperature in the churning?

Prof. FARRINGTON: Yes.

Mr. SMITH: Much more lost in churning at high temperature than low?

Prof. FARRINGTON: Yes, and the amount of butter lost in the butter-milk depends not only on the temperature of the cream, or the churning, but also on the thickness of the cream which you are churning.

Mr. SMITH: You can churn sweet cream at much lower temperature.

Miss ROSE: By thickness do you mean percentage of butter fat?

Prof. FARRINGTON: Yes, richness of cream.

Miss ROSE: Which would be the least loss?

Prof. FARRINGTON: If you want to churn this cream you must churn it at a temperature of 60 or above. If you try to churn with sweet cream at a low temperature, you will have to churn for a week or two, and then the butter won't come. I would call thin cream, cream that contains from fifteen to twenty per cent. of fat. There is very little separator cream that is so thin as that. Cream containing fifteen to twenty per cent. of fat should never be churned at a low temperature, sweet. If you want to churn thin cream you should sour it, and churn at about 60. If you get a cream containing about thirty-five per cent. fat, you can churn that sweet at a low temperature. If you churn thick sweet cream at a temperature of 45 or 50 you can get a very exhaustive churning. But if you churn that thick cream sweet, at at a temperature of 65 to 60, I think you get a very rich buttermilk. If you combine the acid of the cream with the richness of the cream, you can churn that cream exhaustively at a temperature of about 52.

A MEMBER: I would like to solve the difficulty we have in our factory. It is a co-operative factory, and we find difficulty in satisfying the patrons on the test. They

claim that, if they thoroughly mix the cream and keep part of it at home to churn it, they get more butter out of it than we give them credit for. We made over seventy-five tons of butter this last summer. It is a cream-gathering factory.

Prof. FARRINGTON: That is a question that comes up in our creamery very often. We get the milk from sixty farmers. They are always complaining. It is simply a question of how to convince them that you are honest, and to make them continue to think it the entire year. I ask them to come in and see the cream tested, and we test it as it ought to be tested. That is the only way I can suggest to you.

A MEMBER: The difficulty is to convince them that we get all the butter-fat out of the milk they are sending. They are under the impression we are not taking the butter out of it, but that it goes off in the buttermilk.

Prof. FARRINGTON: If I were you I would give them a pail of buttermilk and let them take it home, and see if they could churn any butter out of it. (Applause.) Another suggestion I might make to help you. If you have a Babcock tester it would be a good plan to save samples of your buttermilk, and show them samples of the test by the Babcock test, and I think you could demonstrate to them that you were getting all the butter out of the cream.

A MEMBER: Do you think it would be honest butter that was made in these home dairies? I have found that sometimes they haven't got proper scales for weighing their butter.

Prof. FARRINGTON: I have found in a number of farm they haven't proper scales for weighing anything. It may be possible your farmers were not weighing your butter.

A MEMBER: I have had conversation with customers at the creamery, who have stated honestly to me, that, during the hot weather, the test was higher than they could make themselves during churning.

A MEMBER: We use the oil test. Is there anybody here who could suggest a better test?

Prof. FARRINGTON: I do not see why you could not apply the Babcock test.

A MEMBER: The cream-gatherer would require to have scales.

Prof. FARRINGTON: The details of that method have all been worked out and published in some books and bulletins. The cream-gatherer goes to the farm; he has a scale in his wagon, and he also has a pail. He goes into this farm and pours the milk into this pail, hangs the pail on the scales, takes a sample of the milk after he has recorded the weight, and then pours the cream into the tank. I do not see why they could not use these spring scale balances here.

Prof. BALLANTYNE: The spring balances are prohibited here by law.

Prof FARRINGTON: Every farmer should have a beam scale.

A MEMBER: I have made a good many comparisons between the oil test and the Babcock test, and I have found one just as correct as the other.

Prof. FARRINGTON: I have heard that same statement before, that some men can use the oil test with satisfactory results, but I never heard anyone complain that they could not get satisfactory results with the Babcock test.

Mr. DERBYSHIRE: How do you divide the skim milk?

Prof. FARRINGTON: Our rule is to give them back about 80 per cent. of the whole milk, which the farmer takes back as his share of the skim and we weigh it.

A MEMBER: Can we possibly get as good quality from cream raised in a shallow pan as in the shot gun can?

PROF. FARRINGTON. I do not think you can. The milk set in shallow pans is apt to accumulate bad odors and is not nearly so pure as cream raised by setting milk in shot gun cans in shallow water. I wish any butter-maker present would give me his idea as to what influences the amount of water left in the batter. Of course you know that with the Babcock test the separation that is made is pure fat, and that you don't get the exact butter value of the milk. You find out how much butter fat there is in the milk, but butter is not only composed of not only butter fat but also of about twelve per cent. water, four to five per cent. salt, and one per cent. curd. The amount of water that butter holds varies a great deal and this is influenced by a number of conditions during the process of making.

Mr. BELL: One cause of that would be insufficient working.

Prof. Farrington: How do you judge as to the water contents of butter? How can you judge as to how much water there is left in butter? By its appearance? By the amount of brine that leaks out of the package? Or by what method do you determine that? Perhaps I had better give my own experience in some experiments I made this summer. At the Sault Falls Convention of the National Creamery Association held last winter, about this time, there was an exhibit of about twenty different packages of foreign butter. The United States Government sent to London and bought samples of butter in the London market imported from a great many different countries: French butter, Danish butter, Irish butter, Swedish butter, Australian butter, and Canadian butter, about twenty different kinds altogether. We all had an opportunity of examining the butter from each one of these countries, and of comparing it with the six hundred samples of American butter then competing for prizes. There were some striking peculiarities of this foreign butter as compared with the American butter. One thing we noticed was that most of the foreign butter had a very dry appearance. When you cut off the package at the top it was very seldom that the brine would show on the freshly cut surface. It would look as if the butter was perfectly dry, while in the American butter in almost every case when you put a tryer into it or cut it off with a wooden ladle there would be streaks of water or brine follow the cut surface. As soon as I left the convention I took up that subject in our station to see if I could discover any reason for this difference in the appearance of the two butters, and I made a great many experiments. We found by churning the cream in one churn and dividing the butter from the churn into two parts, working one half on a table worker at once, then giving it a certain number of revolutions and working it without any salt just as it came from the churn, then putting it in a package and setting the package to one side, and then taking out the other half and salt it one ounce to the pound, as is the American rule, and working that butter the same number of revolutions and putting that in a package; and then comparing these two packages; (the second lot was salted, the first lot was not salted, both were worked the same number of revolutions.) We noticed in every case, that the salted butter had the appearance of drops of moisture or brine upon the surface. The appearance of brine on the salted butter was much more prominent than it was on the unsalted butter. We next analyzed these two packages of butter to find out which one did contain the most water. Tho natural inference was that the unsalted butter was perfectly dry and the salted butter very wet, but in every instance the chemical analysis of these two samples of butter showed that the salted butter contained very much less water than the unsalted. On an average of about thirty determinations there was a difference of about four per cent. in the amount of water in the salted butter as compared with the unsalted. The salted butter every time contained less water than the unsalted. That was such a contradiction to the appearance of the butter, that we tried to figure out some explanation for it, and the best we could get at was that the fat of which the butter was composed will mix with water, and that the globules of water that are mixed with the fat, are so small that you cannot see them. They won't separate very much, and as soon as you add salt to the butter the brine is made. The attraction of the brine and fat is so much different to the attraction of fat and water, that the salt or brine accumulates. In the unsalted butter it does not accumulate. Salt is therefore one thing that influences the amount of water in butter. That is one of the clearest demonstrations we made in our creamery last year, that although the unsalted butter looks drier than the salted, it actually contains more water than the salted butter.

Another thing—we churned the butter to different sized granules of butter. We took it out of the churn, we stopped the churn when the granules were a little smaller than wheat, then we worked it in the worker a certain number of revolutions, and salted it, then took the package of that butter and analyzed. We also churned another churn of that same cream until the granules were about the size of corn grains, and we worked that butter in the same way and we found in every case that in the butter with the larger granules, the finished product contained more water than the butter that was churned to very small granules. You see that in working the butter it passes between the rolls of the worker, and that if the butter is in very small granules it forces out the water much faster than it does if the granules are larger as the water is held in the midst of these granules. These are two points that influence the amount of water in the butter. It may be that the temperature at which the cream is churned has also something to do with

the amount of butter, but we have not carried on any experiments yet to satisfy us as to what the difference is. If anyone else has had any experience in that line, I wish they would mention it.

PROF. DEAN: As to the size of the granules, that is different to our experience.

PROF. FARRINGTON: When scientists don't agree I do not know who can agree. Have you published the results of that experiment?

PROF. DEAN: Yes you will find them in our last annual report, for 1898.

PROF. FARRINGTON: You will find my report in our last annual report for 1899.

PROF DEAN: It does not follow that because we have results different from Prof. Farrington, that we will always have them. So far as our experiments went, the smaller the granules the larger the amount of moisture the butter contains.

PROF. FARRINGTON: It seems to me as natural, if you churn the butter till the granules are the size of your fist, that in working if you cannot squeeze nearly as much out as you could if the granules were the size of wheat grains. Our chemical analysis substantiate our theory.

PROF DEAN: There is to my mind little or no attraction between fat or grease and water. They have no affinity one for the other. Now, water is held in the butter granules between the particles, the smaller the particles the greater the number of spaces and the greater the amount of space for water to accumulate.

PROF. FARRINGTON: Yes, and if you have a greater number of spaces, and the water is divided into larger globules, it seems to me you squeeze the globules out much faster by the same amount of working that you would if it were one large lump.

MISS ROSE: I think I agree with Prof. Farrington. I find when the butter has been to much gathered it is harder to expel the moisture than when it is gathered in small granules.

PROF. FARRINGTON: I thank you very much. I am always glad to have the ladies on my side. Still I shall be very much pleased to repeat the experiment and get further information on this point.

A MEMBER: When butter comes from the churn in very small granules there is a large amount of water removed from that butter when it is being worked, and I think that all butter makers have noticed this, that when the butter is gathered in large lumps there is very little water expelled from it.

MISS ROSE: I am not speaking of the amount of water that comes off from the worker, but the amount of water that is retained in the butter after the working.

PROF. DEAN: I can agree with Prof. Farrington, that you cannot judge of the amount of moisture in the butter by appearance only. You can only determine that by analysis.

PROF. FARRINGTON: I think the evidence is about evenly balanced, so I think we had better drop the subject unless some one wants to speak on my side. With regard to the temperature at which you wuuld heat milk or cream in pasteurizing. In competition with Danish butter which brings nearly the highest price in London, I believe some butter from the North of France, Normandy butter, brings the very highest price. Danish butter is made from pasteurized cream. The process is simply to heat it up to a certain temperature and hold it for a minute or so at that temperature, or for twenty minutes. Now, I presume that you have noticed that butter that has been made from pasteurized cream is very different from butter made from cream that is not pasteurized. Heating of the fat seems to change it in some way. No matter how you cool or work it afterwards, you still have a sort of smeary body.

PROF. DEAN: Not in this country.

PROF. FARRINGTON: I just came from St. Marys, where they have one of the best creameries in this country, and that is what they told me was the great difficulty they had to get over, the trouble of the smeary appearance. In addition to pasteurizing cream for the purpose of making butter it is always heated and pasteurized for the purpose of putting it into pint bottles for delivery to families. It will then keep for one or two weeks without souring, and they like to get the cream in that way for that reason. There is one objection to this cream, that is that the cream does not rise on the milk, and we find that by lowering the temperature from 155, which has always been adopted in the past as the proper temperature, down to 140 we preserve the the natural cream-rising qualities of the milk, and that I think is a point that is of a great deal of interest to

dealers who pasteurize their milk and deliver it to customers in any city or town. From experiments reported by Theobald Smith, it has been shown that the temperature of 140 was sufficient to kill the tuberculosis germ. Previous to that it was considered necessary to heat the milk up to 155 or 160, and that the hardest disease to kill was the tuberculosis. In our annual report for 1899 you will see the results of some experiments that show that the temperature which has been adopted in the past, 155, is not necessary, and that you can accomplish the same results at a temperature of 140.

Mr. BALLANTYNE : How long would you continue that experiment?

PROF. FARRINGTON : About 15 minutes.

PROF. DEAN : Have you had better results from heating up to 180 degrees? Is not that a Danish report that a temperature from 180 to 185 gives better butter than pasteurizing at 155?

PROF. FARRINGTON : I know in Denmark, that they found by statistics, that 33 per cent. of the dairy cows have tuberculosis in some form or other. It is one of the highest records of sick cows in any country that I know of, so it may be they want to be sure to kill all these germs, before they make the milk or cream into butter.

Miss ROSE : Is the melting point of butter the same in butter made from pasteurizing cream as butter made from ordinary cream?

PROF. FARRINGTON : I cannot think of any chemical change that could be caused in the butter simply by heating the milk or the cream. At a test that was made every day at the World's Fair, from three breeds of cattle tested for six months, a sample of the butter was brought every day to the Chemical Laboratory, and we analyzed it. There was butter from thorough-bred Guernseys, thorough-bred Jerseys, and thorough-bred Short Horns. Milk from these cattle was taken to the dairy building, made into butter, each batch kept separately, and samples of these lots of butter taken the Laboratory and analyzed. The samples were not marked in any way except by a number on each. When these three samples came into the Laboratory, every one of us could pick out from the jar of butter the breed to which each jar belonged. The Jersey butter was always hard and firm and solid, and had a considerable higher melting point than the Guernsey butter or the Short Horn. Another peculiarity of these three breeds was the extremely yellow color of the Guernsey over that of either of the other breeds. The Jersey butter was considerably whiter, and it may be that the breed of cows causes the melting point of fats that are in the butter.

Miss ROSE : Do you know of any other way of overcoming the difficulty of cream churning, except that of raising the temperature? We had some cream, and it was only after we raised the temperature over 70 that we could get butter at all.

PROF. FARRINGTON : Do you know how rich that cream was?

Miss ROSE : About twenty per cent.

PROF. FARRINGTON : If I had such cream as that in a churn, I should try to run it through a separator and make it thicker. You can churn thick cream at a temperature that does not give soft butter.

Miss ROSE : The difficulty was this : We churned it at 72, washed at 56 or 58, and the same day I had churning at 56, and the butter I had churned at 72, was just as firm as the butter churned at 56.

PROF. FARRINGTON : Was the same lot of cream divided?

Miss ROSE : No, altogether different cream ; 15 degrees difference in the churning temperature, yet one butter was as firm as the other.

PROF. FARRINGTON : Was there not a difference in the thickness of the cream?

Miss ROSE : No.

PROF. FARRINGTON : It must have been due to the breed of cattle, or the feed.

Miss ROSE : They were Jersey cows.

PROF. FARRINGTON : The Jersey butter was always harder than either of the other two lots.

Miss ROSE : The butter had a very crumbly appearance. I could hardly work it sufficiently to get it knit nice.

PROF. FARRINGTON : I think those two lots of cream must have come from two different breeds of cattle or from two farms at which there had been a different method of feeding.

Mr. SMITH : Would not the fact that the cream churned at a higher temperature, and washed at a lower temperature, have a tendency to make it firm in body ?

PROF. FARRINGTON : That is a point I want to investigate in the future, to see what influence the temperature and churning have upon the amount of water in the butter.

Mr. SMITH : We are carrying on an experiment in the Western Dairy School at Strathroy, to discover whether it is more beneficial to pasteurize the whole milk or the cream. I have a cream pasteurizer in now. We are going to make a number of experiments on both methods.

PROF. FARRINGTON : You know of course that 95 per cent, of the pasteurized butter made in Denmark is made by pasteurizing the milk instead of the cream.

Mr. SMITH : Do you not think that by developing a little more acid in pasteurizing cream you could overcome that mild flavor, that we could get any flavor we desired ? Why would it not be just as easy to develop a sufficient amount of lactic acid in pasteurized cream provided you used the same starter ?

Prof. FARRINGTON : I think you can. That is one way in which you can get a uniformly high flavor if you wanted it ; but the London market does not want butter with a high flavor, they want this mild flavor that you get from pasteurized cream.

Mr. STEINHOFF : I met with a considerable quantity of butter last year that had too much moisture. What would you say was the fault, or what would be a remedy ?

Prof. FARRINGTON : According to my experience, if I wanted to diminish the amount of water in the butter I would churn it to small granules and add a large quantity of salt. According to Prof. Dean you could churn it to large granules.

Mr. BALLANTYNE : Suppose you didn't want a large quantity of salt ?

Prof. FARRINGTON : Then I would churn it to large granules.

Mr. STEINHOFF : Would you recommend working twice ?

Prof. FARRINGTON : Yes, sir, I am sure I would. I think it is always beneficial to to work butter twice, especially if you used the combined churner and worker. You could get a more even distribution of the salt.

Mr. SMITH : Do you think, if the butter-maker thoroughly understands the working of butter, and if he can tell when it is worked sufficiently, that it is necessary to work it twice ?

PROF. FARRINGTON : I think he could tell if he is an expert.

Mr. SMITH : Don't you think he should be expert enough to do that ?

PROF. FARRINGTON : No, I do not think it is necessary.

Mr. SMITH : I think every butter-maker should know how to work butter properly, and I think it is a very simple matter to learn.

Mr. STEINHOFF : Do you say that working butter is a good way to get the water out ?

Mr. SMITH : I would advocate churning the butter at the right temperature. It has been my experience that granules that are very fine retain too much moisture.

PROF. FARRINGTON : My method of giving butter two workings is about like this ; you stop the churn and draw off the buttermilk, throw in your salt and give it about half a minute of working ; then you let it lie in the churn for half an hour to an hour, and then you give it a second working right there. That is when I do the second working. I think it is much better than to complete the working at the start.

Mr. SMITH : I may say that it is a very good system, and a very good suggestion indeed.

Mr. FARRINGTON : That is what I mean by two workings.

Mr. SMITH : What we understand by two workings here is to take the butter from the churn into a cooler room, and bring it back again to give it the second working.

Mr. DERBYSHIRE : Then you think most of the butter to-day is overworked ?

Mr. SMITH : I think it is.

PROF. FARRINGTON : I think the cause of mottles in butter is the salt. If you take that butter right off without stopping you will finish your work before the salt is thoroughly dissolved, and so you will be more liable to have mottles in the butter than you would if you worked it for awhile and then let it stand for half an hour before working it again.

Mr. SMITH : Don't you find a very great difference in the quality of the salt ? Some salts dissolve more quickly than others.

PROF. FARRINGTON : There is as much difference in the size of the granules of salt, as there is in powdered sugar and granulated sugar. The salt that is the finest will dissolve the most quickly.

Mr. STEINHOFF : I think the matter of moisture is an important one. Mr. Smith speaks as if it were a matter of the butter being worked enough. Where I found excessive moisture, I do not think that was the cause. I think there must be something in the temperature of the churning.

Mr. BALLANTYNE : I think you can remedy that difficulty by regulating the amount of salt you have in the butter. You will find that in excessively salted butter the brine will drop off much more quickly than in butter that has not been salted to such an extent.

A MEMBER : It is always a good thing to recommend working the butter a little more when you find too much moisture. Excessive moisture in the butter as it comes on the butter-worker is due to two causes. 1st, the granules of the butter are too smalls, and 2nd, the butter has not had sufficient time to drain. What has been you experience with regard to the yield of butter from pasteurized and unpasteurized milk ? Have you found pasteurized milk to yield the same amount of butter as unpasteurized ?

PROF. FARRINGTON : True, there is a slight difference in favor of the unpasteurized butter. You get a larger yield from raw cream than you do from pasteurized cream. You never can churn pasteurized cream at as low a temperature as you can raw cream. If you churn raw cream at a low temperature you get a more exhaustive churning.

Mr. RODGERS : I have found that the yield of butter from pasteurized cream was less than that from raw cream.

COMMITTEE ON RESOLUTIONS.

Moved by HAROLD EAGLE, seconded by D. DERBYSHIRE,—

That this Association memorialize the Ontario Government to make a grant to the Industrial Exhibition Association of Toronto towards the erection of a new dairy building on the Toronto Exhibition grounds during the present year.—Carried.

Moved by ROBERT JOHNSTON, seconded by I. W. STEINHOFF,—

That this Association, realizing the vast importance of good roads to the country generally, and especially to the dairying interest, is of the opinion that this improvement can be brought about in a more perfect and economical way by placing the main roads of the counties in the jurisdiction of the County Councils ; and would recommend that the Legislature be asked to take such steps as may be deemed advisable to bring about this change.—Carried.

Moved by J. N. PAGET, seconded by A. F. MACLAREN, M.P.,—

Whereas the building wherein the exhibition of cheese and butter and dairy utensils at the Industrial Fair is held is altogether unsuitable, both from its position and construction, in which to display the the exhibits of cheese and butter and of utensils used in the manufacture of cheese and butter, or for the convenience of the public to inspect the exhibit ; and

Whereas the method of making the entries and of receiving the exhibits is faulty, causing much confusion in the arrangements of the exhibits in the building, and making it most difficult for the judges to satisfactorily do their work.

Therefore be it resolved, that this Association would request the Directors of the Industrial Fair Association, to appoint a committee to confer with a committee to be appointed by the Board of Directors of this Association, with a view to making more perfect arrangements for the management of the Dairy exhibit.—Carried.

Moved by HAROLD EAGLE, seconded by R. M. BALLANTYNE,—

That the sympathy of this Association be tendered to Mr. J. A. James, of Nilestown, for many years a member and director of this Association, on account of his serious illness, and the Association express their hope that he will be speedily restored to health. —Carried.

REPORT OF NOMINATING COMMITTEE.

OFFICERS FOR 1900.

Honorary President, - - -	Hon. THOS. BALLANTYNE, Stratford.
Honorary Vice-President, - -	JOHN PRAIN, Esq., Harriston.
President, - - - - -	R. M. BALLANTYNE, Stratford.
1st Vice-President, - - - -	A. WENGER, Ayton.
2nd Vice-President, - - -	JAS. CONNOLLY, Porter's Hill.
3rd Vice-President, - - - -	J. N. PAGET, Canboro.

Directors.

District No. 10, - - - -	GEO. H BARR, Sebringville.
District No. 13, - - - - -	GEO. B. GOODHAND, Milverton.
District No. 9, - - - -	ROBT. JOHNSTON, Bright.
District No. 11, - - - - -	A. F. MACLAREN, Stratford.
District No. 7, - - - -	M. MORRISON, Harriston.
District No. 12, - - - - -	JOHN BRODIE, Mapleton.
District No. 8, - - - -	HAROLD EAGLE, Attercliffe Station.

Auditors.

J. C. HEGLER, - Ingersoll. J. A. NELLES, - London.

Representatives to Industrial Exhibition, Toronto.—H. EAGLE, R. M. BALLANTYNE.
Representatives to Western Fair.—T. B. MILLAR, London; I. W. STEINHOFF, Stratford.

In consideration of the fact that the interests and objects aimed at by the Cheese and Butter Makers' Association are identical with the objects of this Association, we beg to recommend that representatives be appointed by this Association to meet with representatives from the Cheese and Butter Maker's Association for the purpose of discussing the advisability of the union of the two Associations.

JAS. A. GRAY, Chairman.
I. W. STEINHOFF, Secretary.

On motion adopted.

Mr. R. M. Ballantyne, President-elect, then took the chair. A vote of thanks was moved to the retiring president which was carried with much enthusiasm.

Mr. EAGLE: There are some things I can do, but one of the hardest things I have always had is to reply to a vote of thanks. It is an easy matter for the President of the Association to go out of the chair and then drop out of the work. I want to thank Mr. A. F. MacLaren for the very kind way in which he has helped me through all the sessions since I went into the chair. Messrs. A. F. MacLaren and R. M. Ballantyne have been responsible for whatever I have done, for if one did not pick at me on one side the other one would; and I want to tender them my hearty thanks for their always ready help. I thank you also most kindly for your vote of thanks. I trust to meet you all next year at our 34th annual meeting, and hope that in the meantime you will put forth every effort to advance the interests of the butter and cheese industry of the Dominion of Canada. Let us see to-day that no stone is left unturned to make Canadian butter and cheese the best in the world. We can do it only by putting a right shoulder forward, and by everyone working heartily together.

DAIRY SCHOOLS OF ONTARIO.

During the winter of 1899-1900 three dairy schools, supported by the Ontario Government, were conducted in the Province—at Guelph, Strathroy and Kingston—all of them being under the direction of Dr. James Mills, President of the Ontario Agricultural College. The courses of instruction were largely the same in each case, although the Central School at Guelph had the benefit of a series of lectures from members of the College staff, and also the advantage of practically judging and handling dairy cows and studying dairy breeds. The courses pursued were practically as follows:

In order to meet the growing demand for good butter-makers to take charge of factories during the winter months and early spring, each dairy school was open from December 4th to the 22nd.

A practical and thorough training was given in the running of cream separators of different makes, the pasteurization of whole milk and cream, care and ripening of pasteurized and raw cream, use of the acid test for cream, running of box churns, the combined churn and worker and the Mason worker, the preparation of butter for local and export markets, and other work of a practical character; also in testing the milk with the Babcock tester and lactometer, in the use of the oil test churn, in composite sampling, and in the making up of factory accounts, so that the students might have a thorough knowledge of how to run a creamery properly. There were no examinations and no certificates given in this special course.

There were two factory courses, one of three weeks and another of six weeks' duration. These courses provide theoretical and practical instruction in cheese-making and the curing of cheese, butter-making (both separator and cream-gathering plans) and preparation of butter for market, milk testing with the Babcock tester and lactometer, and oil-test churn, which is so much used in cream-gathering creameries; pasteurizing both whole milk and cream. They also included fermentation tests, the use of starters, dairy bacteriology, agriculture in relation to dairying, and factory records and accounts, etc.

Discussions on practical dairy topics, led by one of the instructors, was held four afternoons in each week. These discussions lasted for one hour and were of much value to both students and instructors. Experts were brought to the schools from time to time to give lessons in the judging of cheese and butter.

Special instructions were also given on the care and running of boilers and engines by a competent instructor. There was also practice in pipe-fitting, repairing valves, etc.

While the fact is recognized that the manufacture of cheese and butter must be confined largely to the co-operative or factory system in order to attain the highest success, it is also a fact that a large quantity of butter and some cheese are made, and will continue to be made, in farm dairies. To enable the farmers to produce a finer quality of butter and cheese, and thereby receive a better price, a home dairy course was carried on in two of the schools. A competent lady instructor was secured in each case, and the methods followed, and the apparatus and utensils used were inexpensive, and such as have been found most suitable for use in farm dairies. Students for this course were allowed to enter any time after January 4th and remain as long as they wished.

At each of the schools a library of carefully selected books, including the latest works on dairying and kindred subjects, together with the leading agricultural journals, is kept for the use of the students.

AGRICULTURAL COLLEGE DAIRY SCHOOL.

H. H. Dean, B.S.A. ..... Professor of Dairy Husbandry.
James Morrison, } ..... Instructors in Cheese-Making.
R. W. Stratton }
Mark Sprague ..... Instructor in Separators and Piping.
James Stonehouse ..... Instructor in Butter-making.
Jas A. McFeeter ..... Instructor in Milk Testing.
Miss Laura Rose ..... Instructress in Butter-making in Home Dairy.
Theo. Wiancko .. Instructor in Separators and Milk Testing in Home Dairy.

The years 1899 and 1900 have been successful ones at the Dairy School. The attendance has been good, the interest keen, and the work helpful to cheese and butter makers and to farm dairymen, including farmers daughters and wives.

During the sessions of the past two years there have registered for the various dairy courses, 209 students. This number does not include the regular College students who have also taken considerable practical dairy work in addition to the lectures given on dairying. Of the 209 registered, 45 were ladies, or over 21 per cent.

By counties, cities and districts in Ontario, and from other provinces and countries the attendance was as follows: Algoma 2, Brant 5, Bruce 11, Durham 6, Dundas 2, Dufferin 2, Elgin 5, Essex 1, Grey 6, Grenville 2, Hastings 5, Haldimand 1, Halton 5, Hamilton 1, Huron 5, Kent 1, Lambton 2, Lanark 2, Leeds 1, Lennox 1, Lincoln 2, Manitoulin Island 1, Middlesex 8, Muskoka 2, Norfolk 3, Northumberland 1, Ontario 5, Oxford 5, Perth 8, Peterboro 3, Peel 1, Prescott 2, Renfrew 1, Simcoe 5, St. Joseph's Island 1, Toronto 11, Victoria 2, Waterloo 6, Welland 2, Wellington 48, Wentworth 8, York 6; British Columbia 2, Manitoba 1, North West Territories 1, Quebec 2, Indiana, U. S. A. 1, Pennsylvania, U. S. A. 1, Scotland 1, England 1, Sweden 1.

The previous experience of students varied from none at all to 21 years. Several students have had experience ranging from 5 to 15 years. Most of our Home Dairy class have had some experience in farm dairy work. All students who purpose taking the factory courses should have some knowledge of the conditions existing in cheese factories and creameries in order that they may receive the full benefits.

These courses include instruction in the making and curing of cheese; the running of power cream separators; operating churns and workers, of which two are combined churns and workers, and preparation of butter for local and export markets; testing milk with lactometer, Babcock and Lister-Gerber testers, and also in the use of the oil-test churn and chart.

Previous experience is not necessary for the Home Dairy work. Here the conditions are such as would be met in a good dairy on a well-equipped farm, except that five hand separators of different makes are in use that students may judge of their respective merits. In addition to the practical work along the line of making good butter and cheese, students are drilled in judging dairy goods so that they may know a good article when they produce it.

Lectures by the Professor of Dairy Husbandry and members of the College staff broaden the views of students. Animals from the dairy stable illustrate the form and characteristics of a good dairy cow, and the special characteristics of the dairy breeds.

The Literary Society is a means whereby students become acquainted with the rules of debate, and wear off the timidity which many have at hearing the sound of their voice on a public platform.

From the brief outline given, readers may judge that the course, for a three months session, is a somewhat comprehensive one, and tends to make better cheese and butter makers as well as better citizens.

The makers who attended the sessions of the Dairy Schools in their beginning are apt to get behind the times unless something is done to draw them from the narrowness of their own factories and surroundings. There are many in factories who understand the making of cheese and butter, but who would be improved by a few lessons on more scientific lines than they can obtain in factories or at the Dairy Schools as now conducted. A course of instruction in laboratory work, relative to Dairy Bacteriology and Dairy Chemistry is needed for these men. This course should not be too technical, and should

extend over not more than two weeks or a month's time. If this were combined with a course in experimental cheese and butter work it would be very helpful. For instance, in the Bacteriological laboratory a student might learn the nature of gas-producing organisms, then he might take a culture of these germs to the cheese room and observe their effect on milk for cheesemaking. Under a trained experimenter he could study the best methods of preventing and overcoming these gassy taints.

In the butter department a student might treat butter in different ways to see the effects on the moisture retained by the butter. He could then take this butter to the laboratory and determine its moisture. This would be a very important lesson to him. It is not supposed that factorymen will become trained chemists or bacteriologists in two weeks or a month, but under proper instruction they might obtain many valuable lessons which would help them in their everyday work and also make life more pleasant.

The advances in dairying demand that our Dairy Schools shall keep abreast of the times. Much of the instruction now given could be as well given at ordinary cheese factories and creameries at less expense than at a Dairy School. Dairy Schools should take up work which cannot be undertaken in the ordinary routine of factory work. The very best man should be employed to give the instruction needed. Men who are miles away from the conditions found at creameries and cheese factories, are not wanted. But men who have been trained scientifically and who at the same time can get on a level with ordinary men, and know their needs can do much more good to the dairymen. How shall we best meet the needs of dairymen during the first quarter of the twentieth century? is a question for the managers of all Dairy Schools to ask. Having asked the question a satisfactory answer should be sought after and the policy of the schools ought to be shaped so as to meet these needs of the great and growing dairy industry of Canada.

H. H. Dean,
Superintendent.

Guelph, March 1st, 1900.

EASTERN DAIRY SCHOOL.

J. W. Hart ..... Supt. and Instructor in Cream-Separating.
G. G. Publow ..... Instructor in Cheese-Making.
W. M. Singleton ..... Assistant in Cheese-Making.
L. A. Zufelt ..... Instructor in Milk-Testing.
W. A. Wilson ..... Instructor in Butter-Making.
J. Buro ..... Assistant in Butter-Making.
Jas. Noble ..... Engineer.
W. T. Connell, M.D ..... Bacteriologist.

I have the honor to submit the following brief report of the operations of the Kingston Dairy School covering the year 1899, and of the current year to date.

Number of students registered during the year 1899, 111. Number of students registered in 1900, 36. In the Special or Long Course of 1899, there were 20 students taking cheese-making, and 28 butter-making. In the examinations (sessions of 1898-99) for the Dairy School Certificate in butter-making 12 students wrote, of whom 8 succeeded in passing. Out of 12 who wrote on cheese-making, 8 passed all the examinations. Six of the latter, having fulfilled all the conditions, have been granted certificates.

The sixth session of the school opened on the 4th of December, 1899, with 8 students in butter-making and 8 in the cheese-making departments. In the second course there were 25 students. In the third or long course, 47 students registered, 29 of whom were in the cheese-making department, while the remainder were given instruction in butter-making.

The applications received to date (session of 1899-1900) number 104. Number of students in attendance to date (session of 1899-1900) 75.

During the session milk for the needs of the school was supplied by 76 patrons. In all 903,142 lbs. of milk containing 35,669.75 lbs. of butter-fat were received, and from this 30,563.5 lbs. of butter and 18,888.5 lbs. of cheese were made. The total receipts from sales amount to $8,029.83 and $7,831.21 was paid to the patrons for milk, an average of 23.26 cents per lb. of fat, or 91.88 cents per hundred weight of milk.

During the summer the students who were working for certificates, were visited, and visits were paid to a large number of cheese-factories and creameries. Visits were also paid to the Dairy Schools at Guelph and St. Hyacinthe. The Superintendent of the School acted as judge at the Agricultural Exhibitions at Toronto, Ottawa and Kingston.

Experiments were carried on during the summer in the curing of cheese at different temperatures. On account of the cool weather prevailing during the summer, comparisons between curing cheese in the curing-room where no attempt was made to control the temperature, and in the rooms where the ice and sub-earth duct were used, were not so striking as they would have been had the weather been hot. The results of the experiments on the whole, corroborated those made in previous years, which indicate that the average temperature prevailing in our factories during the summer months is too high, and that a better quality of cheese with less shrinkage would follow if the curing-rooms were kept at a lower temperature.

Another important point to which little attention has been paid is that more moisture can be retained in the cheese where it is intended to cure at a temperature of 60 or 65 degrees. Where more moisture is retained in the cheese, more cheese can be made from each hundred lbs. of milk. The cheese will be softer and will cut much better than the hard dry cheese necessarily made where the curing-rooms cannot be kept cool.

It is proposed to carry on investigations at the school during the coming summer in the curing of cheese having different percentages of moisture.

J. W. Hart,
Superintendent.

Kingston, March 1st, 1900.

WESTERN DAIRY SCHOOL.

Archibald Smith.....Superintendent and Instructor in Milk Testing.
C. O. Luton.....Instructor in Cheese Making.
Geo. R. Johnston.....Instructor in Cream Separators and Butter Making.
Miss Bella Miller.....Instructress in Home Dairy.
Prof. Harrison.....Bacteriology.
Prof. Day.....Agriculture in relation to Dairying.

The Western Dairy School was closed during the Summer of 1899.

I was engaged as Superintendent about Nov. 1st, 1899, and on Dec. 4th the School was opened for a special creamery course which ended on Dec. 22nd.

The cheese department, which had been done away with, was re-established, and a portion of the cheese department was partitioned off for a Home Dairy room, and a number of other changes were made in the equipment of the School.

On Jan. 4th, 1900, the school re-opened with a full staff of instructors in the several departments. About 4000 pounds of milk is received daily, and the cream from one skimming station.

There have been 29 students in attendance, and a thorough and practical training is given in the manufacture of cheese and butter by both factory and Home Dairy systems, the handling of cream separators, milk testing, care of boilers and engines, and Agriculture in relation to dairying, etc.

A new feature introduced this winter has been the holding of monthly meetings of the farmers and dairymen of this district at the Dairy School. Competent practical speakers are brought from a distance to deliver addresses on Agriculture and Dairying, etc., and to take part in the discussions which follow. These meetings have been well attended, and are much appreciated by the farmers who attend, as they serve to impart a great deal of useful information. This is one of the best methods I know of for educating the farmers in the production of a better quality of milk for our cheese and butter factories, and in improved methods of dairying. The school will close for this term on March 31st.

A number of experiments are being made in the manufacture of butter and cheese.

Arch'd Smith,
Superintendent.

Strathroy, March 1st, 1900.

ANNUAL REPORTS

OF THE

LIVE STOCK ASSOCIATIONS

OF THE

PROVINCE OF ONTARIO.

1899-1900.

DOMINION CATTLE BREEDERS' ASSOCIATION.
DOMINION SHEEP BREEDERS' ASSOCIATION.
DOMINION SWINE BREEDERS' ASSOCIATION.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF THE
LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
PRINTED AND PUBLISHED BY L. K. CAMERON.
Printer to the Queen's Most Excellent Majesty.
1900.

WARWICK BRO'S & RUTTER, PRINTERS.

TORONTO.

ANNUAL REPORT

OF THE

LIVE STOCK BREEDERS' ASSOCIATIONS.

1899-1900.

To the Honorable the Minister of Agriculture:

I have the honor to submit herewith the Annual Reports of the Dominion Cattle Breeders' Association, the Dominion Sheep Breeders' Association, and the Dominion Swine Breeders' Association.

Your obedient servant,

A. P. WESTERVELT,

Secretary.

CONTENTS.

CATTLE, SHEEP AND SWINE ASSOCIATIONS.

REPORT OF THE SECRETARY.

At the time of making my first annual report, it will be in place to mention briefly the objects for which these associations were formed, and the means which have been adopted up to the present time to carry these into execution.

Dates of Organization. The Sheep Breeders' Association—the first one organized—was formed in March, 1889. The officers and directors were :—President, Robert Miller, Brougham, Ont.; Vice-President, James Russell, Richmond Hill, Ont., Treasurer, Frank R. Shore, White Oak, Ont.; Secretary, F. W. Hodson, London, Ont. Directors :—John Campbell, jr., Woodville, Ont.; John Jackson, Abingdon, Ont.; W. Whitelaw, Guelph, Ont.; J. C. Snell, Edmonton, Ont.; Capt. Wm. Rolph, Markham, Ont.; Rock Bailey, Union, Ont.; Peter Arkell, Teeswater, Ont.; Wm. Walker, Ilderton, Ont.; Thomas Palmer, Richmond Hill, Ont.

The Swine Breeders' Association was formed in September, 1889, with the following officers and directors :—President, Joseph Featherston, Springfield-on-the-Credit; Vice-President, J. Y. Ormsby, Springfield-on-the-Credit; Treasurer, E. M. Jarvis, Clarkson; Secretary, F. W. Hodson, London, Ont. Directors—R. Snell, Edmonton; R. Dorsey, Burnhamthorpe; James Main, Boyne; F. Green, Innerkip; E. D. George, Putnam; D. DeCourcey, Bornholm.

The last formed of the three associations was the Cattle Breeders' Association, which was organized in April, 1892. The first Board of Directors was composed as follows :—President, Hon. Thomas Ballantyne, Stratford, Ont.; Vice-President, R. Gibson, Delaware, Ont.; Secretary, D. E. Smith, Brampton, Ont.; Treasurer, Henry Wade, Toronto, Ont. In 1895 this association was reorganized, and a constitution and by-laws were adopted similar to those of the Dominion Sheep and Swine Breeders' Associations. The officers and directors appointed at the time of reorganization were :—Hon. President, Hon. Thomas Ballantyne, Stratford; President, John I. Hobson, Mosboro', Ont.; Vice-President, J. C. Snell, Snelgrove, Ont.; Secretary-Treasurer, F. W. Hodson, Guelph, Ont.; Directors—A. Johnston, Greenwood, Ont.; Alf. Stone, Guelph, Ont.; James Bowman, Guelph, Ont.; D. McCrae, Guelph, Ont.; W. W. Ballantyne, Stratford, Ont.; G. W. Clemons, St. George, Ont.; Capt. Wm. Rolph, Markham, Ont.; W. J. Rudd, Eden Mills, Ont.; G. E. Day, Guelph, Ont.

Objects of Associations. These associations were formed to encourage the breeding of a better class of stock, to assist in improving the methods of caring for the same, and to extend the markets for our surplus stock. These are inseparably connected. What affects the one will necessarily affect the other. If means are used to raise the average of our stock to a higher plane, the tendency will be to increase the sales and raise the prices, and better methods of handling will be the means of producing better finished animals and will tend towards the same result.

Assistance to Fair Associations. The associations have at all times co-operated with the officers of the various fair associations to encourage the display of attractive and instructive exhibits of the various classes of stock. Each year delegates have been appointed to the larger fair associations, who have been courteously received and their views favorably considered, and in many cases, when possible their requests have been complied with. The expenses of these delegates have been paid while in attendance at the meetings of the fair associations to which they have been appointed.

In this connection I might say that the present year is the first time the delegates appointed by the Dominion Cattle Breeders' Association have been recognized by the Board of the Industrial Exhibition.

Lists of expert judges have been nominated each year, and these have been placed in the hands of the fair managers and have been mailed to others who might apply for them. They have been the means of a better class of judges being appointed than formerly at the agricultural fairs.

Annual Report. The report of the work of the associations has been published annually, together with papers read at the annual and other meetings of the associations, and placed in the hands of those interested in the breeding and feeding of live stock. Much practical and valuable information has been distributed in this way, and much good has been done towards instructing and interesting the farmers of Ontario and Canada in the live stock industry.

Transportation. Each year a Transportation Committee has been appointed by each association for the purpose of looking after the transportation interests of live stock breeders. The work of these committees has been fruitful, great strides having been made, particularly in recent years, in obtaining reductions in the transportation rates of the trunk lines of Canada. In 1897 the estimated weights on registered live stock, in less than carload lots were reduced one-third, and the necessity of sending a man in charge of stock going over 100 miles was dispensed with. At the same time the rate on car loads of registered stock to Manitoba and the Northwest, was reduced about one-half, and special concessions were also allowed to permit of loading and unloading at various points while in transit. In 1898 the rates on less than car load lots were still further reduced. It was arranged that stock be billed according to the Canadian Joint Freight Classification, but that the rates on registered stock should be one-half the regular tariff rate. In January, 1899, a special rate of $196 was obtained to Vancouver, British Columbia, the rate previous to that date being $251. Since February of the same year, calves, sheep and pigs, when in lots of three or over, have been shipped, crated or uncrated at the option of the shipper. In February of the present year, the Michigan Central Railway, which previously was not a party to this arrangement, issued the following circular, which gives similar rates over this Company's lines in Canada.

"Special regulations governing transportation of pedigreed stock for breeding purposes, between stations on Michigan Central Railroad in Canada :

"The following rules will govern the transportation of registered cattle, sheep and swine, intended for breeding purposes, between stations on this company's line in Canada, when owner's sign the usual valuation agreement for ordinary stock, and produce certificates of registration, issued by an association recognized by the Provincial Department of Agriculture. Shipments will be way-billed at one-half regular tariff rates at the full estimated weights as per Canadian Joint Freight Classification. Agents will take note of particulars as to name of animal and age, and keep record of same, showing the information on billing accordingly. If extra values are declared, the rates and weights will be as per classification for valuable stock in the Canadian Joint Freight Classification. Registered cattle, sheep and swine may be taken without an attendant, provided owners sign the usual contract releasing the company from liability in consequence thereof. Shipments of calves, sheep or swine in quantities of three or under must be crated. Part car loads over three must be penned off at shipper's expense at one end of the car, or shippers at their option may crate any quantity over three in preference to penning them in. Permission will be given to stop cars in transit at intermediate points on the direct line to destination, to complete loading, at an additional charge of $3 per car for the first, and $2 per car for each subsequent stop, this charge to be added to the billing. To entitle shippers to these special rates owners must sign the usual valuation agreement for ordinary stock."

In connection with the question of transportation a very important and helpful feature has been the cars of thoroughbred stock shipped under the auspices of the associations. Last year nine cars were shipped and stock distributed at points between Winnipeg and Calgary. Two cars have already been shipped this year. The assistance of the transportation companies has been of great service in carrying on this part of the work.

Before leaving the matter of transportation I would like to draw attention to the advantage to be derived by all shippers making themselves thoroughly familiar with the classification of weights and the numbers and dates of the circulars issued by railway companies respecting rates on thorough-bred stock. All agents have copies of these circulars, but at small stations, where it is not necessary to refer to them frequently, they are unable to turn them up when required. If they are furnished with the number and date of the circular, this difficulty is at once removed. This information is contained in the pamphlet on transportation published by the associations. Should the rate at any time be refused, the rates asked by the agent should be paid and a receipt taken, and there will be no difficulty in obtaining a rebate upon application to the district or general freight agent. The assistance of the Secretary of this association may be of service in this.

Lists of Stock For Sale. The lists of stock for sale by the members of the associations have been published monthly since 1897 in *The Agricultural Gazette.* These lists have been of great service in bringing to the notice of probable buyers where the stock which they require can be procured. The lists have been placed in the hands of breeders throughout Canada, and also of a number in the United States. I believe it should be impressed on the minds of all members the advantage of having the list of stock they have for sale published in this way. To all inquirers as to where certain stock can be procured, this list of stock is mailed, and a large number of applications are received each week.

In order to make the most out of our lists of stock for sale, buyers should know that there is such a list and where it can be procured. British Columbia is buying some stock from Ontario, but in greater numbers from the neighboring States. The trade with the Northwest Territories is yearly increasing, but a large quantity of stock is purchased from the other side of the line. This is trade that, with the present transportation rates, should be entirely in the hands of Ontario breeders. If an advertisement were placed in the most widely circulated papers in these districts, and also, perhaps, with advantage in the Maritime Provinces and in some leading paper in the United States, stating that a list of stock for sale of the members of the Cattle, Sheep and Swine Breeders Associations could be obtained on application to the Secretary, it would be in the interest of all breeders of thoroughbred stock in Ontario and be a means of bringing to the notice of outside buyers the stock for sale in this Province.

Farm Help Exchange. During the past year a department, "Farm Help Exchange," has been added to the *Gazette.* The heading of this column is as follows, and fully explains the object for which it was undertaken :

"The Farm Help Exchange has been started with the object of bringing together employers of farm and domestic labor and the employees. Any person wishing to obtain a position on a farm or dairy, or any person wishing to employ help for farm or dairy, is requested to forward his or her name and full particulars to the Secretary of the live stock associations. In the case of persons wishing to employ help, the following should be given : particulars as to the kind of work to be done, probable length of engagement, wages, etc. In the case of persons wishing employment, the following should be given : experience and references, age, particular department of farm work in which a position is desired, wages expected and where last employed. These names, when received, together with particulars, will be published FREE in the two following issues of *The Agricultural Gazette* and will afterwards be kept on file. Upon a request being made, the particulars only will be published, the names being kept on file. Every effort will be made to give all possible assistance, to the end that suitable workers, male or female, may be obtained. Every unemployed person wishing to engage in farm or dairy work is invited to take advantage of this opportunity."

The large number of applications received each week shows without comment the amount of interest taken and how much this venture is appreciated by the farmers throughout Ontario. Since this work was taken up in August of last year, the number of persons who have taken advantage of the opportunity afforded has been far beyond what was expected. Situations have been found for those wanting work on a farm, and a great many breeders have been supplied with stock-men. Numerous letters have been received from breeders and others commending the work of the association in this direction.

The Agricultural Gazette. A column showing sales made each week would also add interest to the *Gazette* and be of benefit to the breeders. Those to whom the *Gazette* was mailed would be informed of the purchases made by their neighbors, and could procure from them fuller particulars as to quality of stock and prices paid.

It should be the aim in our association work to make the associations as great a power for good as possible, and to make them such that each breeder of thoroughbred stock will feel that he cannot afford to be without membership in the associations, sometimes on account of direct benefits to be derived, but oftener on account of the greater indirect benefits to be obtained. The larger our membership, the more influence we will have to be used for the benefit and advancement of the live stock industry. *The Agricultural Gazette,* as the official organ of the Live Stock Associations, gives an influence that cannot be attained in any other way, and the better and more truly it is made the organ of

the associations, the more benefit will be received from it by the Live Stock Associations and by the live stock breeders throughout this Province.

Stock Purchased. A large amount of stock has been bought each year by the officers of the associations for those who are unable, owing to distance, to look personally after the purchasing of what was required. No commission has been accepted, and nothing paid in addition to the cost of the stock but actual travelling expenses incurred. This year three carloads of pigs have been purchased for the Northwest Government. These will be shipped early in April, and will be sold at auction by the Northwest Government at Calgary and at points on the main line of the C. P. R. and on the McLeod and Edmonton branches.

Location of Winter Fair. Not the least important of the educational work of the associations was the management of the Provincial Winter Fair. A full history of the show was published in the Live Stock Report a few years ago. Since that time the show has been held twice in the City of Brantford—in 1897 and 1898—and last year in the City of London. Owing to the size attained by the show and the special features inaugurated, it has been considered that the best work of which the show is capable can not be done unless proper accommodation is provided, and no place can be expected to provide the accommodation necessary in consideration of the show being held at that place for only two years. In order that the most good may be derived from the show, I believe it is the unanimous opinion that it should be permanently located at some central point and suitable buildings erected or provided for the purpose of holding the show each year. The proposition made by the Minister of Agriculture to deputations who waited on him having in view the permanent location of the show, was that the building should be provided by the place where the show was located, and that sufficient funds be supplied the associations to be used for the purpose of placing in the building the special fittings necessary for holding the show. Applications for the show will no doubt be received from places which will guarantee the necessary accommodation. This is a very important matter and should receive full consideration, keeping in mind the one broad principle that the show should be held at that point where it will do the greatest good to the greatest number and that a sufficient guarantee of accommodation be given—to include a suitable building, centrally located, with convenient facilites for the unloading and loading of stock.

Annual Auction Sales. The following memorandum has been submitted by the Dominion Live Stock Commissioner :—

In Great Britain auction sales of live stock have been held annually for many years. Much of the breeding stock is most satisfactorily disposed of in this way, also a great number of "stores" and other animals. In some sections of Ontario this system has been adopted with gratifying results.

Formerly Canadian cheese was all sold by salesmen at private sale ; within recent years the auction principle has been adopted in many sections, and has been found satisfactory to both buyer and seller.

Scattered throughout Canada are hundreds of farmers on small farms who annually rear from one to four first-class breeding males, and perhaps a few females. Many of these men understand the principles of stock-breeding, and have from time to time produced some of the noted showyard specimens. The progress and profits of these men in the past have been greatly hampered because of their inability to promptly sell their surplus stock annually. In some years they have been able to sell ; in other years they have had to keep a number of animals longer than their means or food warranted.

Breeders doing a more extensive business have suffered from the same cause, sometimes severely. The result has been that many capable men have given up the business, to the great loss of the farmers and country generally.

The rank and file of our farmers must be induced to use only the best class of males in order that Canada take the place she should with her meats, dairy products and poultry in the markets of the world. Only products of a superior quality find a ready and a profitable market at home or abroad. It takes as long, generally longer, to produce an animal which is worth from 2c. to 3c. per lb. as one worth from 4c. to 6c. and costs almost as much for feed and attention.

The loss resulting from inferior stock bears heavily on the dairy interests. There are hundreds of cows throughout Canada which produce annually not more than 2,400 lbs, of 3 per cent. milk ; there are others, well bred and well fed, which easily produce 6,000 to 10,000 lbs. annually of 4 per cent. milk. There are even a few grand cows which have at public test yielded at the rate of over 20 lbs. of butter per week. The annual loss to Canada from keeping poor

stock, and keeping it badly, is enormous. Our motto should be. "The greatest quantity of the best quality, produced most cheaply." This can only be fulfilled by using well-bred sires of good qualify, and by feeding the dams and offspring liberally.

Anyone who has bought "stores" or dairy cows from year to year knows how increasingly difficult it is to obtain the right sort at any price, yet inferior animals can be bought readily, very many of which would prove unprofitable at 2c. per lb. In some of the provinces it is more difficult to buy good "stores" to-day than it was twenty years ago. This condition ought not to exist, and should not continue.

The difficulties enumerated can in a measure be overcome, and desirable conditions extended by the establishment of well-conducted annual auction sales, to which breeders may consign their surplus animals at stated times each year, with the assurance that they will be sold for their market value. These sales should be held at fixed points on or near the same day of the same month each year.

None but animals of good individual quality and useful breeding should be offered.

The sales should be widely advertised, both in Canada and the United States, and every effort made to interest the farmers generally throughout the district where they are held.

Each animal offered should be sold to the highest bidder. No by-bidding should be allowed.

At first the sales may not prove entirely successful, and persons sending animals may not obtain as high prices as they desire, but soon, by wise and honorable management, the confidence of the public, both Canadian and American, will be gained, when these sales will prove a marked success in every particular, and year by year grow more and more important. The benefit to the country will be very marked. The rank and file of the farmers in every district, and the extensive buyers from a distance, will know where to go to buy what each wants at current value, and the expert breeder will know that once each year he can sell at the market value his surplus stock, and not be compelled to dispose of them to the butcher, or hold them until they eat their heads off, and then sell them for less than they cost to produce.

Well-conducted annual auction sales of live stock will prove an excellent advertisement for Canadian live stock.

The plan outlined is co-operative advertising and co-operative selling, which is cheaper and more effective than similar work done by an individual.

A few of the larger breeders or dealers, who have spent years in learning how to sell, can dispose of all they can produce, and can buy from their less fortunate neighbor and re-sell his animals at a profit. The case of the breeder doing a small business is different, he needs help. The motto of every Canadian should be "The greatest good to the greatest number." It is true that the smaller breeder and general farmer will be greatly benefited by the establishment of annual sales. In this way the extensive breeder and importer will be assisted, for when farmers are successful they are willing to and can pay better prices for suitable sires and other stock.

It may be said that annual auction sales have been tried again and again by private individuals and public associations and have ended in failure. The failure, when there was failure was due to the fact that the confidence of the people was never gained. It was generally believed, and not without reason, that only rejected animals were offered at many of the auction sales heretofore held, such as owners had failed to sell at private sales, because of inferior quality

Although but few animals of each breed have been offered, the sales held at the Ontario Agricultural College, Guelph, are recognized as a success in more than one sense. This sale is annually looked forward to by a large number of farmers, and when an animal of good quality is offered it invariably brings a fair price.

If annual auction sales are to be established and maintained in any of the provinces, the best and most reliable breeders must patronize them, and year by year give them their loyal and patriotic support, and in the not distant future they will be abundantly repaid.

It is desirable that commencing and maintaining annual auction sales in each province shall be undertaken by the Provincial Live Stock Associations.

When the executive officers of the Live Stock Associations decide to undertake this work, in order to encourage the venture, I am authorized to intimate that the Department of Agriculture will pay to the said executive committee $650, if conditions set forth in clause B are complied with.

B—(1) The officers of the Provincial Live Stock Associations shall undertake all details connected with the work of establishing and conducting annual sales of pure-bred live stock, and in due time shall encourage the establishment of annual sales of other stock. The sales so established shall be known as Provincial Auction Sales.

(2) The sales shall be held at the same point or points, and on or near the same day of a certain month annually.

(3) Each animal offered shall be of good individual quality, in good condition, in sound health, not defective, and shall be registered in a record recognized as reliable by the Dominion Department of Agriculture.

(4) Each animal advertised in the catalogue of a sale shall be sold to the highest bidder if one or more bids are made. There shall be no by-bidding by the owner of any animal, or by any-one authorized by him.

(5) Each sale shall be thoroughly advertised in the provincial papers, especially those circulating among the farmers in the district where the sale is to be held, also in those having a Dominion circulation.

(6) A well-arranged sale catalogue containing the pedigree, and all other essential particulars of each animal to be sold, shall be issued, and 500 copies mailed to as many probable buyers in Canada and the United States, at least three weeks before the date of the sale.

(7) No entrance fee for cataloguing or selling animals shall be charged. The owners shall be required to deliver each animal at the place of sale at least twenty-four hours before the time advertised at which the sale shall commence ; each animal shall be accompanied by sufficient food of desirable quality.

"(8) Suitable buildings, properly equipped, shall be provided in which to hold each sale. The equipment should be a secretary's office, properly heated and lighted, a building, as a rink or drill shed, large enough to accommodate all the animals to be sold, also to include a clear space in which an auctioneer's stand may be erected, surrounded by ample heating accommodation for the buyers. There should be sufficient water supply at a convenient point in the building. The entire space should be well lighted from twilight to broad daylight.

"If these sales are commenced, it is hoped that arrangements may be completed whereby very low railway fares will be granted to parties attending and on animals sent for sale, and that the catalogues and all literature advertising the sale may pass free through the mail.

"(9) The Live Stock Commissioner may decide in any case whether or not all or any of the required conditions have been complied with ; his decision shall be final."

There is, I believe, but one opinion as to the benefit of these sales would be to the live stock breeders and to the country if a success, and their success depends entirely on their management. If the buyers are properly protected there will be no difficulty in getting numbers of them to attend these sales, and such rules as are made by the associations should have this object in view. Care should be exercised also in advertising, to see that full information is received by all those interested in the sale or purchase of thoroughbred live stock.

Dominion Grant to Associations. The advisability of assisting the Cattle, Sheep and Swine Breeders' Associations by money grant is now being considered by the Dominion Department of Agriculture. It is suggested that this money be given to further the efforts of the associations in extending its usefulness of the lists of stock for sale.

Legislative Grants. I am very glad to be able to state that an additional sum of $500 has been placed in the estimates to increase the Legislative grant to the Dominion Cattle Breeders' Association to $2,000. This additional money is donated for the purposes of extending the educational work of the associations at the Provincial Winter Fair.

It would be well to consider the advisability of offering prizes for dressed carcasses in the cattle department.

In the dairy department of the Winter Fair the value of results obtained would be much increased by taking into consideration the value of the food consumed.

Arrangements almost similar to those of last year have been made with the Government of the Northwest Territories for the transportation of bulls into that country. Application for space should be made to Chas. W. Peterson, Deputy Commissioner of Agriculture, Regina, N.W.T. This shipment will go forward some time in May. Not more than two bulls will be shipped to any one applicant.

The sum of $2,000 has been placed in the estimates to assist in extending the educational work of the Sheep Breeders' Association.

The dressed carcases competition of the Winter Fair should, I think, be divided into two classes : "Under one year" and "one year and under two." This will add to the prize list of the sheep department about $176.

A number of the American Sheep Breeders' Associations have agreed to offer special prizes in the sheep department at the next Winter Fair.

Swine Records. Following is a list of pedigrees and transfers recorded in 1899 :—

	Boars.	Sows.	Total.
Berkshires	452	661	1,113
Yorkshires	609	566	1,175
Chester Whites	190	160	350
Tamworths	321	344	665
Poland Chinas	95	74	169
Duroc Jerseys	37	90	127

	Boars.	Sows.	Total.
Suffolks	..	..	28
Essex	..	..	10
Total			3,637
Transfers (all breeds)			466

The list of volumes of the Dominion Swine Record, now on hand, is as follows:

Volumes 1 and 2	0	Volume 6	46
Volume 3	145	Volume 7	37
Volume 4	276	Volume 8	47
Volume 5	105	Volume 9	125

The printing of each volume of the Swine Record during the past two years has cost the association over $800. This is considerable money, when we consider that the net amount paid into the association for registration amounts to about $1,000. I have gone carefully into the matter, and I submit a proof page of a form for the Record, which will do considerable towards reducing the cost. The sample submitted is in smaller type, and the form published has been shortened. The matter cut out is of no material value. Any experienced person wishing to ascertain the pedigree of any animal will trace back through the various volumes in any case, and to the inexperienced the shortened form will convey as much information as the more extended. The matter contained on the sample proof occupied two and a quarter pages in the volume of the Record. The rate charged for the old form was 90c. per page, while for the shortened form the rate per page would be $1.35. There were 824 pages in Vol. IX. and this in the shortened form would occupy about 435 pages, making the cost of the volume $587.25. The cost of the old volume, without binding, was $741.60. This would make a saving of $154.35.

While taking up the matter of the Record, it might be well to consider the advisability of publishing more frequently than is done at present. Why can the Record not be published quarterly as well as yearly? It would be an advantage to have all pedigrees published as soon as recorded. If this plan were adopted the pedigrees recorded during January, February and March could be printed and in the hands of the breeders by the middle of April. The cost would be less than if issued once each year, as a heavy Manilla cover would answer all purposes. All volumes left over at the end of the year could be bound in cloth, and any member wishing a bound copy could have same by returning his quarterly copies and paying cost of binding—about 25 cents. I would suggest that if this plan is followed a thousand copies be issued and four or five pages of advertising be inserted in each quarterly volume. This would reduce the cost of printing the Record very materially. The extra volumes I would suggest should be sent free to all agricultural experimenal stations, to agricultural papers in Canada and the United States, and perhaps in England, to be used as reference books. I believe the amount of money to be saved in this way is worthy of your consideration.

Grant to Winnipeg and Brandon Fairs. During the past years the sum of $100 has been granted to the fairs at Winnipeg and Brandon. The policy of the association has been to return as prizes the amount received as registration fees from Western breeders. With this in view, the amount could safely be increased to $125. If this were divided so as to offer about $85 at Winnipeg and $40 at Brandon I believe it would be satisfactory to all interested. These prizes should be donated directly to the fairs by the association.

Feeding Experiments. I also wish to bring to your attention a feeding experiment proposed by the Live Stock Commissioner. The experiment would be conducted with 50 pigs of each of the following breeds:—Berkshires, Yorkshires, Tamworths, Chester Whites, Poland Chinas, Duroc Jerseys and Essex, 25 of each lot of pigs to be fed from birth on the same kind of food. When these are ready to market one-half would be sent to Ingersoll and the other half to Toronto, to be reported on as fresh pork, cooked pork and Wiltshire sides. The experiments would be conducted under the management of the association, but no expense would be incurred. It would be necessary to make arrangements to procure these pigs and to have them fed, then, when

ready for shipment, to make arrangements with the packers and the breeders for a full and intelligent report.

Provincial Winter Fair. The Provincial Winter Fair of 1899 was notable in that so many persons from outside points were in attendance, while the local attendance was very small, the gate receipts being about $300 less than usual. There were 93 entries in the beef cattle department, 308 in the sheep, 303 in the swine, 53 in the dairy and 87 in the dressed poultry department. There were donations of special prizes by manufacturing firms, adding to the prize list the value of about $1,200.

All the lecturers appointed to attend farmers' institute meetings during the season of 1899-1900 were in attendance, and received instruction which they carried away for the benefit of those they addressed during the months following.

In conducting the work of the show, the aim should be to offer prizes so that the exhibits may be of the greatest educational value. The dressed poultry was a very important feature of the show, and the lectures and the object lessons in this department were especially practical. This department should be conducted with as great energy as possible. In order that the full benefit may be received from the dressed carcase competition, efforts should be made that all interested may be able to connect in their minds the dressed carcase with the live animal. It is the live animal that is dealt with by the breeders and feeders, and to be of benefit it is not sufficient that they know that a certain carcase is a good or bad one. What is required is that they may be able to tell by the appearance of the live animal whether or not when made into a dressed carcase it will fulfil certain requirements.

Arrangements should be made so that the reports of all the different departments of the show be as detailed and practical as possible for publication. The department of agriculture is this year issuing 22,000 copies of the Live Stock report, and a copy will be mailed to each member of the Cattle, Sheep and Swine Breeders' Associations, and to each member of a farmers' institute. But 3,000 copies were issued of the report of 1898-99. All that a great many public men, farmers and even breeders know of the work being done by these associations is that by what is printed in the report and elsewhere, and the money is well spent in making our reports of as great practical value as possible and seeing that everything of value is reported. We should not be satisfied with doing good work, but should bring that work to the notice of the public generally.

It has often been suggested that as the show is held for educational purposes no admission should be charged. While this principle may be correct, the adoption of it might mean that the show would be overrun with an undesirable element with no way of checking it. It would be well to consider, however, if it would not be desirable to allow free admission to members of the Dominion Cattle, Sheep and Swine Breeders' Associations, and also to all members of any farmers' institute that has paid the sum of $5 into the funds of the associations. That is, any farmers' institute may pay the sum of $5 into the funds of the associations and entitle the members of that farmers' institute to free admission to the show.

Conclusion: The general policy and plan of work of the associations has been such as to enable them to make remarkable progress, and this should command them for our guidance in future years. During later years the good work done by the associations in years previous has been very noticeable. They have year by year been acquiring more influence. The excellent management and foresight of those who assisted and were instrumental in organizing the associations are marked factors in the success being met with by the associations to-day. A number of these are still actively interested in the work of the associations, and the work now being done will be much benefited by their long and practical experience. I ask of these, and of you all, your hearty co-operation and assistance in carrying on and advancing the important work of these associations that they may be of ultimate benefit to the live stock industry of this country.

A. P. WESTERVELT,
Secretary.

PRESENTATIONS TO MR. F. W. HODSON.

Mr. JOHN I. HOBSON, on behalf of the Associations, read the following address to Mr. F. W. Hodson, the retiring Secretary:

DEAR SIR,—Interested as we are in your personal welfare, and desirous that the whole Dominion shall have the benefit of your superior talent for organization and administration, we rejoice at your promotion to a wider sphere of usefulness. We desire to take advantage of the present opportunity to give expression to our appreciation of your work in the different Provincial departments in which you have labored. The excellent results of your work as Secretary of the Dominion Cattle, Sheep and Swine Breeders' Associations, and as Superintendent of Farmers' Institutes for Ontario are too well known to require special mention. It is only eleven years since the first of these associations was formed, and at that time you were appointed Secretary and Managing Director. It was through your efforts that these organizations were effected, and their present usefulness and popularity are largely due to your unceasing work.

Your efforts have not been confined simply to the duties of your office. You have been constantly on the lookout to advance our interests whenever practicable. The freight rates previously charged for the transportation of pure-bred stock have been very much reduced, and the facilities for advertising such stock for sale have been very materially improved, and hopes are entertained that still more will yet be accomplished in this direction.

We regard your pioneer work in the different departments in which you have labored as a pronounced success, and we have no doubt that in the wider field before you, where you will find greater scope for your talents, and with the experience you have already gained, your resourcefulness will find ways and means to assist very materially in advancing our interests by promoting the live stock trade and improving the quality of the live stock of this country.

While we regret your separation from the Associations with which you have been so actively connected, we wish you and your estimable wife and family every success in your new home and your new work, and beg you to accept this cabinet as a slight token of esteem from your many friends and co-workers.

Dominion Cattle Breeders' Association.
JOHN I. HOBSON, President. A. P. WESTERVELT, Secretary.
Dominion Shorthorn Breeders' Association.
JAMES RUSSELL, President. HENRY WADE, Secretary.
Dominion Sheep Breeders' Association.
D. G. HANMER, President. A. P. WESTERVELT, Secretary.
Dominion Swine Breeders' Association.
GEORGE GREEN, President. A. P. WESTERVELT, Secretary.
Holstein-Friesian Association of Canada.
W. G. ELLIS, President. G. W. CLEMONS, Secretary.
Dominion Ayrshire Breeders' Association.
ROBERT NESS, President. HENRY WADE, Secretary.
Hereford Breeders' Association.
H. D. SMITH, President. HENRY WADE, Secretary.

The following address and presentation was also made by friends and colleagues of Mr. Hodson:

DEAR SIR,—On the eve of your vacating the offices of Superintendent of Farmers' Institutes for Ontario and Secretary of the Cattle, Sheep and Swine Breeder's Association your personal friends and colleagues desire to express their great pleasure at the recognition of your ability by your appointment to the office of Dominion Live Stock Commissioner. From what we know of your excellent qualities of head and heart, which become more manifest with closer acquaintance, we look for great success in your newly chosen field of labour.

In many lines of work in which we have been associated and in which we have had a common interest, patient and respectful consideration of the views of one another has

been a matter of first necessity. We appreciate the confidence that you have at all times manifested in those who have been associated with you in your work. Our aims have been the same, the advancement of the agricultural interests of the Province, and the progress made gives us no little pleasure. You will now have a wider field of labour, and still greater opportunities for usefulness, and if a knowledge of the interest of your many friends in you and your work will be an incentive to duty, rest assured that we shall follow your course very closely, and look with delight and perhaps with some pride upon your advancement.

Kindly accept this clock as some slight indication of our respect for yourself and family.

Signed by a few of your many friends.

John Kelly,
Jas. Tolton,
Albin Rawlings,
John Jackson,
J. W. Wheaton,
Henry Arkell,
Arthur Johnston,
Wm. C. Edwards,
Wm. Rennie,
A. C. Hallman,
John D. Howden,
J. E. Brethour,
Wm. Linton,
D. G. Hanmer & Sons,
Simpson Rennie,
R. H. Harding,
W. S. Fraser,
Jas. I. Davidson,
G. B. Hood,
A. F. Maclaren,
Henry Glendenning,
A. P. Westervelt,
Andrew Elliott,
Henry Arkell,
G. E Day,
Alex. W. Smith,
John Bell,
John I. Hobson,
Jas. Mills,
T. E Robson,
C. A Zavitz,
G. W. Clemons,
A. E. Shuttleworth,
Geo. Green,
H. Wade,
J. M. Duff,
C. C. James,
H. H. Dean,
Oswald Sorby,
W. E. H. Massey,
Wm. Smith,
Douglas Sorby,
J. B Reynolds,
J. Hugo Reed,
O. W. Yapp,
H. A. Foulds,
Fred. Westbrook,
Thos Orr,
R. Gibson,
John Davidson.

Reply by Mr. Hodson.

Mr. Hodson made a very appropriate reply, a condensed report of which follows :

Gentlemen and Co-workers in the advancement of Canadian Agriculture,—It is hard for me to express the feelings of gratitude that I have to-day. The kind words you have uttered will long live in my memory, and the beautiful and useful gifts which you have presented to me will be kept and valued by myself and my children as long as we live.

To all of us this will be a most memorable occasion ; it is the first time that the breeders of all classes of pure bred stock have joined together as one for the accomplishment of a purpose. Let us hope that this is the beginning of a better and more prosperous era.

Within the last five years co-operation has brought many benefits to the Canadian breeders of fine stock. Great advances have been made in our Association life, but greater heights are yet to be attained. Our Associations are to-day but in their infancy. Your officers and directors must be wisely aggressive, and all that they do must be done with a view of doing "the greatest good to the greatest number of the Canadian people."

We should do everything in our power to advance the interests of the legitimate importer and breeder of pure-bred live stock. The importance of the work done by these men is not recognized or valued by the Canadian people as it should be, and not even by our farmers or our rulers. On the success of the importers and breeders of live stock depends the success of our nation. It makes a great difference to Canada whether our cattle, when sold alive by the farmer, average two cents per pound or five cents per pound. Yet there is often more than this difference in price between a well-bred, well-fed bullock, sheep or pig and a poorly-bred, poorly-fed one, nor is this the only difference. It costs at least one per cent. pound less to produce flesh when food is fed to a well-bred animal than when fed to a scrub of whatever sort. The difference is even greater in the case of dairy animals. The annual average milk product from a scrub herd will not exceed 2,400 lbs. per cow. The annual average milk product from a well-bred, well-fed herd will be at least 6,500 lbs. per cow, and in some cases has even reached 10,000 lbs. per cow.

Another great advantage in feeding well-bred stock is that there is always an active demand for the best of every kind, while no one wants the scrub ; he is difficult to sell at any price and he hurts the market wherever he goes. He and his owners are always more or less poverty stricken beggars.

The best class of stock cannot be produced by Canadian farmers without the aid of the breeders of pure-bred live stock, men whose life work is to produce good males for breeding purposes. These animals must be bought and used by every farmer before Canadian agriculture will be as profitable as it should be. These facts shoud be impressed on our law makers and rulers and on farmers everywhere. The life work of such men as John Miller, A. Johnston, Hon. John Dryden, John Jackson, Jas. Tolton, D. G. Hanmer, Graham Bros , D. & O. Sorby, and many others have added millions annually to the wealth of the nation. Yet, individually, these men have not made as much money as their enterprise deserved. These facts cannot be brought too often or too urgently to the attention of the Canadian people or Government. It is in the interest of all Canada that everything be done that can be done to advance the interests of our live stock man.

The union between the live stock breeders should grow closer and more far-reaching, and should embrace all breeds of horses, cattle, sheep and swine. Each Horse and Cattle Breeders' Association should take steps whereby each individual member should be a recognized member of the Horse or Cattle Breeders' Association, as the case may be, and and enjoy all the privileges of such membership without having to pay an additional fee. This is a very important and necessary step that should be considered by every separate association. The closer and more complete the union among the stock men the more power will they as a class have with the Government of the day and with the great railway organizations.

A great and important work remains yet to be done in extending the market at home and abroad, in reducing transportation rates, and in improving the Live Stock Associations, Farmers' Institutes and agricultural fairs, in making each of these institutions of more educational value.

A serious fact which you should consider is that the average quality of Ontario horses, cattle and sheep are not as good as they were twenty years ago. Why is this? One reason, and an important one, is that Canadian farmers are not tenacious enough nor persistent enough. Let me illustrate. A farmer will buy a Cotswold ram and perhaps a ewe or two, and will call himself a Cotswold breeder for a period. Some other breed will become popular, we will say Shropshires. He will float out with the tide and buy a Shropshire ram and produce some very good cross breeds, and he will be loud in the praise of Shropshires. Soon, however, the early lambs produced by the Dorset Horn breeder will attract his attention ; he will as likely as not forsake the Shropshires and breed Dorset Horns for a time, yet never owning any one sort long enough to make any profit for himself or to do the country any good. It is not difficult, even among the Canadian lovers of improved live stock to find men who have at one time or another bred Leicesters, Cotswolds, Lincolns, Shropshires, Hampshires and Southdowns. The production of horses, cattle and swine in Canada, in fact, all over America has suffered from the same cause.

The great herds, flocks and studs of Britain were brought into existence and maintained by persistent effort over a long-continued period. There, a founder of a flock or herd, his son and grandson may be found continuing in the same line of work, not only breeding the same breed, but breeding for the same type. It was by long-continued effort that Bakewell established the Leicesters, and that Collings, Bates, Booth, McCombie, Cruickshanks and others established their great herds and have influenced and benefited the beef products of the world. Not only is it necessary to choose a suitable breed and stick to it, but it is also imperative that each breeder select a type and bend all his energies to produce animals of that type. So careful are British breeders in this respect that flocks can be found where no females have been bought and kept on the farm for fifty years, and the greatest care has been taken in selecting sires to know that they are of the same type and so bred that they are likely to produce the same type or overcome some weakness in the buyer's flock. This is why English-bred animals are so impressive.

We can produce as good animals in Canada as they can in England, perhaps better, but in order to do so we must cease vacillating and adopt the substantial British system of breeding.

There are other reasons for the degeneration of Ontario's live stock, but I believe the reason I have given is one of the principal causes, if not the chief.

For some time past there have been yearly complaints regarding dishonest practices at exhibitions. That fraud is practised is true, that it is doing incalculable harm is also true. This is a difficult question to handle, but it is one that these Associations must face. My advice is to handle it honestly and fearlessly, and in such a way as to effectually stamp out roguery and misrepresentation.

In your new managing director you have a man in every way worthy. Give him your loyal support and a free hand. Surround him by capable advisers who are honest, fearless and not self-seekers, and who will advise without being imperious. Stand by him and see him through all difficulties.

To my successors, and to all public servants I would say, let your motto be "The greatest good to the greatest number." Show partiality to no one. Serve no party, no sect, set or faction. You will find men true and loyal who will stand by you through thick and thin; others you will find who will never stand by you or anyone else. Do not let the acts or words of such persons discourage you or affect you in the least. Never retaliate, use them as you use all others; do your duty from day to day without fear or favor, and without self-seeking, being sure of this, that as you sow so shall you reap. For myself, what I advise others I will earnestly try to follow.

Mr. A. McNeil, Windsor: It does appear to me that in the very kind address of Mr. Hodson, there is no word with reference to his grand work in connection with the Farmer's Institutes. To-night is perhaps the first opportunity that we have had to unite, so that we could talk together over this matter. It would be a favorable opportunity for some of those who have been longest connected with that work to express their appreciation. It will have to be done in this in this informal manner, because we never had an opportunity of framing it into shape. I would like to bear testimony to most remarkable work that has been done in that line up to the present time. Mr. Hodson's wonderful facility in organization has had every scope in this work, and work has been done in a few years that we had no reason to expect. The work that has been done by his wonderful efforts in organization has simply been complementary to the Live Stock Associations, and much of the work done in these Associations would have fallen had it not been for the work of the Superintendent of Farmers' Institutes. The skill he has in placing his hand on the proper source of action throughout the Province has multiplied the work to a great degree. I am sure his energy and work in this line has been a constant source of marvel to me. I cannot adequately express my appreciation of it on the spur of the moment, but I think there are others here who would have do much better than I have done, but I would not like to let this opportunity pass without expressing my feelings and the feelings I know prevail in the breast of every Institute worker here to night

Mr. Henry Wade: I can only second what has been said, and said so well, by Mr. McNeil in regard to the manner in which Mr. Hodson has worked up this Farmers' Institute system. He certainly has been a marvel in the manner in which he has grasped the organization and got other people to work everywhere, and the enthusiasm he has put into them and their work, and I think it is much better to be able to do that than to have to do the work yourself. Mr. Hodson has the faculty, more than any man I know, of making other people do work for him; and when we reflect that he is going to a larger sphere of action where we can derive more benefit from his work, we should be delighted to know that they have the right man in the right place.

Mr. J. S. Woodward: I have had the honor to be connected with this work for a long time. I had the honor of organizing it in New York State against great opposition, carrying it on there till my health gave out. Since then I have had the honor to be connected with Institute work in various other states, and I must say that I have been in no place where so much work is accomplished with the same amount of expense, and with better results, as is done in the Province of Ontario, and I attribute this very largely to the thorough organization and selection of workers by Mr. Hodson.

Major James Sheppard: I cannot claim any connection with the Live Stock Associations, but I would like to say a word with regard to the fruit industry. I know the fruit industry owes Mr. Hodson, as Superintendent of Farmers' Institutes, a very great

Mr. F. W. Hodson.

debt. He has taken just as much interest in their matters as he has in connection with his own work. Whenever the fruit growers have asked to have a man put upon institute work, that they thought would do good, Mr. Hodson has always turned a willing ear to it, and has picked out a man that he thought would do the most good. There is another organization that I would like to say word in favor of, that is the Good Roads Association. They are holding a meeting in the city of Toronto tonight. That Association undertook to send men on the road to talk this subject. We got every sympathy from Mr. Hodson, and everything was done for us that could possibly be done because he realized the importance of the subject and its benefits. I bear testimony as one of the executive of that Association, to the assistance we have had from the Superintendent of Farmers' Institutes, and I think we owe him a great debt of gratitude for the aid he has given to the Good Roads Association.

Hon. John McMillan, M.P.: Mr. Chairman, since my name has been called, I will say that since the Farmers' Institutes were organized in Ontario I have been out every season except two, and since Mr. Hodson took hold of the Institute work he has done everything in his power to make it a complete and thorough success. He has done everything in his power to extend them, and I am happy to say that he has been the cause of bringing the Farmers' Institutes to the condition they are in at the present time. I have not the honor of belonging to any of the breeders' associations, but I do say this, that I believe the live stock interests in Ontario owes more to Mr. Hodson than to any other man in the Province to-day. (Applause.) I hope that in the new field to which he is going that he will be as successful as he has been here.

F. W. HODSON, DOMINION LIVE STOCK COMMISSIONER.

The subject of this sketch was born in October, 1856, on the farm of his father, in the township of West Whitby. He was the son of a very refined mother, to whose careful training in his youthful days he owes much of his success in life.

When old enough he was sent to the nearest public school, where he pursued his studies until he reached his thirteenth year. Then he was summoned to remain at home and take his share of farm work. He not only accepted the situation without a murmur, but threw himself into the work with such enthusiasm that he accomplished as much as could have been expected from a mature farm hand, and soon mastered all the various details of farming.

Early in 1880 the late Wm. Weld, proprietor of the *Farmer's Advocate*, engaged Mr. Hodson as associate editor of his paper. There he remained for one year, at the expiration of which time he was given control of the editorial department. But the confinement of an office proved too much for one so much of whose life had hitherto been spent on a farm, and at the expiration of two years he had to resign his position.

On returning to the farm, he assumed full control of it. By adopting systematic methods of farming and breeding, he soon got the farm on a paying basis, and acquired a high reputation as a successful farmer.

In 1887 he was again offered a position on the staff of the *Farmers' Advocate*, and, his health being greatly improved, he accepted the offer. He at once threw himself into the work with his usual energy, and the result was seen in the increased business done by the paper. The establishment of the Manitoba edition of the *Farmers' Advocate*, and many other improvements, were carried out under his advice during the seven years that elapsed before ill-health compelled him once more to lay down the editorial pen.

Mr. Hodson's far seeing eye foresaw the important benefits to be derived by breeders from co-operation, and in 1889, in connection with a number of prominent breeders, he organized the Dominion Sheep Breeders' Association. He induced the swine breeders to follow suit the next year, he himself acting as secretary of both associations. Next, Mr. Hodson turned his attention to the Cattle Breeders' Association, which was then in an unsatisfactory condition. Being appointed secretary of this association also, he soon put things on a different footing.

Among the many notable benefits to farmers and breeders brought about by these live stock organizations there is one that stands out pre-eminent. Years ago Mr. Hodson pointed out the benefits that would accrue to live stock breeders if the railway companies would carry pure-bred stock at half rates. In spite of many discouragements he stuck resolutely to his purpose, and his pertinacity has, at last, been successful in causing the railroad companies to accede to this request. Now all recorded pure-bred cattle, sheep and swine are carried at half rates between all points east of Fort William, and carload lots are carried at reduced rates between points in Ontario and places west of Fort William, to the advantage of breeders in Eastern Canada and of settlers in the far West.

Then, again, there has been the wonderful development, under Mr. Hodson's influence, of the Provincial Winter Show, which has reached proportions undreamt of years ago.

In the early stages of the Farmers' Institutes the work was carried on by professors from the Ontario Agricultural College, Guelph. With the ever-increasing growth, however, of the Institutes, it became necessary to appoint a superintendent, who could devote his whole time to the organizing and developing of the work. Mr. Dryden could find no one better fitted for the post than Mr. Hodson, and well has he justified the Minister's selection. The work has grown from year to year under his care until the membership has now reached the splendid total of nearly 17,000, and 3,133 addresses were delivered to audiences who totalled up 119,402 during last season. Not only this, but Mr. Hodson has succeeded in imparting much of his own enthusiasm to the officers and members of the various Institutes.

The new Live Stock Commissioner has a great fund of energy, and he, in no wise, spares himself. He is an excellent organizer and a good executive head He has a wonderful talent for studying human nature, discovering the proper men for his work, and then utilizing their energies in carry out his plans Hence, in a large measure, has resulted the great success which has attended his work throughout. (G. DEW. GREEN.)

FIFTH ANNUAL REPORT

OF THE

DOMINION CATTLE BREEDERS' ASSOCIATION.

ANNUAL MEETING.

The annual meeting of the Dominion Cattle Breeders' Association was held in the Farmers' Pavilion, Western Fair Grounds, London, on the evening of December 11th, 1899, the President, Mr. John I. Hobson, in the chair.

Officers for 1900.

After the address of the President, the following Officers and Directors were elected :

President	Richard Gibson, Delaware.
Vice-President	Arthur Johnston, Greenwood.
Secretary-Treasurer	A. P. Westervelt, Toronto.
Vice-Presidents (representing the different Provinces) :	
Ontario	H. Wade, Toronto.
Manitoba	Hon. Thos Greenway, Crystal City.
Northwest Territories	C. W. Peterson, Calgary, Alta.
Quebec	H. D. Smith, Compton, Que.
Nova Scotia	C. A. Archibald, Truro, N.S,
New Brunswick	T. A. Peters, Fredericton, N.B.
British Columbia	J. H. Ladner, Ladner's Landing, B.C.
Prince Edward Island	Senator D. Ferguson, Charlottetown.
Newfoundland	Hon. Thos. C. Duder, St. John's.
Directors :	
Shorthorns	John I. Hobson, Guelph.
Herefords	W. Macdonald, Toronto.
Polled Angus	Jas. Bowman, Guelph.
Galloways	D. McCrae, Guelph.
Ayrshires	D. Drummond, Myrtle.
Holsteins	G. W. Clemons, St. George.
Jerseys and Guernseys	W. E. H. Massey, Coleman.
Ontario Agricultural College	Prof. G. E. Day, Guelph.
General Director	A. W. Smith, Maple Lodge.
Auditor	J. M. Duff, Guelph.
Delegates to Fair Boards :	
Toronto Industrial	Prof. G. E. Day, Guelph, and J. M. Gardhouse, Highfield.
Ottawa	J. G. Clark, Ottawa, and F. W. Hodson, Ottawa.
London	R. Gibson, Delaware, and T. E. Robson, Ilderton.
Brantford	G. W. Clemons, St. George, and J. R. Alexander, Brantford.

Messrs. R. Gibson, D. McCrae and John I. Hobson were appointed a committee to report on fraudulent practices at exhibitions.

Mr. F. W. Hodson was made a life member of this Association.

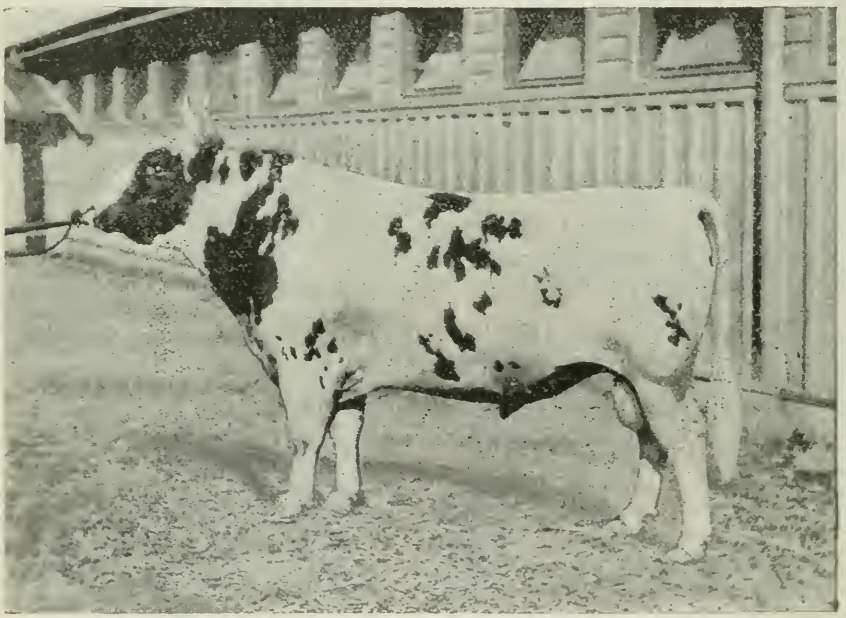
THE MODEL DAIRY COW.

By J. S. Woodward, Lockport, N.Y.

All our domestic animals of to-day are very artificial, and the farther they have been changed from the original type the more valuable they have become. Coming, as they doubtless did, from a common ancestry, breeds have been made to differ very widely from each other, so much so in the bovine as to make one almost doubt them of one race.

Bovines may be divided into four great classes,—runners, fighters, beef and dairy. As an illustration of each instance, the Texan as a runner, the Buffalo as a fighter, the Shorthorn as a beef, and the Jersey as a dairy type, and each is formed just as could be expected by the life they have lived for long generations.

But suffice it for this occasion to consider the beef and dairy divisions. These differ very widely in form, and full as much so in temperament. All the families of the beef type are very like in form and temperament. In form they are blocky and massive, with wide loins, large quarters, and a tendency to lay fat on the body under a thick skin. In temperament they are lymphatic. They are quiet, good natured, slow motioned and not easily excited or disturbed, and like men of this temperament, with half a chance they are always fat and happy.



The famous prize winning Ayrshire Bull, Kelso Boy, bred by D. Drummond, and now at the head of his herd.

Dairy breeds, on the contrary, are lank in form and of a nervous, sanguine temperament, nervous, excitable, quick motioned, and disturbed by everything strange. The famous Jersey cow, Ida Marigold, when her owner was trying to get an official test, would shrink several pounds in yield, and more than one per cent. in quality, just by having a stranger, the official tester, present when she was being milked, and the only way it was possible to get a fair test was for the official to come and care for her until she had become used to having him about. The animal of a beef type cannot be a superior dairy cow, as she is not "built that way," neither can a model dairy cow be a profitable beef producer. No matter to what breed they belong, all *A. No. 1* dairy cows will be found to be very like both in form and temperament. So markedly is this true, that there are certain points so sure to appear, that by knowing what they are and closely observing them we can be reasonably sure of selecting a good cow. These developments or points of excellence, in any breed do not come by chance or caprice, but the result o

a high degree of skill in feeding, and intelligence and ability in selecting those animals showing the greatest production, and in all dairy breeds certain modifications of form have been found in the best animals, and they are wonderfully alike in all.

We do not know just how the food eaten is converted into milk. We have an account of a man whose abode was once inside of a whale, and the whale is a milk producer, but this man seemed much more intent on making the whale sick, so as to cast him out, than in studying milk production, but no account is recorded of a man having been inside the cow, so we find the method of the metamorphosis of food into milk still in the dark. Though we do not know how it is done, we do know that milk is in some way evolved from the food eaten by the cows. Hence the cow's ability to make milk depends largely upon her ability to eat, digest and assimilate food. It is a notable fact that the dairy cow, in a remarkable degree excels in the power to eat food and convert it into that which is suitable for man's sustenance As an instance, Princess Wayne No. 954 H.H.B., with a mature weighs of 1370 pounds, in twelve years from the time she dropped her first calf at two years old, gave 186,866⅛ pounds of milk, and produced 11 living calves. This was an average of 15,572 pounds yearly, or 11 2-5 times her own weight. In her best year she gave 29,008 11-16 pounds, or 21¼ times her own weight. Dr. Atwater says that fresh milk has a food value equal to 23.8 per cent. of bone-free

A group of famous Holstein Dairy Cows, the property of A. & G. Rice, Currie's Crossing, Ont. Shown at the Ontario Provincial Fat Stock, Dairy and Poultry Show, 1898.

flesh, or carcass from which all bone has been extracted. Now if this be true, and no one has ever challenged it, then this cow digested food and turned it into a form equal to 3,706 pounds of bone-free meat each year, and in her best year equal to 6,904 pounds, or over five times her own weight. But if the truth of this is questioned, we know that milk contains about 12½ per cent. of solids, so she must have yielded on an average 1,946, and in her best year over 3,625 of milk solids Again Prof. Brooks in the Ayrshire Breeders' meeting in 1891, told of a little Ayrshire cow, weighing less than 1,000 pounds, that gave 1,500 pounds of milk in one month, and over 15,000 pounds of milk in one year, which would be equal to 457 pounds in 30 days, or 15 pounds per day, or 187 pounds of milk solids, or over three pounds of milk solids per day. In the dairy division of this show you will find a cow, Aaltje Posch 4th, giving over 74 pounds of milk in one day, containing over 9 pounds of milk solids and equal to 18.6 pounds of bone-free flesh, or about 36 pounds of carcass, or about 50 pounds live weight per day. Pray tell me where a beef animal ever did one-tenth of this? If these figures are not satisfactory try another basis of comparison. Prof. Henry in his work "*Feeds and Feeding*," says a beef animal should make three pounds of beef on the same food on which a cow makes one pound of butter. Now this cow gave 74 pounds of milk, containing 4.8 per cent. of fat, or 3.55 pounds of butter fat, equal to 4.25 pounds of butter. So a beef animal should make 12.75 beef or over 18 pounds of gain, live weight, to equal this cow's production.

Is there a beef animal in the show that under the adverse conditions has made a pound of gain? To be able to produce such an amount of milk the cow must have great storage capacity and ability to gather, eat and digest a large amount of food. She must have a highly nervous, sanguine temperament, which means that she must have a large amount of blood with a very rapid circulation. Her brain must be large and active, hair fine and silky, skin soft, velvety, and yielding to the touch; her secretions must be abundant and yellow, particularly inside the ears and about the udder.

If we begin at the head to describe the dairy cow, we want her wide between the horns, with horns rather small and tapering, and would prefer them to turn slightly inward and upward. The eyes should be large, bright, prominent and wide apart; face a little dished with a broad nose, large nostrils and very wide capacious mouth; this is the "entry port for the whole system. Her jaws should be large and muscular, as they will have a large amount of work to perform in eating so much food. In short this end of our model cow is the important end, and should show the ability to gather and ruminate an abundance of food to furnish the material from which to elaborate so much milk.

Nellie Osborne 2nd, Sweepstake Ayrshire Heifer; bred by D. Drummond and sold to Mr. Wylie at public auction when one year old for $425.

Her neck should be long and slim; in fact, a regular even neck comes very near the model. A large chest wide and well down will be needed to contain a large, well developed set of lungs, as she needs to have her blood kept pure and well filled with the red corpuscles and kept in rapid circulation. Her back should be long with the vertebrae well apart so that the ends of the fingers can be dropped well down between them. If she is a little hollow backed it will be all the more desirable. Her abdomen should be very large, so large that when standing squarely behind her you can scarcely see her chest or fore shoulders. It is very necessary that this should be large, because it is her *store house* or *hay mow* into which her food is first to be put and mixed together and soaked preparatory to being eaten. She should be wide and high in the pelvic arch so as to render parturition safe and easy. Her tail should be long and slim, with the breast down to or below the gambrel joint. The thighs should be slim and stand well apart, bow-legged, so as to give ample room for large capacious udder. This is a very important organ in the model cow. It is the laboratory in which the milk is in some way evolved from the blood. There are many styles of udders, and each in turn has been the fashionable one, but one fully filling the space between wide and open thighs and extending well up behind and well out in front of the legs is much to be desired. I do not like a low down swinging udder; it betokens a weakness of constitution, and is liable to be injured

by the legs in walking and to get soiled when going in dirty places. It is much better to have it held up with good, strong udder cords. When the udder is milked out it should be soft and flabby, and feel a good deal like a sack partially filled with soft flabby cotton. A flesh hard udder is a poor indication, and to be avoided. The teats should not be too large, but of a size large enough to be easily grasped by the hand when milking, and they should be set well apart on the udder. What I despise most is a cow with teats so small and close together that they can be milked only with the thumb and one finger.

The milk veins are also of great importance and should be well developed. The larger and more tortuous and more branched they are the better. It is a fine indication to have one branch run up well between the fore legs. The opening where these milk veins enter the abdomen—*milk wells*—should also be large; if so large that the end of fingers can be run well into them so much the better. I do not place too much reliance on the escutcheon or milk mirror, though I do like to see a well defined one, running well up and broad with soft fine hair. The legs should be slender, with solid bones, and not too long. I like the cow to be pretty low down so as to easy reach the ground for feeding. In the shoulders, just on the point in front, there should be found a depression, or "pit," and the larger these the better the indication, even if the ends of the four fingers can be placed in them as far as the second joint. Similar "pits" can be found just on the inside near front angle. These, with open vertebra and long slender tail all indicate an open or loose organization, favorable indication of the cow's ability to convert food into milk. The more open and loose the better. I would again urge the importance of a capacious abdomen or stomach for the model dairy cow. The fact should not be lost sight of that this is her *store room*, into which her food is taken to be comingled or mixed and soaked ready for eating. When we say the cow eats, she is not eating at all, but merely gathering food ready to be eaten, and were she to stop here she would starve, even with this stomach full of food. But when she has what she considers sufficient for a good square meal she gets into some quiet corner and commences to eat, *chewing the cud.* Rumination is really eating, so no matter whether we give her food two or three times a day she really eats nearly all the time. Hence the great importance of an ample store room or abdomen.

I have thus briefly tried to show that the cow stands alone in the ability to change the products of the farm into human food, and to point out a few indications by which to select a model dairy cow.

DIRECTORS' MEETING.

A joint meeting of the directors of the Dominion Cattle, Sheep and Swine Breeders' Association was held in the Live Stock Association Tent, Industrial Fair Grounds, Toronto, on Wednesday, September 6th, 1899, at 8 p. m. Mr. F. W. Hodson tendered his resignation as Secretary-Treasurer of the Dominion Cattle, Sheep and Swine Breeders' Associations and the Ontario Provincial Winter Fair, owing to his appointment as Dominion Live Stock Commissioner. The resignation was accepted upon motion of Mr. Jas. Tolton, seconded by Mr. J. E. Brethour.

It was moved by J. E. Brethour, seconded by G. E. Day, that in voting upon the appointment of a Secretary-Treasurer, this committee vote as a whole, owing to the importance of having but one Secretary-Treasurer for the three Associations. (Carried.)

It was moved by D. G. Hanmer, seconded by Andrew Elliott, that Mr. A. P. Westervelt be appointed Secretary-Treasurer of the Dominion Cattle, Sheep and Swine Breeders' Associations. (Carried unanimously.)

It was moved by Jas. Tolton, seconded by G. W. Clemons, that as the Provincial Winter Fair is managed by the Dominion Cattle, Sheep and Swine Breeders' Associations, the Secretary-Treasurer of these Associations hereafter be also Secretary-Treasurer of the Provincial Winter Fair. (Carried.)

ADJOURNED ANNUAL AND DIRECTORS' MEETING.

The adjourned annual and directors' meeting of the Dominion Cattle Breeders' Association convened at the Palmer House, Toronto, on March 29th, 1900, the President, Mr. Richard Gibson, in the chair.

The Secretary Treasurer's report was read, and on motion of Arthur Johnston, seconded by John A. McGillivray, it was resolved: That the report of the Secretary *re* annual sales be adopted, and that this Association regard with favor the proposition to hold public sales under the control of the Executive Officers of the Provincial Live Stock Associations; and that this Association hereby empowers its Executive Officers to take such steps and appoint such committees as may be necessary to the successful carrying out of said sales.

Moved by D. McCrae, seconded by A. W. Smith, that the part of the Secretary's report dealing with advertising lists of stocks for sale in the different Provinces and the United States be adopted. Carried.

After a brief discussion on the other clauses contained in the Secretary-Treasurer's report, it was moved by Henry Wade, seconded by Wm. Linton, and carried, that the whole report be adopted.

Moved by D. McCrae, seconded by John A. McGillivray, that we, the Dominion Cattle Breeders' Association, assembled, feel the sense of our great loss in the death of Mr. Walter Macdonald, and would suggest that a committee be appointed to draft a resolution of condolence and forward same to his widow. Carried. The following gentlemen were nominated by the President to compose the Committee: Messrs McCrae, Smith and Johnston.

Mr. Alfred Stone was appointed director in place of the late Mr. Macdonald on motion of John I. Hobson, seconded by Arthur Johnston.

Moved by John I. Hobson, seconded by Wm. Linton, that Mr. F. W. Hodson, Dominion Commissioner of Live Stock, be elected a life member on the Directorate of the Dominion Cattle Breeders' Association. Carried.

It was moved by John A. McGillivray, seconded by F. W. Hodson, that the Secretary, Mr. A. P. Westervelt, be congratulated on his able initial report, and that he receive an increase in salary from $150 to $200 per annum. Carried unanimously.

Permanent Location of Provincial Winter Show.

Deputations were received from the cities of Guelph and Brantford, asking the influence of the Dominion Cattle Breeders' Association to permanently locate the Provincial Winter Show at their respective places.

Mr. J. A. McGillivray moved, seconded by Wm. Linton, that the Provincial Winter Show be permanently located in Guelph.

Moved, in amendment, by J. E. Brethour, seconded by J. M. Shuttleworth, that the permanent location for the Provincial Winter Show should be Brantford.

The following gentlemen addressed the meeting from the city of Guelph: J. M. Duff, Alderman Barber, A. F. H. Jones, and Mayor Nelson.

The representatives from the city of Brantford who addressed the meeting were: R. Henry, Alderman Whiteham, Mr. Brooks, and Mayor Elliott.

After the claims of the gentlemen representing the two cities had been brought prominently before the directors, a ballot was taken, resulting in favor of Guelph; and the Secretary was authorized to cast a ballot for the Cattle Breeders' Association in favor of Guelph as the permanent location of the Provincial Winter Show, on their providing the necessary accommodation to the satisfaction of the Winter Fair Committee.

Prize List Cattle Department, Including Prizes for Dressed Carcases.

It was moved by D. McCrae, seconded by Prof. Day, that the matter of the prize list and rules in the Cattle and Dairy Department be left in the hands of the Executive Committee. Carried.

On motion of John I. Hobson, seconded by Prof. Day, it was resolved that the following names be added to the Executive Committee, in addition to the President, Vice-President and Secretary; Mr. John I. Hobson, G. W. Clemons, John A. McGillivray and Prof. Day.

Judges —Cattle Department.

Mr. Alex. Smith moved, seconded by D. McCrae, that Mr. John Gibson and Thos. Crawford, M.P.P., be the judges on live stock in the beef cattle department, and that Mr. Robert Miller and Mr. W. B. Watt be first and second reserve judges, respectively. Carried.

It was resolved that the selection of judges for dressed carcasses in the cattle department, be left in the hands of the Executive Committee.

Delegates to the Provincial Winter Fair.

John I. Hobson, Guelph; Arthur Johnston, Greenwood; G. W. Clemons, St. George.

Affiliation of Other Cattle Breeders' Associations.

The following resolution, passed at the annual meeting of the Dominion Shorthorn Breeders' Association, was read by the Secretary: "That the Dominion Shorthorn Breeders' Association make all their members, members of the Dominion Cattle Breeders' Association at a small fee per member, such fee to be decided upon by the Executive Committee Carried." Similar motions were passed by the Ayrshire and Holstein Associations.

Moved by Arthur Johnston, seconded by Alex. Smith, that this Association accept the proposition made by the Shorthorn, Holstein and Ayrshire Breeders' Associations, and that we hereby instruct, and empower, our Executive Committee to amend our by-laws to meet the necessities of the case; and that other Cattle Breeders' Associations wishing to come in on similar conditions be allowed the same privileges. Carried.

FINANCIAL STATEMENT.

The following financial statements was made to the Department of Agriculture for the Province o Ontario for the year ending December 31st, 1899:

Receipts.

Members' fees	$ 113 00
Legislative grant	1,500 00
Refund G. T. R.	1 60
	$1,614 60

Expenditure.

Balance due Treasurer as per last report	$ 121 72
Grant to Fat Stock Show	1,138 44
Secretary's salary	150 00
Directors' fees and expenses	55 83
Expenses for conventions or regular meetings	5 00
Postage and stationery, $122.05; printing, $72 23	194 28
Cost of reporting	25 00
Miscellaneous—	
Typewriting and preparing annual report	110 04
F. W. Hodson testimonial	22 85
Caretaker, office	5 00
Auditor, 1898	5 00
Telephone, telegraph, express, etc	21 34
	$1,854 50
Balance due Treasurer	239 90

Richard Gibson, President.
A. P. Westervelt, Treasurer.

Examined and found correct, this 28th day of March, 1900. } J. M. Duff, Auditor.

MR. JOHN I. HOBSON.

Ex-President Dominion Cattle Breeders' Association.

Mr. Hobson is a son of one of the earliest settlers of Wellington county, his parents having taken up a farm at Mosboro, upon which he was born. Mr. Hobson has been a farmer, and a successful one too, up till three years ago, when he retired. His success is attributed in a very large measure to his great desire to excel, and intense fondness for his calling. Farming with Mr. Hobson, with all its hard work, was a positive pleasure. Of late years business outside of farming has grown very much on his hands and has occupied a great deal of time, and this, combined with the lamented loss of an only son who had assumed the management of the farm, led Mr. Hobson to retire.

Mr. Hobson was for ten years judge of the prize farms of Ontario, and these duties which he performed with great ability and acceptance, gave him an opportunity of studying farming in all its phases in this Agricultural Province. Mr. Hobson has also travelled extensively in the United States, in Manitoba, through the West, and out to the Coast, taking advantage of the opportunity thus afforded of visiting several ranches and observing the methods of doing business in force there. He has also spent a good deal of time in Great Britain.

In addition to being a practical and successful farmer, Mr. Hobson takes a live interest in insurance, and is President of a local company in Guelph, and of the Provincial Underwriters' Association.

The subject of this sketch has also taken an active part in municipal matters, retiring after filling the Warden's chair. Mr. Hobson has been chairman of the Ontario Agricultural College Board since its appointment. He is Vice-President of the Shorthorn Association, and a Director of the Sheep Breeders' Association, as well as being actively concerned in everything which advances the interests of the farmer. As President of the Fat Stock Show he contributed much towards its success.

MEMBERS OF THE DOMINION CATTLE BREEDERS' ASSOCIATION FOR 1900.

Name.	Address.	Class.
Alexander, J. R	Brantford, Ont	Ayrshires.
Barclay, L	Port Hope, Ont	Shorthorns.
Ballantyne, W. W	Stratford, Ont	Ayrshires.
Biggins, W. J	Clinton, Ont	Shorthorns.
Bright, John	Myrtle, Ont	Shorthorns.
Birdsall, F. & Son	Birdsall, Ont	Shorthorns.
Bow Park Co., Ltd	Brantford, Ont	
Bowman, Jas	Guelph, Ont	Polled Angus.
Bonnycastle, F. & Son	Campbellford, Ont	Shorthorns.
Brodie, G. A	Bethesda, Ont	Shorthorns.
Brooks, R. S	Brantford, Ont	Ayrshires.
Brown Ranche Co	Cardston, Alta	
Butler, Wm. & Son	Dereham Centre, Ont	Guernseys.
Burnett, E. G	Greenbank, Ont	Shorthorns.
Burt, J. W	Coningsby, Ont	Polled Angus.
Caldwell Bros	Orchard, Ont	Ayrshires.
Chapman, J. G. & Son	St. Thomas, Ont	Shorthorns.
Campbell, J. R. & Son	Vernon, Ont	
Craig, W. J	London, Ont	Jerseys.
Clemons, G. W	St. George, Ont	Holsteins.
Cooper, J. V	Picton, Ont	Shorthorns.
Cooke, E	Norwich, Ont	
Davidson, J. I. & Son	Balsam, Ont	Shorthorns.
Davis, H. J	Woodstock, Ont	Shorthorns.
Davis, J. F	Tempo, Ont	Shorthorns.
Dent, T. H	Woodstock, Ont	Jerseys.
Dickenson, Wm	Mildmay, Ont	Shorthorns.
Douglas, Jas	Caledonia, Ont	Shorthorns.
Dyment, N	Clappison's Corners, Ont	Ayrshires.
Duncan, W. A	Sault Ste Marie, Ont	Jerseys.
Elliott, W. R	Hespeler, Ont	Shorthorns.
Eldridge, John	Hepworth Station, Ont	Shorthorns.
Fairbairn, H. K	Thedford, Ont	Shorthorns.
Flatt, W. D	Hamilton, Ont	Shorthorns.
Fried, J. & Son	Roseville, Ont	Shorthorns.
Gardhouse, J. M	Highfield, Ont	Shorthorns.
Grainger, Wm. & Son	Londesboro', Ont	Shorthorns.
Graham, H. C	Ailsa Craig, Ont	
Gibson, J. T	Denfield, Ont	Shorthorns.
Gorwill, S. B	Fanshawe, Ont	Shorthorns.
Guy, Frank	Bowmanville, Ont	Ayrshires.
Hall, Walter	Washington, Ont	Polled Angus.
Hauser, Ignatius	Weisenburg, Ont	
Haining Bros	Highgate, Ont	Shorthorns.
Hood, G. B	Guelph, Ont	Grades.
Howden, J. D	Whitby, Ont	Shorthorns.
Hobson, J. I	Guelph, Ont	Shorthorns.
Hoover, A., jr	Emery, Ont	Holsteins.
Hume, Alex	Menie, Ont	Ayrshires.
Hodson, F. W	Ottawa, Ont	
Jeffs, E. & Son	Bond Head, Ont	Shorthorns.
Jones, Mrs. E. M	Brockville, Ont	Jerseys.
Kaufman, A. E	Washington, Ont	Polled Angus.

MEMBERS OF THE DOMINION CATTLE BREEDERS' ASSOCIATION FOR 1900.

Name.	Address.	Class.
Leitch, D	Grant's Corners, Ont	Ayrshires.
Legge, Thos	Temperanceville, Ont	Shorthorns.
Lemon, S	Kettleby, Ont	
Lloyd-Jones, T	Burford, Ont	Guernseys.
Martyn, W. J	Canton, Ont	Shorthorns.
Martindale, F	York, Ont	Shorthorns.
Mooney, J. W	Inverness, Que	Shorthorns.
Murrison, Jas	W. Lorne, Ont	Polled Angus.
McCrae, David	Guelph, Ont	Galloways.
McKee, H. & J	Norwich, Ont	Ayrshires
McGillivray, J. A	Uxbridge, Ont	
McCormack, Jas. & Son	Rockton, Ont	Ayrshires.
McDougal, A	Guelph, Ont	
Oke, Jas. & Sons	Alvinston, Ont	Shorthorns.
O'Brien, John	London West, Ont	Jerseys.
Pettit, W. G	Freeman, Ont	Shorthorns.
Rawlings, Albin	Forest, Ont	Herefords.
Rettie Bros	Norwich, Ont	Holsteins.
Reid, R. & Co	Hintonburg, Ont	Ayrshires.
Rice, A. & G	Currie's Crossing, Ont	Holsteins.
Robertson, Thos	Dunsford, Ont	Polled Angus.
Robson, T. E	Ilderton, Ont	Shorthorns.
Rudd, W. J	Eden Mills, Ont	Devons.
Rusnell, D. H	Stouffville, Ont	Shorthorns.
Richardson, M	Caledonia, Ont	Holsteins.
Sharp, Jas	Rockside, Ont	Polled Angus.
Shaw, A. M. & Robt	Brantford, Ont	Galloways.
Stevenson, R. S	Ancaster, Ont	Holsteins.
Stewart, Wm. & Son	Lucasville, Ont	Polled Angus.
Stephen, W. F	Trout River, Que	Ayrshires.
Smith, Amos	Trowbridge, Ont	Shorthorns.
Sibbald, F. C	Sutton West, Ont	Shorthorns.
Smith, W. M. & J. C	Fairfield Plains, Ont	Ayrshire.
Sibbald, John	Annan, Ont	Galloways.
Smith, H. D	Compton, Que	Herefords.
Smith, H	Hay, Ont	Shorthorns.
Skilliter, T. A	Grenfell, Assa	Shorthorns.
Smith, A. W	Maple Lodge, Ont	Shorthorns.
Simmons, W. H	New Durham, Ont	Holsteins.
Tape Bros	Ridgetown, Ont	Shorthorns.
Trimble, A. H	Red Deer, Alta	Ayrshires.
Usher, I. & Son	Queenston, Ont	Shorthorns.
Varcoe, Major John	Carlow, Ont	Polled Angus.
VanNostrand, J. A	Vandorf, Ont	Shorthorns.
Wood, W. J	Cornwall, Ont	Jerseys.
Yuill, J. & Son	Carleton Place, Ont	Ayrshires.

TWELFTH ANNUAL REPORT

OF THE

DOMINION SHEEP BREEDERS' ASSOCIATION.

The annual meeting of the Dominion Sheep Breeders' Association was held in the Farmers' Pavilion, Western Fair Grounds, London, at 7.30 p.m. on December 14th, the President, Mr. D. G. Hanmer, in the chair. The officers and directors for the ensuing year were elected as follows:

OFFICERS FOR 1900.

President	A. W. SMITH, Maple Lodge.
Vice-President	R. H. HARDING. Thorndale.
Secretary-Treasurer	A. P. WESTERVELT, Toronto.
Directors:	
Cotswolds	D. McCRAE, Guelph.
Leicesters	W. WHITELAW, Guelph.
Hampshires and Suffolks	JOHN KELLY, Shakespeare.
Dorsets	JOHN A. McGILLIVRAY, Uxbridge.
Southdowns	JOHN JACKSON, Abingdon.
Oxford	JAS. TOLTON, Walkerton.
Lincolns	T E. ROBSON, Ilderton.
Merinos	W. M. SMITH, Fairfield Plains.
Shropshires	D. G. HANMER, Mt. Vernon.
Ontario Agricultural College	Prof. G. E. DAY. Guelph.
Auditor	J. M. DUFF, Guelph.
Delegates to Fair Boards:	
Toronto Industrial	J. M. GARDHOUSE, Highfield, and JOHN JACKSON, Abingdon.
Ottawa	F. HODSON, Ottawa.
London	A. W. SMITH, Maple Lodge, and W. H. BEATTIE, Wilton Grove.

The following Expert Judges were then chosen:

EXPERT JUDGES.

Cotswolds: Jas. Russell, Richmond Hill; Wm. Thompson, Uxbridge; Thos. Teasdale, Concord; D. McCrae, Guelph; H. Rawlings, Ravenswood; Val. Ficht, Oriel; J. C. Snell, London; T. Hardy Shore, Glanworth; Geo. Weeks, Glanworth; Wm. Ward, Uxbridge; W. G. Laidlaw, Wilton Grove; Wm. Rae, Arkell; Joseph Ward, Marsh Hill; John Park, Oriel; Joseph D. Davidson, Belhaven; A. Johnston, Greenwood; John Goodfellow, Maxville; Andrew Russell, Carrville; A. J. Watson, Castlederg; Samuel Bailey, Utoxeter; J. Slater, Buttonville; Geo. Allen, Oriel. *Toronto*: G Weeks, W. Thompson. *London*: J. Russell, Richmond Hill; W. G. Laidlaw, Wilton Grove. *Ottawa*: V. Ficht, Oriel; J. D. Davidson, Belhaven. *Chicago*: H. Rawlings, T. Hardy Shore.

Leicesters: John Wells, Galt; Hardy Shore, Glanworth; Abraham Easton, Appleby: E. Wood, Appleby; Wm. Parkinson, Eramosa; E. Parkinson, Eramosa; John Orr, Galt; Wm. Watt, Salem; Wm. McIntosh, Burgoyne; Thos. Currelly, Fullarton; R. Eastwood, Mimico; John Kelly, Shakespeare; Andrew Thompson, Fergus; J. K. Campbell, Palmerston; J. C. Snell, London; G. B. Armstrong, Teeswater; John Gibson, Denfield; C. E. Wood, Freeman; Joseph Gaunt, St. Helen's; J. M. Gardouse, Highfield

John Laidlaw, Wilton Grove; Andrew Whitelaw, Guelph; William Whitelaw, Guelph; R. C. Martin, Marysville; Alex. Smith, Maple Lodge; Alex. Waldie, Acton; Walter Nichol, Plattsville; H. G. Arnold, Maidstone; Prof. Craig, Ames, Iowa; John Marshall, Cass City, Mich.; J. W. Murphy, Cass City, Mich.; Prof. Curtiss, Ames, Iowa; D. C. Graham, Cameren, Ill.; Geo. Penhale, Exeter; James Snell, Clinton; John Wright, Chesley; Prof. Grisdale, Ottawa; Prof. Day, Guelph; M. Campbell, Northwood; D. Lillico, Ayr. *Toronto*: Jas. Snell and Joseph Gaunt; referee, John Laidlaw; *London*: Wm. McIntosh; reserve, W. Parkinson. *Ottawa*: John Orr. *Brantford*: W. Whitelaw.

Dorsets: John Jackson, Abingdon; J. G. Hanmer, Mt. Vernon; Richard Gibson, Delaware; W. H Beattie, Wilton Grove; Prof. Curtiss, Ames, Iowa; Thos. W. Hector, Springfield-on-the-Credit; G P Everett, Mt. Vernon; Mortimer Levering, Lafeyette, Ind.; Arthur Danks, Allamuchy, N.J.; Prof. Craig, Ames, Iowa; Prof. G. E Day, Guelph; Jas. Tolton, Walkerton; H. N. Gibson, Delaware; R. H. Harding, Thorndale; G. McKerrow, Sussex, Wis.; John Hunter, Wyoming; James Bowman, Guelph; Henry Arkell, Teeswater; Henry Arkell, Arkell; M. N. Empey, Napanee; E. O. Denton, Somerset, N.Y.; Herbert Hanmer, Burford; R Bailey, Union.

Southdowns: John Miller, Markham; Wm. Martin, Binbrook, H. N. Gibson, Delaware; John Jackson, Abingdon; T. C. Douglas, Galt; Henry Arkell, Teeswater; W. H. Beattie, Wilton Grove; A. Simenton, Blackheath; Geo. L. Telfer, Paris; J. G. Hanmer, Mt. Vernon; J. Scott, Aberfoyle; Geo. Baker, Simcoe; Jas. Smith, Mt. Vernon; H. B. Jeffs, Bond Head; D. H. Dale, Glendale; Geo. McKerrow, Sussex, Wis; J. C. Duncan, Lewiston, N.Y.

Oxfords: Smith, Evans, Gourock; James Tolton, Walkerton; R. J. Hine, Dutton; Kenneth Finalyson, Campbellton; Henry Arkell, Arkell; William Dickison, Mildmay; Peter Arkell, Teeswater; John Harcourt, St. Ann's; J. H Jull, Mount Vernon; W. H. Arkell, Teeswater; John E Cousins, Harriston; Arch. McKenzie, Corwhin; R. E. Birdsall, Birdsall; George McKerrow, Sussex, Wis.; W. A. Shafor, Middleton, O.; J. V. Cooper, Picton; Wm. Newman, Cherry Valley; Wm. Arkell, Teeswater; James L. Tolton, Walkerton; L Parkinson, Greenock; A. Elliott, Pond Mills; D. Brown, Iona; N. Gibson, Delaware; W. Lee, Simcoe; Prof. Craig and Prof. Curtiss, Ames, Iowa. *Toronto*: James Tolton, Walkerton; Henry Arkell, Arkell. *London*: W. H. Arkell, Teeswater, J. L. Tolton, Walkerton.

Hampshires and Suffolks: Henry Arkell, Arkell; R. Gibson, Delaware; I. Hillier, Thornton, Mich.; John I. Gordon, Mercer, Pa; Prof. J. A. Craig, Ames, Iowa; W. H. Beattie, Wilton Grove; James Bowman, Guelph; John Kelly, Shakespeare.

Lincolns: J. T. Gibson, Denfield; Wm. Oliver, Avonbank; E. Parkinson, Eramosa; T. E. Robson, Ilderton; G. Walker, Ilderton; John Geary, London; J. C. Snell, London; R. W. Stevens, Lambeth; L Parkinson, Eramosa; John Mitchell, Glencoe; John White, Eramosa; Alex. Smith, Maple Lodge; Wm. Whitelaw, Guelph, T. Currelly, Fullarton; Hardy Shore, White Oak; J. H. Patrick, Ilderton; James Petit, Hensall; James Cranston, Denfield; A. McTavish, Shakespeare. *Toronto*: James Petit, Hensall; L. Parkinson. *London*: Ernest Parkinson, Eramosa; Hardy Shore, Glanworth.

Shropshires: R. Gibson, Delaware; G. P. Everett, Mt. Vernon; J. Conworth, Paris; W. H. Beattie, Wilton Grove; A. Brown, Picton; R. Miller, Brougham; J. Hanmer, Burford; J. Campbell, Woodville, D. G. Hanmer, Burford; Jas. Phinn, Hespeler; M. Levering, Lafayette, Ind.; A. Elliott, Galt; J. Dickin, Milton West; J. S. Thompson, Gas City, Ind.; Geo. Allen, Allerton, Ill.; W. G. Pettit, Freeman; D. J. Campbell, Woodville; G. Phinn, Hespeler; Chas. Calder, Brooklin; H. N. Gibson, Delaware; Geo. Hindmarsh, Ailsa Craig; C. W. Gurney, Paris; W. E Wright, Glanworth; J. Miller, Brougham; H. Hanmer, Burford; Prof Curtiss, Ames, Iowa; J. C. Duncan, Lewiston, N.Y.; G. McKerrow, Sussex, Wis.; Prof. Day, Guelph; S. Hagar, Plantagenet, Ont.; Joseph Barnett, Rockland, Ont.; George L. Telfer, Paris. *Toronto*: George Allen, Allerton, Ill; Geo. Hindmarsh, Ailsa Craig; reserve, W. H. Beattie, Wilton Grove. *London*: J. C. Duncan, Lewiston, N.Y.; reserve, George Phin, Hespeler, Ont. *Ottawa*: R. Gibson, Delaware; reserve, A. Elliott, Galt. *Fat Stock Show*: Geo. McKerrow, Sussex, Wis.; reserve, Prof. Curtis, Ames, Iowa.

Merinos: W. M. Smith, Fairfield Plains; R. Shaw, Glanford Station; W. H. Beattie, Wilton Grove; Rock Bailey, Union: Andrew Terrell Wooler, G. P. Everett, Mt. Vernon; Geo. McKerrow, Sussex, Wis.

ADDRESS

By H A. Foulds, Brantford.

As a little preface, it would perhaps be in order for me to thank the directors of this Association for the honor they have done Mr. Yapp and myself by asking us to come before such an intelligent class of people as the sheep breeders of Ontario, to judge some of your products and to deliver an address. We have done our best in judging the carcasses that have been killed and hung up for inspection. If there is any criticism we will try and prove, that what we have done has been done in our best judgment. I thought when I saw all of the carcasses hung up along side the dressed hogs, that we had a good deal the hardest lot in the show to judge. As we all know, there is a great agitation and talk at the present time, especially in our part of the country, about hog products, more so than there has been about mutton sheep. I am a little interested in both, and while I am not closely connected with sheep raising and sheep breeding to any great extent, I am more so with sheep killing, as I am a butcher and have had a certain amount of opportunity to judge the different breeds. When I asked Mr. Hodson along what line he would like us to talk—if on the export trade—he said : "Just exactly what we would like to hear." I have noticed that what was wanted a few years ago is not wanted now, especially in mutton and pork. A few years ago you could get it fat enough, but at the present time fat mutton of any kind will not sell. I know from experience in my own shop, when we buy mutton or lamb (we call it lamb until it is a year old), we cannot sell that which has too much fat on it. A few years ago we could take mutton that would cut quite thick and customers would take it, but at the present time it is necessary to cut off nearly all the fat from chops, leaving no more than half the thickness of the sheep. We generally cut our sheep, splice them down and so cut the quarter right in two. Any person running a butcher shop generally has customers for all classes of meat. We have customers wanting the best cuts, and customers that want more value for their money, and others that have not so much money to spend, and they take a cheaper piece and they do not want too much fat ; and if we can breed and feed a sheep so that there will be a greater percentage of lean meat in the animal than has hitherto been done, our object is attained. If we could breed so that we did not have to trim off so much fat, the man that is cutting up the carcass will get more money out of it. If the breeder produces that class of animal he is sure to get the top price. A butcher will come to my door with a dozen lambs on his waggon, I pick out and take this and that, and he will say ; "What is the matter with this one? it is the best lamb that I have got on my waggon." I tell him that it is too fat, and that I could not make my money out of it.

We have been criticized for giving the Shropshire lambs the first place, and while they were hanging together it scarcely looked reasonable for a lamb that is just an ordinary fed lamb to get a prize over a heavier sheep. Each sheep was cut through at the same place, nine ribs to the fore-quarter, and through to the back-bone, so that we could see where the lean meat is, because if we get the proper meat where we cut them in two, we are almost sure to get that lean meat all through the animal. We cut this lamb down and found a very great percentage of lean to the amount of fat. There are some very good sheep in this class, and we consider that lamb had the best points. (I am speaking from the standpoint of home consumption). That lamb we considered a typical Shropshire lamb for butchers' meat, and I was surprised and delighted to see a lamb of the appearance of that lamb, although it was only an ordinary lamb, weighing 62 pounds. From its general appearance it did not look more than an ordinary lamb, and when we cut into it we found the lean meat predominated to a very great extent. Then we went on, and in nearly all the carcasses we followed that rule out as far as we were able. In the case of some of the other sheep, it was a pretty hard matter to judge. A good many of them had been judged as live animals, and it was a matter of curiosity to me to see how we would bear out the judgment of the men who judged them before they were killed. I am happy to say that in a good many cases it came out fairly well.

I do not remember cutting up an Oxford Down sheep before, and I am happy to tell you that the first prize Oxford Down filled the bill in our eye very well indeed. There was a great amount of lean meat carried all the way through, and in addition it has a good leg and will demand the highest price, and I may say there is not too much

fat up the back. If we can by any means, scientifically or any other way, breed what we want so as to cut without waste of back fat, the farmer is going to reap the benefit of it. Supposing we have to pay 8c a pound and we have to cut off twenty five pounds and put it in our waste box at 2c a pound, we have to get a big price for the balance to come cut even. A good many of the sheep that were killed for this test were fed too well to get a prize.

Q. What would be the difference in price between the fatted sheep hanging up and the Shropshire lamb?

Mr. FOULDS: If I were buying the lamb to cut up, I would get at least three cents a pound more for it than I would for the other.

Q. Live weight or dressed?

Mr. FOULDS: Dressed. In fact, in a great many cases we would not buy such a fat sheep at all. We would have to trim off the fat, then if we could get 25c to 30c a pound for it, it would pay, but we would have to sell for 12½c to 15c a pound, and it will not pay us for the waste.

Q Is it not, in point of economy, better for a person to buy a leg of mutton of that description and submit to the waste?

Mr. FOULDS: It is, if you could get the price for it. Take the leg of mutton from the Southdown. There is a leg of mutton that is too good to be sold in any of the smaller cities of this country. If they could sell legs of mutton of that quality to some of our larger cities such as Montreal, where quality is what they are looking for and where they do not consider the price, it would be all right, but you cannot get enough money in a city the size of Brantford for a leg of mutton like that to pay us for the waste we have in the other part of the sheep. There is no doubt at all the quality is No. 1. The only objection to the sheep is that while you get two legs of mutton that weigh perhaps twenty pounds, you get eighty pounds of mutton that you have to trim. I venture to say at the very back of that sheep there is three inches of fat. It is all very well for some people to come in and say, "Oh! what do you cut the fat off for? I like it." At the same time I think they will not use it.

Q. What is the present value for a dressed carcass?

Mr. FOULDS: We very seldom use sheep of this description. Towards spring when lambs get scarce, we have to take what we can get, and that is very often fat sheep. Sheep like that fat sheep to-day will not bring in the market as much by 10c a pound as that first prize sheep.

Q You answered the question in regard to difference in value of dressed weight at 3c a pound. Does not part of that come on account of that being a lamb carcass and this an older sheep?

Mr. FOULDS: If they were both lambs that point would be the same. We very often do throw out fat lambs in our city because we do not want them; perhaps the same farmer will come back in a while and we will buy the same lamb at 5c a pound.

Q You do not object to the large carcass if it is lean?

Mr. FOULDS: No, if the sheep is well developed—a nice large carcass—it is generally good meat all the way through,

Q Do you prefer a thick fleshy leg in preference to the thin one, provided it has a good proportion of lean?

Mr. FOULDS: Yes, the heavier you can get them the better, if the weight is not made up of fat. I do not care how heavy you get a sheep, if it is of the right quality of meat. If the weight is made up of fat there is too much waste to it. I think one very great fault of fat sheep is that they are not provided with the proper kind of food to develop the muscles or lean meat. They are pushing to get them ready for the market with a line of food that makes too much fat.

Q It is not, then, so much the fault of form, as that the breeder has stuffed him too much?

Mr. FOULDS: The breeder has been just too good to that sheep,—he has been too kind to him. If he had been a little more stingy, it would have made a better sheep for the butcher.

Q. We find the Buffalo market to-day does not call for a very heavy lamb, as that gives them too much fat.

Mr. Foulds: You cannot get lambs too heavy if they are the right quality of meat. If you get a lamb up to 80 or 90 pounds and then push him and have it all fat, you might just as well sell him at 80 pounds as 120 pounds.

Q. Would you say a lamb with a good carcass should weigh 100 pounds?

Mr. Foulds: Yes, at the present time.

Q Would he support himself too well on good pasture?

Mr. Foulds: I cannot say that he would; they are naturally an easily fed lamb. put them in a sweet pasture and they will grow lots of muscle and lean meat and I may say fat.

Q. What effect has rape on the quality of flesh?

Mr. Foulds: Rape is inclined to make too much fat and of a soft quality. There is a little difference in the fat that is put on the sheep, for instance fairly liberal pasture will put on a certain amount of fat that will be more palatable to the consumer than if that fat is put on by some soft food such as rape.

Q. Do you handle many rape-fed animals?

Mr. Foulds: Not many.

Q. Do you think the meat is better if the lamb is given some exercise?

Mr. Foulds: Yes, I think a proper amount of exercise will make better flesh.

ADDRESS.

By C. W. Yapp, Brantford.

In starting, allow me to express my thanks to you for the great honor that you have bestowed on me and Mr. Foulds in asking us to judge these carcasses and to make a short address. Mr. Foulds has given you a very able address on the requirements of mutton for the home market, and I will endeavor to give you some description of the export trade. I am more in touch with that market, although I was at one time engaged in the retail butcher business and know considerable about what has been said.

One gentleman in the audience spoke about the quality of the lean differing in carcasses which are fat and in carcasses which are composed largely of lean, and asked was not the quality much better in the fat animal? "That is true; it is a great deal better." Mr. Foulds, in making the distinction, spoke of the Suffolk. There were three shown, and, after we had given our awards, we found that the awards were reversed from those made by the live stock judges, and the sheep to which we gave third prize had obtained second when alive. Although it was the heaviest sheep, we considered that it was not matured; it had not the quality of the other two, although it looked the larger sheep; still, the lean meat was not so general through it, compared with the other two.

Another gentleman asked, "Is it not worth more from the consumer's standpoint?" I do not think it is. Up to a certain grade it is not; but when you get into the finer textures, then it is much better, as in the fatter sheep there is too much waste on the carcass. You know that light sheep are meeting the best demands; all the Old Country markets demand the lighter weights. Now, some ten, twelve or fifteen years ago, we thought we could not get a sheep heavy enough to send to the old country, and a sheep that weighed two hundred was a profitable one, whereas now one hundred and fifty is the general weight, especially as we have to pay so much for freight. I think we would make much more money shipping the dead stock, for in shipping live stock, where we get nine head we could get two hundred of the dead stock, and in that way it would be worth more, as we would pay less on the freight.

Sheep sell to best advantage in London and Liverpool markets. I know whereof I am speaking, as I was there last summer. I was at Deptford, the largest sheep market in England, where I saw thousands and thousands of sheep, and I gave it close attention, for I had some intimation that I might be up here this fall. I found that the carcasses of mutton there weighing from sixty to sixty-five pounds were the most saleable, having due respect, of course, to the quality of that weight; that is always taken into consideration. We know that the largest breeds of sheep will run to too much weight and the grain will be of too coarse an order, and we also know the little South-Down sheep is just the opposite; it is not a big carcass, but the grain of the meat is very fine. I

think the cross breed will just now take best in the market, by crossing some of the other breeds with the smaller breeds.

I had a letter from one of the largest salesmen in London, Mr. J. Crampt, foreman of Crampt & Biers ; he gave me a statement of what he considered the best breeds for export to London and Birkenhead. He wrote me some time ago with reference to this, and gave me what he thought the best breeds for this country to grow for export to England, and I think this will interest you. He claimed that a cross between a Lincoln or Cotswold, or Leicester, or a Hampshire Down or South Down or a Shropshire Down—a cross between any of these—would meet the requirements of the English market.

He gave the weights, from sixty to sixty-five pounds for lambs, and in sheep seventy to seventy-five pounds, dressed. So you see they do not want the sheep very heavy. In fact, you could not keep a sheep of these larger types past the age of a lamb without getting it beyond the weight. The Canadian farmers are a little too prone to send off to the old country their old broken down ewes, their old sheep after they are past service for raising lambs, and of course they cannot get much for them, from the fact that the freight on them is just as high as on the lambs, and they sell for six to eight shillings per head lower. Sheep of the black-faced order sell always a little higher ; they will sell from two to four shillings a head higher in the old country than the white-faced ones. We do not wish to discriminate at all against those whose favorite breeds happen to be of the white-faced order. I think some of the white-faced breeds are equal to the black-faced breeds. I noticed particularly the Oxford Downs and Horned Dorsets. One Dorset sheep was a particularly good animal ; I do not know that we could better it in any way. I have come to the conclusion that there is too much expense in shipping live sheep or live cattle to the old country. The sooner the cattle can be killed here and put into the cold storage and sent across to the old country by the fast Atlantic route, which we thought we had so near completion two years ago, the better it will be for the breeders of this country. In shipping the live stock we have to put a lot of feed on board the boat to last us the journey, simply to bring sheep or cattle out in the same condition as when we put them on the vessel, and in some cases they are not as good. This food is literally lost. The room taken up by one bullock would hang four dressed cattle, and there is no use taking over a lot of refuse. We had better keep it here to help keep up the fertility of the land. I think it would be much more profitable to the farmer, because the farmer has to bear the expense of shipping the cattle over. There is no doubt about that ; it all comes out of the producer. We buy our stock that much cheaper. In the same way, if we do not have so much to pay in carriage we have more to pay the farmer for the animals. Canada is now a very strong competitor in the British market with the Argentine Republic, and they market their stock there ; still, we can land our stock in the old country at a time when it will not conflict with the great output of the South American lambs. At this time of the year, up to, say, February, they will net a very good price. Shipping is just starting to come from South America now, and is not coming in very large numbers. Our lambs are now very fair, and the trade with the old country remains with us until pretty near spring.

Q. Do you think it is possible for Canada to compete with New Zealand with dressed mutton in the market, when they sell it at 5c.? That is a cash figure ; the Australians say that before they will be beaten they will lay the mutton down at two pence a pound.

Mr. YAPP : If that is the prevailing price of the dressed meat we could not expect to compete in that way.

Q. Is it not generally understood that a large portion of our lambs goes to the American market?

Mr. YAPP : The Buffalo, Albany, New Jersey and New York trade to-day pays the highest price for lambs weighing about 90 to 95 pounds. I had two carloads of lambs Tuesday, this week, that averaged 91½ pounds apiece and weighed 96 pounds at home. They brought $5.35 a hundred, the highest price that day. There were other lambs selling for $5.00 and $5.25. I saw some very nice Michigan lambs, but they ought to have been fed for five or six weeks longer.

Q. Do they make any difference in the color of the sheep?

Mr. YAPP : No, not very much now ; it fluctuates according to the quality of the wool.

Q. Did you find any complaint in the American market about rape fed lambs?

Mr. YAPP: No, I have not heard any fault found about that. Rape was one of the best foods we had; it is sweet food. I have fed some lambs on rape in the fall of the year.

Q. Is it a fact that the color of the face makes a difference in the price of mutton? I have spent some time in the old country being very much interested in the sheep trade, and I found like you in some cases it does make a considerable difference. I found the sheep that commanded the highest price was a cross between a Leicester and a Highland black face.

Mr. YAPP: It may be to a certain extent; there is no doubt, of course, the black faced sheep are smaller and have a finer grade of meat.

Q. The Argentine send their meat both ways?

Mr. YAPP: Yes.

Q. Which is the more profitable?

Mr. YAPP: They send more dressed than alive.

Q. Do you really mean black faced mutton?

Mr. YAPP: Black faced is a distinct breed of sheep. In speaking of the black faced mutton, they will sell in proportion to the darkness of their faces; there is a preference for all black faced sheep.

Q. In speaking about special quality and the small size required you spoke about London and Liverpool. There are other markets which take these sheep if our own markets will not. They will take some of the fattest carcasses that can be taken over. They want a different class of mutton from the highly trained taste of London.

Mr. YAPP: I was through Manchester—that is the locality you mean—but I did not stop long enough to enquire the taste of the people. I was at Birkenhead, Liverpool, where there was a large number of South American sheep. I was at Smithfield market a great deal of the time, and I saw there large quantities of Argentine mutton. I do not think we can send over any great quantities of sheep there to compete very favorably with the Argentine Republic, although they have a greater distance to go. They raise them so cheaply and of such quality and weight that they meet the demand of the English market.

Q. What would you think for the market of a cross between our heavier and lighter sheep? I noticed different sheep with the lambs that come from the west, which have more or less of the Merino, it is the lamb of the Chicago stock market. I was thinking the introduction of the Merino with our quality we could get the right weight?

Mr. YAPP: I do not know, I am sure; it would bring about a much lighter sheep.

Q. Would you ship as light a sheep now as you would in June or July to the English market?

Mr. YAPP: Yes, I do not think there is much change in that.

Q. What is the greater charm about the 60 or 65 lb. sheep?

Mr. YAPP: It is not a matter of weight; they have the proper mixture of fat and lean.

ADDRESS.

BY GEORGE MCKERROW, SUPERINTENDENT OF FARMERS' INSTITUTES FOR WISCONSIN.

Mr. Woodward told you last night that he was a Yankee. I am another; and I am your brother, too. (Applause.) From the dialects I have heard spoken here I know I am very closely connected with some of you; my father and mother were born in Nova Scotia, and I am here in Canada now to gather information, and take back with me all the good things I can grasp, and I may say that I am pleased I remained over a few hours this evening to hear the talk these practical men have given us. As a boy I began in sheep husbandry, and since then I have owned sheep, sometimes by the dozen and sometimes by the thousand, and they have done well by me; I do not know how well I have done by them. When I was a boy I was drawn even closer to you people than a brother, because my stepfather was a Yorkshire man, and the first lesson with regard to live stock were from him. For fifteen years continually he was judge of the beef cattle

and mutton sheep at our County Fair, and he took me with him and gave me lessons on these animals. He liked thick-fleshed animals, and he did not like blubber, as he termed it; and so I got to like the animal that was thick fleshed, and a few years later I began a business of my own, and in the winter time I dressed and delivered sheep of my own in the Milwaukee market, twenty miles from our home, by the waggon loads, and I took contracts with three of the leading butchers of that city. One of these butchers, who catered to the highest class of trade and furnished some of the best clubs and restaurants with mutton, gave me a cent more than any other butcher in the city would, and he was to have the privilege of selecting from every load of mutton taken into the market. Nearly all the mutton I brought to market was crossed with the Longwools, a Leceister or Cotswold cross with the Merino, and I bought the best fattened sheep I could find for this trade. I noticed the man who had the first choice would not take the very fat mutton, nor one as thin as the lamb here, because he would say, "My trade requires a thicker cut, and all the lean meat they can get in that thick cut." He would select his carcass very carefully, avoiding useless fat, but at the same time requiring a sheep pretty well developed and thick in its flesh, wide in its loin and wide along the top of the ribs, and very full here in the legs. I asked him why he was so particular about having a wide loin and a wide back, and he said, "I get a higher percentage of high priced cuts than I do out of one that has a drooping rib and a narrow rib. Leg of mutton is high priced meat, and I send that up to the best restaurants or to the club, and I can charge them five cents a pound extra for it, and they do not find fault, but if I sent them a thin narrow cut they would send it back to me." My ideas began to change from the first ideas I had got with regard to mutton, and I have taken a great deal of interest from that time on, in having fat sheep for exhibition at breedng or fat stock shows, and have studied the question as well as I was able. As you know at the Chicago Fat Stock Shows some ten or twelve years ago they adopted a rule that every first prize animal should go to the block test, and it was carried on for some two or three years, and I find that of the animals that went on the block not one had excessive fat, and on the other hand there was not a very thin animal. Now, you have been told here to-night why this excessive fat is objectionable. You have also been told to-night that a thick cut is not objectionable, if it only carries a good large amount of lean meat and no great amount of fat. You have a rule in your premium list which says: "Stock shall be judged from the consumers' standpoint." Now, that is a pretty hard rule to define, it looks plain on its face, but who is the consumer the judge is to have in mind. Is it himself? If it is me personally, my old English step-father educated me to eat fat mutton, and I like it. Is it my wife? She would choose a leaner piece of mutton, or is it the ordinary consumer in the small town, who is asking for lean meat all over the country as well as in England, or is this high class trade which demands a rich juicy mutton, such as can only be got in its perfection out of a sheep that has been fairly well fed. That is a question that I have revolved in my mind since I knew I was to do some of your judging here; just what standard of consumer shall I set up? And I said to myself, the only right standard, is the highest standard possible, and it strikes me that is the standard of the consumer who will pay the highest price for the carcass. I believe we find that consumer in our best hotels and in our largest cities, and in our best restaurants in our large cities, and in the clubs where they purchase the very best they can have. And there I think we ought to set our standard, because there I think we can set a little higher standard, for it means a higher price than we can set in any of our smaller towns. I was glad to be borne out in that idea by the gentleman here, when he said, if he could sell one of these legs of mutton in some of the larger cities, he could get an extra price for them. I think that would also be true in loin cuts, and also in chop cuts here along the ribs. So there is this question of the market and who the consumer is to be. I did some judging here, and I am very thankful to say that I did not have anybody come out and tell me that I was a fool with regard to the decisions I had made. We as feeders look for this kind of rib, well sprung away from the back-bone, and then we select something with a good leg to begin with, and one that in its development will continue to be a good leg. We do not want to select a flat ribbed sheep that drops away from the back-bone suddenly, because we know we have not got the width of back. It was remarked in the Suffolks, after the decision of the judges, that the decisions we gave were the reverse from the decisions of the judges in the block

tests. We selected animals that had the best sprung ribs and widest loins, we judged their flesh conditions were very much similar. We say, "This animal has a good deal more spring of rib, he is better over his shoulder and back of his shoulder, and wider in his loin, and therefore we select him." While he killed differently, showing a large amount of lean meat, too, and yet these judges see fit to reverse it, and we have no fault to find, only we still contend that one would not get so many top cuts off this one as the one we selected. In judging these animals alive, I do not believe there is a man living that can tell exactly how these animals will kill, but he can do so approximately. He can tell where he finds any surplus fat at the back and around the rump, he knows when he finds softness there, almost to a certainty, that that is fat; he can only infer that follows out in the carcass. When he takes the brisket and finds fat hanging there, he can satisfy himself that fat is continued through that animal, and as a rule that will follow out to be true when this animal is cut up.

Here before you is an animal that I believe was born to be a good mutton sheep. The fault was in the fellow that fed him; he was too good to him. It is not very often we take this kind of sheep and feed them up to this condition. As they run in our fields we get more too thin than too fat. I annually dress 20 sheep a year for our own family, so I still study them up in dressing them. There is a happy medium, I believe, we will reach from this kind of work. I believe in our Fat Stock Shows, but, in the judging of our animals, our judges have been inclined to give the prize simply to the animals that are carrying the most flesh along their backs, and this has been a mistake. But do not let us jump to the other extreme and make the mistake of selecting a lot of narrow-backed, narrow-loined, slab-sided fellows. Let us use more care in finishing these animals for the show ring. Finish them while they are getting plenty of exercise, but do not finish them upon too fattening foods. Because we grow corn in the United States we are apt to feed corn, and corn-fed animals are flabby. Feed such grain as oats, peas, and clover, and alfalfa where you can grow it. None of the animals that come to our market can beat the alfalfa-fed lambs of California and New Mexico for a proportionate thickness of flesh to the carcass.

It is said an Englishman is prejudiced in favor of the black-faced sheep, and the question was asked if it would not be a good thing to cross with the Merino? Certainly, if you cross with the American Merino. If you will only come over and get some of our American Merinos you can improve the lean meat of your mutton, for I never saw an American Merino too fat, and I have killed lots of them. Now, I do not believe the color of the face has anything to do with the quality of the mutton. When we had the old Silesian Merino, the finest wool sheep in the world, I am positive you could not feed any fat into his carcass, except as he put it on his kidneys, and so I would not be surprised if you might get some benefit from the Merino.

Mr. SHORE: Do you not think that the reason the dark-faced sheep of the old country demand such a high price is that they were brought up on the moors and downs of England so many years, and were not over-fed, and had to rustle for a living.

Mr. MCKERROW: You have brought up a point I meant to have touched upon when I was speaking of the quality of the mutton. I think that the quality of the mutton has been developed in certain breeds of sheep in the amount of exercise they have had to take. These old black-faced sheep in the mountains of Scotland have to hustle all the year round, like the Scotchman, and that means exercise for them. The old Spanish Merino had to hustle. He got one part of his feed during one part of the year in the mountains, and the other part of the year sometimes hundreds of miles away in the lowlands, and that had a tendency to develop the lean meat. These sheep raised from the thin herbage of the downs had to do a lot of picking, and that means muscle. Exercise will aid in developing muscle. It is true that the dark-faced sheep are preferred in some of our own markets; the Chicago market prefers them. Some of these dark-faced breeds have developed the part of the carcass where a lot of the best cuts lie.

A MEMBER: Can you feed a full grown sheep so as to increase the lean meat?

Mr. MCKERROW: I believe you can but not to advantage. I think that muscle ought to be grown as the sheep grows. If that sheep is fed with plenty of exercise I think you slightly increase the muscle. I would not like to say positively, but I think so.

Hon. JOHN DRYDEN: I am glad that at this show we have finally got down to rock bottom in our judgment. There is no doubt that the block is the final test of the skill

which we as breeders are trying to exercise in carrying on our business. We sometimes talk about the butcher's standpoint and breeder's standpoint, but I think the breeder and butcher ought to come together. We breeders are trying to capture the trade of the best consumer, or the consumer that will give us the most money for our goods; that is the idea. You cannot very well find out what the standard required is unless you see the animal upon the block. The diffidence I felt to-day, when talking about the hogs, was that we seldom see animals dressed, but we see them alive, and what we want fo-day is to find out by some means how to tell when the animal is alive, and when we see it and handle it, just how it will kill in the butcher's hands. If our colleges—and I believe they are doing it—will take hold of that point and teach our young men to ascertain when it is alive what the animal will be when it is killed, then they will have helped us a good deal to attain that which we seek for.

I am glad Mr. McKerrow came here to talk to you from the standpoint of a judge. These judges of the shows have placed upon them very heavy responsibilities, because they are setting up a standard and educating us all. But sometimes we think they do not know what they are doing and we say so. We go home and say "The judges made a mistake." But if the judge is doing his duty he will set up a standard for us. When a man can select an animal when it is alive which will take the prize when it is killed, he is a good judge. That is the kind of judges that I want Professor Day to educate at our college. I think the discussion we have had to night, and the discussion we have had this afternoon, are very important indeed, and will lead to excellent results, and, as far as I can, I shall use my influence to see it carried out to greater perfection. Some of us are apt to get the idea that we do not need to learn, that we know it all now. This is one of the places where we get that all taken out of us. The man who showed that very fat sheep has wasted his feed, his labor and his time, and probably will not do it again. The rest of us have got a lesson, and I am sure we will profit by it. I am glad to have had the privilege of being here, and receiving the information I have obtained from all three gentlemen who have spoken. (Applause.)

Mr. F. W. Hodson was made a life member of the Association.

AN IDEAL MUTTON SHEEP.*

By John A. Craig, Professor of Animal Husbandry, Iowa State College, Ames, Iowa.

To obtain a clear view of the many qualities that make an ideal mutton sheep, it will be necessary to consider the merits of such a sheep from five standpoints, those of the breeder, the feeder, the butcher, the consumer, and the manufacturer. It may seem that I am attaching too many details to the consideration of such a subject, but I would ask you to have in mind that I am discussing an ideal sheep, which should include all the qualities that we can enumerate. With all these requirements in mind, I have to consider the needs of the breeder, the wants of the feeder in fattening sheep, the demands of the butcher for lamb and mutton, the desires of the consumer of them, and the requirements of the manufacturer of the wool. In forming an ideal, we must merge these five requirements together in our view of the whole, and to enable us to do that justly, let me present to you an examination in detail of the needs of all of them.

Ideal Mutton Sheep for the Farm.

The Ideal Breed.—In making a choice of any sheep for the farm, the leading consideration should be how much money will that kind of a sheep produce per acre. This means that the breed must be carefully selected according to the nature of the land, so that sheep may be healthy on such soil, and then the feed and other conditions must tend towards the greatest productiveness on the part of the sheep. On strong, rich lands,

*Note. Included in this paper are ten illustrations, figs. 1-10, showing Prof. Craig s method of judging sheep.

that tend toward a luxuriant growth of vegetation, the breeds of large sheep may be kept to the best advantage. They prove thriftiest on such soils, and the amount of mutton and wool which that produces will more than counterbalance in gain what might be obtained through a smaller quantity of higher quality. Where the land is more rolling, a breed of another type is demanded to make the most of it. This sheep is lighter, more active, and seems to require more exercise to produce best. It is evident that the breed which is to be ideal for the farm must be in harmony with the natural conditions existing on the farm.

Necessity of breed type.—To make our sheep as ideal as possible, it is necessary that, in conjunction with the close study of breed quality, we must adhere to our meaning of breed type. It is not only necessary to select a certain breed because it has a reputation for some desirable characteristic, but we must see to it that the breed type is clearly shown. When the sheep shows the type of the breed which it represents, then it is the best guarantee for prepotency in breeding. This is a characteristic of our ideal sheep, and on that account I would like to emphasize the necessity of adhering closely to breed types when giving this feature proper prominence in discussing our ideal sheep. When an animal has breed type, it not only shows the characteristics of the breed, but it also has what is more important in the breeder's work, the power to transmit this quality. With these requirements in view, let me consider some other details which the breeder must consider in forming his conception of an ideal mutton sheep.

Fig. 1. Looking at the face and head and feeling the fulness of the neck.

Fig. 2. With one hand on top and other below estimate the depth of chest.

The importance of sex characteristics.—Whatever the type that is decided upon, there are other features connected with it, which I think I dare emphasize to the fullest extent. I refer to the desirability from the breeders' point of view of having the sex characteristics as strongly defined as possible. In the selection of a stock ram, it should be a guiding principle to select one showing masculine character. The head should be such as you expect to see only on a fully developed male, having none of the fineness or femininity which is characteristic of the ewe. The face should be shorter, the nose broader, the forehead wider, giving the head that burly look which is truly a distinction of masculinity. Back of the head the neck should fill into a fully defined crest or scrag. Then there should be that depth of chest with the width that is characteristic of male form. I think it will be borne out by those breeders who have observed it that those animals are more impressive as sires and more satisfactory for breeding purposes.

Considering the ewe, the type here should show marked variety from that of the ram. The face is finer in its features, slimmer, and in every way shows femininity. The neck lacks the fulness, but seems to have more length than that of the ram, while the chest does not show that fullness that adds so much to the burly appearance desired in the male. The flock-master knows that the ewe possessing femininity in all features is the one that makes the most satisfactory breeder, viewed from all standpoints. Some may think that I have emphasized this point too much, but I would ask you to remember

that we are discussing an ideal sheep, for which I am going to claim everything that seems to be desirable in sheep life.

The points I have mentioned so far have most to do with prolificness, the nursing qualities and the durability of the sheep. If they are selected according to the type suited to the land, this reflects their sex characteristics; they should be adapted to their environment, and consequently remain producers for a number of years. The selection of the types suited to the land should secure thrift. The adherence to breed type gives prepotency, and the selection of the type reflecting the sex characteristics should secure prolificness, good nursing qualities and the other attributes of good breeders. I would add that it is necessary to select the form that denotes constitution, as that gives long life of production. Constitution is not only reflected in the depth of the heart and lung room, but it is also greatly favored by the other features that lead to the protection of the sheep, that should be mentioned in considering one that is ideal for the farm. The fleece should be dense, compact, and carry its covering over all parts of the body. A sheep having a fleece of this kind is less subject to a vast variety of disorders that spring from exposure to changeable conditions. The fleece has its highest value to-day on the farm, for it has a material influence on the life of the sheep.

The Ideal Sheep in the Feed Lot.

The feed type that gives the best gain.—In considering the type of sheep which gives the best results in the feed lot, we have only to have in view the type that gives us the

Fig. 3. Notice the heart girth by the distance between the hands.

Fig. 4. With the hand perfectly flat note the levelness of the back, its firmness and covering.

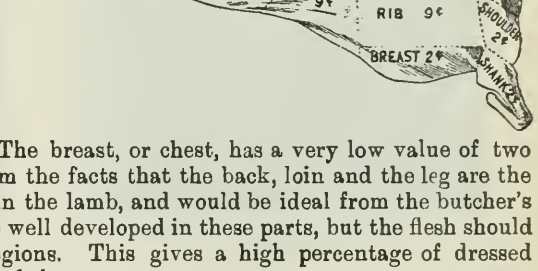
greatest vigor to insure an active digestion and the most constitution, so that nothing may upset the sheep in the rapid progress desired. In this connection it will be worth much more than a world of description for me to show you the types we have experimented with in the feed lots and to submit to you the results from them. Some years ago, when connected with the Wisconsin Experimental Station, I selected some lambs of our own breeding which showed in every way, in fleece and form, a high degree of merit for a grade sheep. These lambs were bred from high grade ewes, and the rams had been selected at big prices for some years to make the best blend with the ewes. The lambs were very uniform as to type and showed what might be called an unusual degree of merit for ordinary feed lambs. To compare with these, I went into Northern Wisconsin and picked out some lambs as uniform in form as possible to show the common, ordinary type of Northern Wisconsin lambs bred from ewes and rams that had not been selected with any clear idea of what was desired for feeding sheep. The representatives of both these kinds of lambs were put exactly on the same kind of feed, and under identically the same conditions, and I herewith submit to you the results. It will only be necessary to cite the chief difference that appears in the result. Putting both lots of lambs in at three cents a pound, taking them out at four cents a pound at the end of the feeding

period, the well-bred lambs of good feeding type, after paying for the feed that they ate at current prices, gave us a profit of $1.13 per head; while those representatives of the Northern Wisconsin indiscriminately bred lambs only gave us a profit in the same way of $0.60 per head. True, the lambs of the best type ate much more feed than the others, but they made a corresponding gain, and the chief point should not be lost sight of, that the profit from each one of them was just twice as much as that from those that I have shown you to be an inferior type for breeding purposes.

The feed type that brings most at maturity.—In feeding lambs for market, the feeder must have in view the fact that there is most demand for the lamb that has fat and is plump at the weight of one hundred pounds. This type is one that is not too much boned and big framed, but such as require only a small amount of flesh to make the carcass smooth and plump at the weight indicated. When it comes to feeding yearlings, then a larger-framed sheep, one with smooth and deep flesh at 125 to 150 pounds, is the one that is desirable. The feeder must have these facts in mind when he considers the ideal type for the feed lot, in addition to a consideration of that which gives the greatest gain.

An Ideal Mutton Sheep for the Butcher's Block.

If we were to obliterate the breeders' type and the feeders' type, and consider only the things that have the most importance in view of the butcher, we should have a very queerly formed sheep presented to us. The butcher is very desirous of obtaining the greatest percentage of valuable cuts. The different parts of a lamb, consequently, from a butcher's point of view, show a wide variation. In the lamb that is ideal from the butcher's standpoint it would not be necessary to have any neck, chest, digestive apparatus or legs. As may be seen from the illustration I submit, the neck has a value of only one cent per pound, the shoulders two cents, and the shanks the same. The rib running from the point of the shoulder to the loin has a value of nine cents per pound, and the same is true of the loin; while the leg of mutton has the highest value per pound, as that is quoted at ten cents. The breast, or chest, has a very low value of two cents per pound. It is very evident from the facts that the back, loin and the leg are the three divisions that are the most prized in the lamb, and would be ideal from the butcher's standpoint. Not only should a lamb be well developed in these parts, but the flesh should be deep as possible in the valuable regions. This gives a high percentage of dressed weight, which adds greatly to the profit of the carcass.



In considering this feature still from the butcher's point of view, there is a question of quality which materially effects the percentage of the dressed meat obtained. The fineness of the bone, lightness of the pelt, and other features have a marked influence on the profit from a butcher's standpoint.

The Ideal Sheep for the Consumer.

The butcher and the consumer are very similar in their demands, but in presenting the wants of the consumer, I would like to call attention to a few points that originate solely with the consumer. The consumer attaches most importance to the character of the flesh. Just at this point, allow me to make a clear distinction between flesh and fat; or, to explain it, say that there is much difference from the consumer's point of view between muscle or lean meat, and tallow. The ideal sheep, from the consumer's standpoint is one that carries a large proportion of flesh or lean meat with but a limited quantity of fat. In live sheep this is indicated by a firm, even handling over all parts of the body. The flesh has firm but spring feel and is smooth over all regions, and specially thick where it has the highest value. Flesh, muscle or lean meat, is encouraged by feeding all foods that are rich in nitrogenous material and also by exercise. We know that exercise in all animals is helpful in the development in muscle, and this is lean meat,

and the same is true in the feeding of foods that are rich in nitrogenous material. The consumers asserts his preference for another feature which we must consider in the ideal sheep. Lamb has the preference on the market over matured sheep, owing to the desirability of small cuts and the supposition that lamb is more tender than the sheep of a year later.

The Ideal Sheep for the Wool Manufacturer.

The Market Kinds of Wool.—It is but fair to give consideration to the qualities that the wool manufacturer desire in discussing our ideal sheep. Though the returns from the fleeces are not very large, yet the sheep breeder must consider it so that his profit may be as great as possible. To arrive at the qualities that influence the prices of wool, let me present to you a study of the Chicago market. There are four kinds of wool coming into that market based largely on the condition of the fleeces. These are what are known as domestic wool, territory wool, blanket wool and carpet wool. Domestic wools are clean and bright, just such as you would expect to come from fleeces that has been grown under what might be called domestic conditions; that is, the sheep are given shelter, fed well and otherwise have good management. This results in a clean bright wool which the market classifies as domestic.

Fig. 5. Taking the width of the loin; also note thickness.

Fig. 6. With one hand at the hip joint and the other at the end of the body, the length of the hindquarter may be estimated.

In contrast to this is the territory wool. This is termed territory wool because it is dirty and discolored. It is the wool that comes from sheep managed and cared for in a way very similar to that which is common in territories. The sheep run out the year round, and their fleeces become full of sand, chaff and other foreign material.

The poorest kinds of wool that go to market are known as carpet and blanket wool. The worst feature in regard to this wool is the presence of dead hairs, as these fibres do not absorb dye readily it has to be manufactured into carpet and blankets. When we understand the nature of the fleece of the original sheep, that it consisted of a growth of hair with a downy skin growth of wool, and when we see the improvement of breeding which has reduced the hair and increased the wool, we can easily understand that when sheep are neglected, the tendency is for their fleece to revert to its original condition. Domestication by man has tended to completely remove the hair and give us the fine fleece of wool which grows on the well bred sheep of to-day. Neglect on the part of the breeder will surely result in the sheep reverting to the kind of fleece it originally possessed, In regard to the discrimination of the market for these kinds of wool, it may be said that the domestic wool as a rule brings three to four cents a pound more than the territory or blanket. Our ideal sheep, then, must produce clean, bright wool, free from dead hairs.

The Market Classes of Wool.—The classes of wools in nearly all markets depends upon length and strength of fibre. The length of the staple and its strength are very important features from a commercial point of view.

Wools are generally known as short-stapled, the carding wools which are used for woolen cloths, or long-stapled or combing wools which are used for worsted cloths. Among the breeds the long-stapled wools include the Lincoln, Leicester, Cotswold, Romney Marsh and Black Face or Highland. The short-stapled include all the Downs, Southdowns, Hampshire, Oxford, Cheviot and the Welsh. The basis of this classification is plain, and the reasons for it are readily understood. The manufacturer of woolens desires a short-stapled wool, for such a wool has better felting qualities and usually more serrations or spirals than the long wools. The idea in this work is to produce the yarn in which the fibres are transversely disposed to the axis or length of the thread. In yarns of this nature this feature is termed "pile". The points projecting from the centre should be numerous, so that in felting the fabric unites and also when the cloth comes to be finished, it will appear on top like fine short fur. (R. A. S., Vol. II, 2nd Series.)

On the other hand, in worsted goods, the object is to stretch the fibres and lay them parallel with each other, and this produces a yarn, even, strong and composed of as fine fibres as possible. In this process of manufacture, it is easy to see that the length and the strength of a fibre includes its most valuable characteristics.

Fig. 7. Noting the degree to which the width of body is carried to the end.

Fig. 8. Feeling the development in the leg of mutton or gigot.

There is another classification that is more definite than this, but it is very similar in nature. The wools according to their length and strength in the Chicago market are divided into clothing which is short, being about two inches, or it is weak ; then there is the Delaine class which is a fine wool from two to three inches in length of fibre. The other class is the combing, which is a strong wool over three inches long. This classification it will be seen depends altogether on the length and strength of the wool. Considering first the clothing wool, which is used for making flannels and certain kinds of rough cloth, shortness in the fibre is its leading characteristic. If the fibre of a fleece, however, is four inches long, it would on its length be classified as combing wool, but if the fibre has a weak spot in it it readily breaks and passes from the combing class into the clothing class and drops two or more cents per pound in price. The Delaine wools are fine wools that are no longer than three inches. They are used for making the finest kinds of cloth. The combing wool must in the first place be strong and stand the process of combing, and the greatest length is desired.

The markets value these wools at this time so as to give a preference for a fine strong fibre which is three or four inches long. This is because it is this kind of wool which makes the cloths that most people are wearing. From this it will be seen that the Delaine and combing wools are those that are desired by the manufacturer, and it will be found that these bring a cent or two more per pound because they are of this class, having the length and strength of fibre that are required in the combing of wool. Our ideal

sheep, then, should grow a sound wool of the combing class. Such a sheep must have a dense fleece and not be subject to very severe exposure. When a sheep experiences a chill it at once affects the circulation of the skin and influences the growth of the fibre, making it unsound in spots. The market does not make any difference as to where this unsoundness occurs, whether it is of weak botton, middle or top. Thrift on the part of the sheep is a necessary condition for growing a sound fibre. The wool on a sheep grows from a small sack in the skin, and passes from the skin through a small opening which may be easily contracted or expanded according to different influences. The influences are various, and for that reason let me emphasize the importance of a dense fleece with as good constitution and thrift as possible on the part of the sheep so as to be least affected by external conditions.

The Market Grades of Wool. The market generally recognizes five grades of wool based altogether on the fineness of the fibre. According to the size of its fibre, wool is arranged into three grades: fine, medium and coarse. No exact measurement limits the division of these, yet the market draws a close discrimination in them. Owing to the fact that the combing wool has been most in demand in the past, a wool in which much strength is desired, the medium grades have had the preference. At this time the fine grades are advancing in price. Our ideal sheep, then, in regard to the grade of wool, should produce one that is fine or medium.

Market Qualities of Wool. I have presented in a general way the leading features that influence the the prices of wool, but there are yet a few others that have some importance and should be considered when we have the privilege of idealizing. The characteristic of lustre is one that is of considerable importance in getting the highest price for a fleece.

Lustre. This refers to the glistening appearance of the fibre when it is held to the light. This is independent of the amount of yolk, and it is also quite distinct from the brightness of the fibre, although yolk in a fleece may add to the lustre of the fibre, yet all lustrous wools have this characteristic independent of the amount of yolk that is present. The chief advantage from a commercial standpoint that attaches itself to the lustrous wools is that they more readily take the delicate dyes. Wools in the market are known as lustrous or dull, according to the appearance of the fibre. The lustrous fibre has the appearance of having been varnished, while the dull one does not show the least tendency to glisten when held in the light.

Brightness. Brightness is quite distinct from lustre, as it refers altogether to the color of the wool. In the market, wools are said to be bright or dark as they vary in this characteristic. The bright wool is one that has a clear white color, while the dark wool is one that has become discolored from the soil on which the sheep have ranged, or it may be through pasturing among burnt stumps. Brightness is always characteristic of the domestic wool, and discoloration is a feature of all territory wools.

Yolk. This is the grease or oil that is naturally secreted by the skin. As before indicated, the yolk in the fleece is an indication of the healthiness of the sheep. The yolk is secreted in the skin, but it passes down through the fibre and finds an outlet at the end of the fibre. If you will notice sheep on certain days when the weather is close and the sheep are likely sweating, the yolk seems to accumulate on the end of the fibre, and if you were to run your hand over the fleece at that time, you would find it become oily. The yolk comes out of the ends of the fibres mostly and works back into the fleece. In some flocks the quantity of the yolk has been increased and encouraged in selection in breeding in every way so that heavy fleeces might be obtained. The ordinary fleece in which the yolk is abundant in proper quantity will lose nearly one-third through washing it in hot water. This grease is of no value to the manufacturer, and it represents a direct loss to him when it is in the fleece in two large quantities. The feeding and the managemet undoubtedly influence the amount of yolk.

Feeding sheep foods that are rich in oil seems to further the secretion of grease and especially in feeding with such rations as are generally given to fattening sheep, the quantity of yolk seemed to increase. In our work in fattening lambs, we have found that those lambs which have received grain from birth invariably shear heavier fleeces than those that had grain only during the latter three months of fattening. By washing samples from the fleece of these sheep, we found that the increased weight of the fleece

was almost altogether due to the increased amount of yolk which the grain fed lambs secreted. The presence of yolk in proper quantities is of chief importance because the fleece becomes soft through it. It is made more compact. Its condition remains bright and clean, and further it is a safe index of the thriftiness of the animal.

Softness. By pressing the fleece with the hand the softness of it can be readily approximated. This feature is opposed to harshness. The softness of the fleece not only depends greatly on the management, but also on the nature of the food and the soil. In reference to the soils, those that are rich in sulphur have been observed to have the most influence on the softness of the wool. It is interesting to know that in one hundred pounds of wool there are at least five pounds of sulphur, and it seems that the abundance of this in the food has an effect on this feature of softness in the fleece. It is well known that the soil has a strong influence on the properties of wool, especially in regard to softness. Clay soils are considered to produce the softest wools, of the best lustre, and next to those rank sandy soils, and lastly those of the nature of limestone. Chalky soils have been noted for the deterioration they produce in the softness of wool. Harshness of the fleece is generally due to an absence of yolk which has resulted from ill-health on the part of the sheep from exposure. If you will consider the nature of the fibre of wool, it is easy to understand how anything, such as ill-health or exposure which effects the secretion

Fig. 9—Manner and place of opening the fleece to see the finest quality of wool.

Fig. 10.—Manner and place of opening the fleece to see the poorest quality of wool.

of yolk is certain to make wool harsh. A fibre of wool is covered with a series of scales which overlap in a similar manner to the shingles on a roof. When the secretion of yolk is abundant, these scales fit closely to the fibre, but when the secretion of yolk is stopped from any unnatural cause, the scales stand out from the fibre very similar to warped shingles on a roof. The result of this is that the fibres lock, and when you feel the fleece that has fibres of this nature they seem to grate each other very similarly to file shavings. The wool is harsh and dry and when pressed it gives that grating feeling which is also characteristic of an unhealthy fleece. It is this that produces what is generally known as cotted fleece.

To briefly summarize the characteristics that the manufacturer wants, I would say that our ideal sheep from the manufacturers point of view should produce a domestic, Delaine or combing wool of medium grade, sound, lustrous, bright and soft.

THE ADJOURNED ANNUAL AND DIRECTORS' MEETING.

The adjourned annual and directors' meeting of the Dominion Sheep Breeders' Association was held in the Palmer House, Toronto, on March 29th, 1900, at 3 p.m., the president, Mr. A. W. Smith, in the Chair.

The secretary-treasurer read his report and financial statement, and on motion of D. McCrae, seconded by John A. McGillivray, it was adopted.

Moved by Jas. Tolton, seconded by D. McCrae, that Mr. F. W. Hodson, Dominion Commissioner of Live Stock, be elected a director for the present year to the Dominion Sheep Breeders' Association. Carried.

On motion of D. McCrae, seconded by Jas. Tolton, it was resolved that the part of the secretary's report dealing with the advertising lists of stock for sale in the different Provinces and the United States be adopted.

Annual Auction Sales.

Moved by John A McGillivray, seconded by Arthur Johnston, that this Association regards with favour the proposition to hold public sales under the control of the executive officers of the Provincial Live Stock Associations; and that this Association hereby empowers its executive officers to take such steps and appoint such committees as may be necessary to the successful carrying out of said sales. Carried.

Permanent Location of Provincial Winter Show.

Deputations were received from the cities of Brantford and Guelph asking the influence of the Dominion Sheep Breeders' Association to permanently locate the Provincial Winter Show at their respective places.

Moved by John A. McGillivray, seconded by Prof. Day, that the Secretary be instructed to cast a ballot for the Sheep Breeders' Association, that the Provincial Winter Fair be permanently located in Guelph, providing they comply with requirements of the Winter Fair Committee.

Mr. D. G. Hanmer moved, in amendment, seconded by F. W. Hodson, that Brantford be the permanent location for the Show, on complying with conditions mentioned.

The representatives from the city of Guelph addressing the meeting were John I. Hobson and Mayor Nelson.

The gentlemen who addressed the meeting from the city of Brantford were Jos. Stratford and Ex-Mayor Elliott.

Upon the ballot being taken the original motion carried.

It was moved by John A. McGillivray, seconded by F. W. Hodson, that the Secretary, Mr. A. P. Westervelt, receive an increase in his salary of $50 per year. Carried unanimously.

Delegates to Board of Provincial Winter Fair.

It was moved by John Kelly, seconded by Prof. Day, that the delegates to the Board of the Provincial Winter Fair be John Jackson, Jas. Tolton and the President, A. W. Smith. Carried.

Constitution and By-laws.

Moved by John A. McGillivray, seconded by F. W. Hodson, that the Executive Committee, with the addition of the mover's name, have power to enact the necessary changes in our constitution and by-laws, which have been suggested as under consideration by the Secretary.

Prize List, Including Prizes for Dressed Carcasses.

Moved by John Kelly, seconded by John Jackson, that on page 8, clause No. 64, of the prize list, the rule be amended to read: "That the awards shall be given to the animal most valuable from a breeder and consumer's point of view." Carried.

Moved by D. McCrae, seconded by Jas. Tolton, that there be an additional section put in the prize list, which will divide prizes for dressed carcasses into two classes—"under one year" and "one year and under two." Carried.

Judges—Provincial Winter Show.

Shropshires, Southdowns, Dorsets and Merinos—Prof. Curtiss, Ames, Iowa. Reserve—Jas. Tolton, Walkerton.

Oxfords, Suffolks and Hampshires—Henry Arkell, Arkell. Reserve—Wm. Beattie, Wilton Grove.

Cotswolds, Leicesters and Lincolns—Wm. McIntosh, Burgoyne. Reserve—Mr. Ernest Parkinson, Eramosa.

Grades and Crosses—Wm. Rae, Arkell, on longwools; Wm. T. Arkell, Teeswater, on shortwools.

Sweepstakes—Prof. Curtiss; and providing he could not attend, it be left in the hands of the executive to appoint a judge.

Moved by R. H. Harding, seconded by Jas. Tolton, that prizes for dressed carcasses be extended to grades. Carried.

It was recommended that in Class 18, Dorsets and Merinos, there be two classes instead of one.

The establishing of two classes in grades was left for the consideration of the Executive Committee.

It was also suggested that 1st and 2nd prize animals entered in the live sections should be killed. This was left in the hands of the executive.

Mr. J. C. Snell recommended that this meeting should take action in regard to more stringent laws in the matter of dogs killing sheep. This had become very prevalent throughout the rural districts, and it was a great hardship to those who had sheep killed and no compensation allowed them.

Moved by D. McCrae, seconded by Jas. Tolton, that this matter be left in the hands of a committee composed of D. G. Hanmer, R. H. Harding and J. C. Snell, and that they look thoroughly into the matter and report at the next annual meeting.

FINANCIAL STATEMENT.

Receipts.

Cash on hand from previous year as per last report	$1,784 84
Members' fees	760 00
Legislative grant	1,500 00
Interest	50 00
Record fees	1,019 10
	$5,113 94

Expenditure.

Grants to other societies, fairs, etc.	$1,967 44
Secretary's salary, $200; directors' fees and expenses, $150.63	350 63
Postage and stationery, $122.16; printing, $96.16	218 32
Cost of reporting	39 95
Miscellaneous—	
Typewriting and preparing annual report	126 94
F. W. Hodson testimonial	22 85
Printing Record, volumes 8 and 9	1,536 40
Caretaker office, $5; auditor, 1898, $5; auditor, 1897, $4	14 00
Grants to Winnipeg and Brandon fairs	100 00
Telegraph, telephone, express, etc	19 05
	$4,395 58
Balance	718 36

Wm. Jones, President.

A. P. Westervelt, Treasurer.

Examined and found correct, this 28th day of March, 1900. J. M. Duff, Auditor.

MR. D. G. HANMER.

Ex-President Dominion Sheep Breeders' Association.

Mr. D. G. Hanmer, of the firm of Hanmer & Sons, Mt. Vernon, has been a breeder of sheep for some 32 years. Shropshires are the breed that the firm have made a specialty of for the past 17 years, but previous to that the subject of our sketch handled at least five other breeds. The Shropshire flock was founded on an importation selected from the flock of Mr. Evans, but additions have been made from time to time, and it now contains as well, blood from such well known flocks as Bradburn, Bach, Barber, Blantern, Nevill, Thomas and others. It now consists of about 200 head, and has been very successful in the showing for the past twelve years.

Mr. D. G. Hanmer.

While Mr. D. G. Hanmer, has practically handed over the care of the flock to his two sons, he still, however, retains more than a nominal interest in it. He has during the past year ably filled the position of President of the Dominion Sheep Breeders' Association, and is ever ready to assist in extending the usefulness of that Association in every way.

MEMBERS OF THE DOMINION SHEEP BREEDERS' ASSOCIATION, 1900.

Name.	Address.	Class.
Allen, Geo	Oriel, Ont	Cotswolds.
Allen, S	Cooper, Ont	Cotswolds.
Arkell, Henry	Teeswater, Ont	Oxfords.
Armour, And	Dunnville, Ont	Leicesters.
Armstrong, G. B	Teeswater, Ont	Leicesters.
Arkell, Henry	Arkell, Ont	Oxfords.
Baker, G. & Son	Simcoe, Ont	Southdowns.
Blais, A. & J	St. Anne de Prescott, Ont	Leicesters.
Bailey, Sam	Wroxeter, Ont	Cotswolds.
Beattie, W. H	Wilton Grove, Ont	Shropshires.
Bowman, Jas	Guelph, Ont	Dorsets.
Bonnycastle, F. & Sons	Campbellford, Ont	Cotswolds.
Brown, J. L	Uxbridge, Ont	Cotswolds.
Bow Park Co., Limited	Brantford, Ont	
Brown, Wm	Fordwich, Ont	
Campbell, Mac	Northwood, Ont	
Campbell, John	Woodville, Ont	Shropshires.
Cranston, Jas	Denfield, Ont	
Conworth, J	Paris, Ont	Shropshires.
Cowieson, John	Queensville, Ont	Leicesters.
Cousins, J. & Sons	Harriston, Ont	Oxfords.
Cornish, J. W	Orchard, Ont	Dorset Horns.
Cornish, John, Sr	Orchard, Ont	Dorset Horns.
Cooper, J. V	Picton, Ont	Oxfords.
Currelley, T. & Son	Fullarton, Ont	Leicesters.
Dickenson, Wm	Mildmay, Ont	Oxfords.
Douglas, T. C	Galt, Ont	Southdowns.
Donaldson, Wm	South Zorra, Ont	Shropshires.
Douglas, Jas	Caledonia, Ont	Leicesters.
Evans, Smith	Gourock, Ont	Oxfords.
Elliott, And	Pond Mills, Ont	Oxfords.
Elliott, W. R	Hespeler, Ont	Oxfords.
Everett, G. P	Mt. Vernon, Ont	Shropshires.
Finlayson, Kenneth	Campbellton, Ont	Oxfords.
Gardhouse, J. & Son	Highfield, Ont	Leicesters.
Garnham, E. A	Straffordville, Ont	Leicesters.
Gardhouse, J. M	Highfield, Ont	Leicesters.
Gibson, Richard	Delaware, Ont	Shropshires.
Gibson, J. T	Denfield, Ont	Lincolns.
Gould, G. & Son	Rutherford, Ont	Lincolns.
Harding, R. H	Thorndale, Ont	Dorset Horns.
Hanmer, D. G	Burford, Ont	Shropshires.
Hanmer, J. G	Mt. Vernon, Ont	Shropshires.
Higginson, C. T. & Sons	Chilliwack, B.C	Shropshires.
Honey, R	Brickley, Ont	Cotswolds.
Hunter, John	Wyoming, Ont	Dorset Horns.
Hodson, F. W	Ottawa, Ont	
Innes, Donald	Tobique River, N.B	Cotswolds.
Jeffs, E. & Son	Bond Head, Ont	Southdowns and Leicesters.
Jackson, John	Abingdon, Ont	Southdowns.
Jull, J. H	Mt. Vernon, Ont	Oxfords.
Johnston, J. W	Underwood, Ont	Leicesters.
Kelley, John	Shakespeare, Ont	Hampshires and Leicesters.
Laidlaw, John	Wilton Grove, Ont	Leicesters.
Laird, G. H. & R	Guelph, Ont	Cotswolds.
Linton, Wm	Aurora, Ont	Cotswolds.
Lloyd-Jones, T	Burford, Ont	Shropshires.
Martin, Wm	Binbrook, Ont	Southdowns.

MEMBERS OF THE DOMINION SHEEP BREEDERS' ASSOCIATION, 1900—*Continued.*

Name.	Address.	Class.
Maynard, J. T	Chilliwack, B.C	
Martin, E. E. & Son	Canning, Ont	Southdowns.
Meyer, J. E	Kossuth, Ont	Cotswolds.
Milne, Jas	Glanworth, Ont	Cotswolds.
McCrae, David	Guelph, Ont	Southdowns and Cotswolds.
McFarlane, Jas	Clinton, Ont	Shropshires.
McCrae, Wm	Guelph, Ont	Cotswolds.
McFarland, John	Clinton, Ont	
McEwen, Robt	Byron, Ont	Southdowns.
McLees, G. W	Beaconsfield, Ont	
McGillivray, J. A	Uxbridge, Ont	Dorsets.
McRobie, Fred	Iroquois, Ont	Leicesters.
Newman, Wm	Cherry Valley, Ont	Oxfords.
Neil, F. H	Lucan, Ont	
Oliver, Wm	Avonbank, Ont	Lincolns.
Orr & Lillico	Galt, Ont	Leicesters.
Parkinson, L	Eramosa, Ont	Leicesters.
Parkinson, E	Eramosa, Ont	Lincolns.
Parks, J. & Son	Burgessville, Ont	Cotswolds.
Pickering, John	Frelighsburg, Que	
Pettit, W. G	Freeman, Ont	Shropshires.
Patrick, Jos. H	Ilderton, Ont	Lincolns.
Rae, Wm	Arkell, Ont	Cotswolds.
Rawlings, John	Ravenswood, Ont	Cotswolds.
Robson, T. E	Ilderton, Ont	Lincolns.
Russell, Jas	Richmond Hill, Ont	Cotswolds.
Rudd, W. J	Eden Mills, Ont	Suffolks.
Swayze, D. R	Wringer, Ont	Cotswolds.
Stevens, R. W	Lambeth, Ont	Lincolns.
Snell, Jas	Clinton, Ont	Leicesters.
Snell, J. C	London, Ont	Cotswolds.
Stevens, Wm	Lambeth, Ont	Lincolns.
Smith, W. M. & J. C	Fairfield Plains, Ont	Merinos.
Smith, A. W	Maple Lodge, Ont	Leicesters.
Switzer, N. W	Streetsville, Ont	
Shore, Hardy	Glanworth, Ont	Cotswolds.
Scott, Jas	Aberfoyle, Ont	Southdowns.
Telfer, A. & Son	Paris, Ont	Southdowns.
Thompson, Wm	Uxbridge, Ont	Cotswolds.
Thompson, Wm	White Rose, Ont	
Tolton, Jas	Walkerton, Ont	Oxfords.
Wren, Christopher	Uxbridge, Ont	Shropshires.
West, Wm	Ilderton, Ont	Lincolns.
Wright, W. E	Glanworth, Ont	Shropshires.
Whitelaw Bros	Guelph, Ont	Leicesters and Cotswolds.
Wilkie, G. H	Wisbeach, Ont	
Wright, John	Mohawk, Ont	Leicesters.
Wright, John	Chesley, Ont	
Wood, C. & E	Freeman, Ont	Leicesters.
Yuill, J. & Son	Carleton Place, Ont	Shropshires.

ELEVENTH ANNUAL REPORT

OF THE

DOMINION SWINE BREEDERS' ASSOCIATION.

The Annual Meeting of the Dominion Swine Breeders' Association was held in the Farmers' Pavilion, London, December 12th, at 7:30 p.m., the President, Mr. Geo. Green, in the chair. Mr. F. W. Hodson read the annual address of the President. The election of officers and Directors followed.

Officers for 1900.

President ..... Wm. Jones, Mt. Elgin.
Vice-President ..... G. B. Hood, Guelph.
Secretary-Treasurer ..... A. P. Westervelt, Toronto.
Directors:
Berkshires ..... Thos. Teasdale, Concord.
Yorkshires ..... J. E. Brethour, Burford.
Chester Whites ..... R. H. Harding, Thorndale.
Poland Chinas ..... W. M. Smith, Fairfield Plains.
Duroc Jerseys ..... W. E. Butler, Dereham Centre.
Tamworths ..... Andrew Elliott, Galt.
Suffolks and Essex ..... Joseph Featherston, M. P., Streetsville.
Ontario Agricultural College ..... Prof. G. E. Day, Guelph.
General Director ..... George Green, Fairview.
Auditor ..... J. M. Duff, Guelph.
Representatives to Fair Boards:
Toronto Industrial ..... J. E. Brethour, Burford, and Thomas Teasdale, Concord,
Ottawa ..... F. W. Hodson, Ottawa.
London ..... D. DeCourcy, Bornholm, and George Green, Fairview.
Peterboro ..... Robert Vance, Ida.
Guelph ..... G. B. Hood, Guelph, and Jas. Anderson, Guelph.
Brantford ..... J. M. Shuttleworth, Brantford.
Belleville ..... J. M. Hurley, M. P., Belleville.
Kingston ..... J. M. Hurley, M. P., Belleville.

Expert Judges.

The following are the expert judges recommended:

Berkshires.—H. J. Davis, Woodstock; J. C. Snell, London; Thos. Teasdale, Concord; George Green, Fairview; Robert Vance, Ida; T. A. Cox, Brantford; Jas. Quarrie, Delaware; Joseph Featherston, M. P., Streetsville; R. P. Snell, Snelgrove; Malcolm McArthur, Lobo; C. R. Decker, Chesterfield; Chas Youngs, Brooksdale; D. DeCourcy, Bornholm; Geo. Thomson, Bright; Robt. Gibson, Galt; R H. Harding, Thorndale; Jos. Yuill, Carleton Place; Jos. Barnett, Rockland; Henry Glendenning, Manilla; E. E. Martin, Canning; Beverley Jeffs, Bondhead; Wm. Linton, Aurora; E. Brien, Ridgetown; G. B. Hood, Guelph; J. E. Brethour, Burford; Alex. Hart, Hampstead; W. A. Shields, Milton; Geo. Hill, Delaware; S. Pangman, Vallentyne.

Yorkshires and Tamworths.—N. M. Blain, St. George; A. Dunn, Ingersoll; J. H. Simenton, Chatham; G. North, Marden; A. Elliott, Galt; L. F. Master, Haysville; A. C. Hallman, New Dundee; J. Bell, Amber; D. G. Hanmer, Burford; John Nichol,

Hubrey; Jos. E. Brethour, Burford; H. Caldwell, Orchard; W. Elliott, Hamilton; C. C. L. Wilson, Ingersoll; F. C. Fearman, Hamilton; Andrew Laurie, Wolverton; Wm. Davies, Toronto; Richard Gibson, Delaware; Henry Dedels, Kossuth; G. B. Hood, Guelph; Jos. Featherston, M.P., Streetsville; H. E. Sharpe, Ida; A. F. McGill, Hillsburg; J. G. Muir, Howick Que.; J. M. Hurley, Belleville; Geo. Gier, Grand Valley; James Stephen, Trout River, Que.; R. McLellan, Harriston; Joseph Fletcher, Oxford Mills; Robt. Nichol, Brussels; A. and F. Foreman, Collingwood, J. Y. Ormsby, Woodstock; Jas. Leach, Toronto; Wm. Howe, North Bruce; Chas. Yapp, Brantford; G. E. Day, Guelph; F. Shore, White Oak; H. J. Davis, Woodstock; D. C. Flatt Millgrove; W. R. McDonald, Ridgetown; Wm. Elliott, Galt; R. G. Martin, Marysville; J. E. Cousins, Harriston; Geo. Green, Fairview; F. W. Hodson, Ottawa; Prof. Grisdale, Ottawa; Robt. Robertson, Nappan, N.S.; J. W. Caldbeck, Augustine, P.E.I., J. G. Clark, Ottawa; J. G. Smith, Hintonburg; D. Drummond, Myrtle.

Suffolks and Essex.—Wm. Jones, Zenda; Geo. Green, Fairview; Thos. Teasdale, Concord; Jas. McGarvin, Chatham; R. H. Harding, Thorndale; Jas. Main, Milton; D. DeCourcy, Bornholm; C. W. Yapp, Brantford; G. B. Hood, Guelph.

Duroc Jerseys.—Jos. Featherston, M.P., Streetsville; Jas. Bray, Portage La Prairie; Wm. Jones, Zenda; Geo. Green, Fairview; Thos. Teasdale, Concord; R. H. Harding, Thorndale; D. DeCourcy, Bornholm; H. Jones, Zenda; W. Tape, Ridgetown; H. George, Crampton; W. E. Butler, Dereham Centre; Geo. Bennett, Charing Cross.

Poland Chinas.—Thos. Teasdale, Concord; Jos. Featherston, M.P., Streetsville; J. H. Snarey, Croton; Jas. Main, Milton; Capt. A. W. Young, Tupperville; Geo. Green, Fairview; Wm. Smith, Fairfield Plains; Wm. Jones, Zenda; Oliver Drury, Fargo; C. W. Yapp, Brantford; R. Willis, Glen Meyer.

Chester Whites.—Wm. Jones, Zenda; J. C. Snell, London: Geo. Green, Fairview; D. DeCourcy, Bornholm; R. H. Harding, Thorndale; W. E. Butler, Dereham Centre; G. B. Hood, Guelph; Prof. Day, Guelph; Thos. Teasdale, Concord; Gideon Snyder, Jarvis; H. Jones, Zenda; Jos. Cairns, Camlachie; Jos. Featherston, M.P., Streetsville; Thos. Brooks, Brantford; J. L. Jarvis, Paris; T. A. Cox, Brantford; H. George, Crampton; G. Bennett, Charing Cross; W. Tape, Ridgetown; J. E. Brethour, Burford; J. C. Nichol, Hubrey.

PRESIDENT'S ADDRESS.

By George Green, Fairview.

As it falls to my lot to preside over another annual meeting of the Dominion Swine Breeders' Association, it may be expected that I should say a few words about the work of the Association during the past year, but, as the Secretary's report will probably deal fully with the subject, I will only say that I think the usefulness of the Association becomes more apparent as the years go by. We see it in the marked improvement in the type and quality of the hogs shown at our exhibitions, which are every year coming nearer to the standard which the export trade calls for. No other single agency has done so much to bring about this result as the membership of this Association by the discussion of subjects relating to the breeding and feeding of swine, and by nominating as judges men who know their business and know the type of hog which the times require. When we note the progress that has been made in this direction, it cannot with truth be said that Canadian swine breeders have been slow to learn the needs of their market, nor wanting in judgment and skill in mating animals to produce the required class of pigs. Neither have they been slow in adopting the best known methods of feeding in order to produce as cheaply as possible the quality of meat required.

No doubt the pork packers and dealers have done a good deal towards bringing about these results by their advice so freely given, but it is to the man behind the hog, the breeder and the feeder, more than to any other class, that Canada's proud position in the British market for bacon is mainly due. The packers, however, have it in their power to help this work along in a way that they do not seem disposed to do, and that is by paying

the farmers a fairer share of the profits of the business, but they evidently consider that it is cheaper to give advice free than to pay a better price for what they get from the producer. This is a matter that may well engage the attention of this Association. The Association might consider the question of the appointment of a committee charged with the duty of investigating and, if necessary, protesting against the manner in which the market for hogs is managed, by which the producer, the man who does the hardest of the work and the most of it, is the only one who does not get a profit out of the transaction.

It is about certain that had it not been for the favorable market for dairy produce this year, a very large proportion of the hogs fed in the country would have been fed at a loss, and that in sections where there are no cheese factories or creameries large numbers of hogs must have been sold at a loss to the feeders. The surest way to spoil the bacon trade of this country is to bear the price for hogs down to starvation point, for farmers do not feed pigs for fun, and when they find there is no money in it they will drop it like a hot potato.

The action of our Association in offering special prizes for dressed carcasses seems to be a step in the right direction, and we all hope that some useful lessons may come out of it, but until some means is discovered by which the relative cost of production can be determined, very little progress will be made in settling the question of the best breed for the farmer. If it costs more to feed a hog than the price it sells for, the sooner the feeder knows it the better for himself, if he has sense enough to quit the business when he does know. I do not think I can fairly be classed as a "squealer," and I have no fear but that I can hold my own when it comes to a case of "root hog or die," but I confess it gives me a tired feeling to hear men, after all the reports of experiments that have been made in feeding hogs of the various breeds for comparison, claiming that it is a question of breed, when all the results have shown that it is much more a question of type and of individual animals, and that even from the packers' standpoint there are good and bad in all breeds; and I am more than ever convinced after all that has been said and written on the subject that any of the breeds may by selection and proper feeding and handling be brought to the desired type and yet prove profitable feeding animals, while others claiming to be of the orthodox breed may be fed at a loss to the feeder.

We shall probably hear a good deal again at this Show about soft pork, and will perhaps be told again how to feed to prevent it, but feeders may be excused if they take advice with a grain of salt when we learn that the packers have condemned hogs that were fed just as they advised. The packers may know how to manage their end of the business, but there are yet a few things that even they do not know about what they consider the simple operation of feeding a pig. We all have a good deal to learn yet, and it is best not to be too sure about anything.

It is customary to appoint officers at every annual meeting, and as I have served my time as President and my term is out, you now have a President, a Vice-President and a Board of Directors to elect. I can assure you I feel more than obliged to you for your kindness in electing me to such an important office for two years. I never saw a Board of Directors or any number of business men who were more careful, or a better class of men to get along with than your Board of Directors. They were always ready and willing to work for the benefit of the Association. It was the whole desire of every man on the board to do his best for the benefit of the Association, and I can assure you that this Dominion Swine Breeders' Association stands second to none in North America. It is the leading Association in the Dominion, and we might safely say in North America.

THE BACON HOG.

By Prof. G. E. Day, B.S.A., Farm Superintendent O.A.C., Guelph.

It may seem to many that this bacon question is becoming worn threadbare, and that the bacon business is in danger of being overdone. There are certain phases of the matter, however, that cannot be kept too prominently before our minds, and while the present paper lays no special claims to originality, yet it represents an effort to bring together and classify a few leading facts, and to present a few suggestions for considera-

tion. In the preparation of this paper I have received material help from several leading breeders and packing houses, in the way of information and suggestions, and I gratefully acknowledge the assistance they have rendered.

In a previous paper before this Association, it was pointed out that the American export trade in pork products differs very materially from the Canadian trade, and hence the requirements of the Canadian packer are very different from those of the American packer. It was also pointed out that Canadian packers generally pay a higher price for hogs than American packers, owing to the fact that they cater to different markets, the logical conclusion being that it will pay the Canadian farmer to make an effort to retain our distinctly Canadian trade and keep out of competition, as far as possible, with the American farmer. Emphasis was also laid upon the importance of a regular supply of the right class of hogs, since a sufficient supply is a very important factor in retaining a market.

In view of these facts, the question arises, is it advisable that all hogs raised in Ontario should be of what is commonly called "bacon type"? This is a perfectly legitimate and very important question, and requires careful consideration. The only way of arriving at anything like a reasonable answer is to study the markets for pork products.

Of the exported pork products, by far the largest portion consists of "Wiltshire sides," manufactured from the class of animals known as "bacon hogs." In some of our largest factories, Wiltshire sides constitute fully 90 per cent. of the total exported products, while the most of the remainder is the product of hogs of the same type, but marketed at unsuitable weights or in unsuitable condition. Thus, practically all our exported pork products are manufactured from hogs of the bacon type.

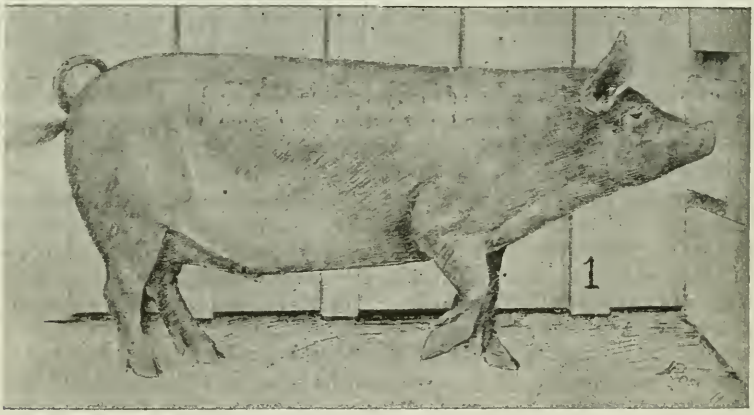


Fig. 1. Light jowl and good neck; shoulders well proportioned; belly sags a little towards the rear; a good length of side.

As for the home market, the cities and towns demand the product of the bacon hog for by far the greater part of their trade. The country trade is also calling for a leaner class of meat than was formerly used. A certain amount of "long clear" is required, but the bacon type of hog can also be made to produce this class of goods by feeding it longer and making it heavier and fatter than is required for Wiltshire sides. For the lumber camps considerable "long clear" and "barrel pork" is required, the latter being made from the thick, fat type of hog. The amount of barrel pork required, however, is relatively so small that it may almost be left out of consideration; besides, even in the lumber camps, there is a growing demand for leaner meat.

From these facts it will be seen that almost the whole home and foreign demand could be supplied by the bacon type of hog marketed at different stages of growth. And it must also be taken into consideration that even if every swine breeder in Ontario aimed to produce the bacon hog, there would certainly still be a considerable number of hogs marketed at unsuitable weights, or of unsuitable type for Wiltshire sides, sufficient in all probability to supply the demand for the other classes of goods. Everything considered, it looks very much as if, through force of circumstances, the bacon hog is bound

to rule in Ontario. We may just as well, therefore, accept the situation with a good grace, and devote ourselves seriously to the study of what bacon type really means.

We now come to a very important matter, that of judging swine of bacon type. It is perhaps too much to expect that there will ever be entire unanimity of opinion among judges, yet it is something greatly to be desired, and an effort should be made to come as near to this desired end as possible. The main difficulty in judging seems to arise from the fact that judges differ regarding the relative importance of the various parts of an animal. They may be in entire accord as to what constitutes a perfect bacon hog, but unfortunately, perfect animals are scarce, and it is in the attempt to balance one defect against another that differences in judgment frequently occur. It would seem reasonable, therefore, to assume that some authoritative standard of excellence and scale of points would be helpful in bringing about greater uniformity in judging.

There exists in the minds of some people a very strong prejudice against a scale of points, yet no judge, worthy of the name, ever makes awards in a show ring without a standard of excellence and scale of points in his mind. That is, he has his own ideas as to what constitutes perfection in the various parts of an animal, and he also has his own ideas as to the relative importance of these various parts. Without these things he cannot judge, for he has no basis upon which to make awards. The actual use of a score card in a a show ring is to be condemned. Scoring animals is a useful practice for the student, training him to notice all points of the animal, forcing him to make up his mind whether defects are serious or otherwise, and guiding him as to the relative importance of parts; but all this should be learned before he attempts to act as judge. The scale of points, then, is merely a means towards an end. It is an aid to judgment, but cannot take the place of judgment. It can serve merely as a general guide to judges, and, properly used, will aid in securing uniformity.

The preparation of a scale of points is no easy matter, and the scale presented here is not claimed to be perfection. It represents an effort to bring the question before this association in a tangible form, in the hope that something authoritive may result. In the scale of points given herewith, an attempt has been made to distinguish between a breeding animal and one intended for slaughtering. It is quite apparent that in breeding animals, weight limits should not be used. On the other hand, an animal that is to be

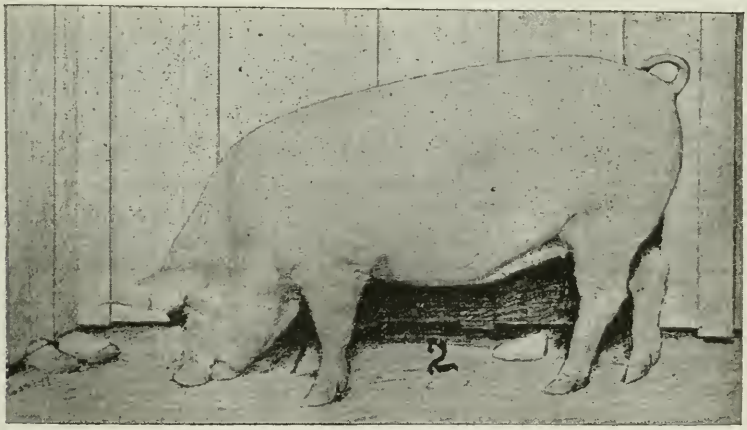


Fig. 2.—Well proportioned shoulder, good top line and good trim belly, but lacks length.

slaughtered need not be criticised as to eyes, ears, hair, style, or the strength of its pasterns, while weight becomes very important. Following is the suggested scale of points:

In connection with the scale of points, it will be well to study the diagram (Fig. 3) given below. It has been copied from an article by Loudon M. Douglas, in the Royal Agricultural Society's Report for 1898. Unfortunately, I have been unable to obtain later figures, but the diagram may be regarded as showing, at least approximately, the relative values of the various cuts. Attention is also called to Figures 1 and 2, which are modified sketches made from photographs of two of our experimental hogs.

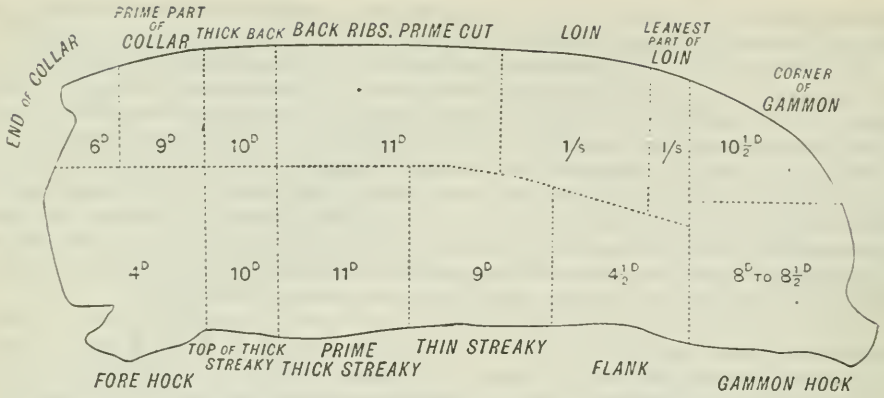


FIG. 3.—Diagram showing various cuts of a side of bacon, and the average prices realized for each during 1897. (Copied from R. A. S. Report for 1898.)

SCALE OF POINTS FOR HOGS OF BACON TYPE.

DESCRIPTION.	POINTS.
HEAD AND NECK—8 points:	
Snout, moderately fine	1
Eyes, good size, full and bright	1
Jowl, Light and neat	3
Neck, medium length and rather light, with no tendency to arch on top	3
FORE QUARTERS—17 points:	
Shoulders, light, smooth, rounded from side to side over top and very compact, no wider than back	9
Breast, good width and full	4
Fore Legs, set well apart, medium length, and straight; pasterns, upright; bone, flat, clean and moderately fine	4
BODY—40 points:	
Back, medium width, rising slightly above the straight line, and forming a very slight arch from neck to tail	9
Loin, strong and full but not unduly arched, wide as rest of back	5
Ribs, good length and moderately arched	3
Side, fairly deep: long, smooth, and straight between shoulder and ham; a straight-edge laid over shoulder point and ham should touch the side throughout	12
Heart Girth, full but not flabby at fore flanks, filled out even with side of shoulder; there should be no tucked up appearance back of fore legs, nor droop back of shoulder top	5
Flank, full and low	1
Underline, straight; the belly should markedly trim and neat	5
HIND QUARTERS—15 points:	
Rump, same width as back, long and slightly rounded from a point above hips to tail, and rounded from side to side over top	5
Ham, full without flabbiness; thigh, tapering towards hock without wrinkles or folds, and carrying flesh well down towards hock	6
Hind Legs, medium length; hocks, set well apart but not bowed outward; bone, flat, clean, and moderately fine; pasterns, strong	4
QUALITY—15 points:	
Ear, rather thin, (1); hair, fine and abundant, (2); skin, smooth, showing no tendency to wrinkle, (2); bone, flat and clean in legs, moderately fine in snout and head, and showing no prominence on side and top of shoulder, (5); flesh, firm and smooth, with no flabbiness at jowl, fore-flank, belly, or ham, (5)	15
STYLE—5 points:	
Active and sprightly in movement, walking without a swaying motion, and standing well up on toes	5
Perfection	100

N.B.—For hogs intended for killing, the same scale of points may be used with the following modifications: Strike out score for eyes, ears, hair and style; deduct two points from points allowed fore legs and also add following score:

Weight, 175 to 200 lbs., live weight. Being under 160 lbs. or over 220 lbs. will disqualify, 13

Regarding the scale of points the following may be noted:

Head and Neck: These parts have very little market value and consequently should be comparatively light. A great deal of the weight of the head is in the jowl, which should therefore be light. A long, scrawny neck is very objectionable, indicating poor

feeding qualities. A short neck is a good thing in itself, but where the neck is very short it is apt to be heavy on top, a formation associated with heavy shoulders carrying a great thickness of fat over the top. Fig. 1 shows a very light jowl and a good neck.

Fore Quarters: The diagram shows that the values are low in the fore quarters, particularly the fore hock, or shoulder. Consequently we want as little shoulder as is consistent with constitution: smoothness of shoulder being especially desirable. Figs. 1 and 2 show very well-proportioned shoulders, together with a very good representation of the style of legs required.

Body: A glance at the diagram will show the importance of the body and the desirability of great length. The desired top-line is well illustrated in Fig. 2, though the hog has scarcely enough length. While a "razor back" is not desirable, yet a broad back invariably gives too great a thickness of fat. A flabby, heavy belly with flabby fore flanks must not be mistaken for a long rib. A fair depth of side is very desirable, but when it goes beyond a certain point it becomes objectionable, because it gives too much belly meat. Notice in the diagram the prices of "flank" and "thin streaky" as compared with the cuts above them. Fig. 2 shows a good trim belly, but in fig. 1, it says a little too much towards the rear owing to the somewhat crouching position of the animal, which the artist has failed to entirely eliminate. Fig 1, however, shows an excellent length of side.

Hind Quarters: Some surprise may be occasioned by the comparatively low value attached to the ham in the diagram. A large, blocky ham is not desirable, but the ham should taper gradually towards the hock, and be very smooth.

Quality: Special attention should be paid to general smoothness and absence of flabbiness.

Style: This would of course be disregarded by the packer, but is deserving of some prominence in breeding stock.

Within the limits of a paper, it is not possible to do much more than outline so large a subject. I feel firmly convinced, however, that everyone who has the interests of our swine industry at heart will find it profitable to give this question very careful study. If this paper does no more than set someone thinking, it will not have been prepared in vain.

I would suggest that a committee of this Association be appointed to consider the question of a scale of points for the bacon hog. I think there is a little too much difference of opinion. I do not pretend to give this as a model at all, I just put it out to let somebody say whether it is useless or not. At any rate we have some kind of a scale of points, and I am going to use it myself, and I would like to have it as nearly perfect as possible, consequently I would be very much pleased if a committee be appointed to take this matter in hand. It has been suggested that a scale of points be drawn up for all the breeds. I am not sure but that committees may have been appointed, but if so, committees have never done anything, and I have taken this opportunity of bringing up the matter of the bacon hog, and I must thank you for listening to me so patiently at this late hour.

Mr. Leech (Wm. Davies Co., Toronto): If I am going to be a judge around the country I would like the question settled about the weight. As regards 220 pounds, they would never throw a hog out if the points are good. The tendency is that if they are over 200 pounds they are too fat, and that is the reason the limit is put at 200 pounds; but we never think of throwing them out if the quality is good merely because they run over 200 pounds. In all the other points I think the Professor is about right; he has got the hog down pretty fine.

Prof. Day: Supposing a hog is right in every respect what is the weight limit?

Mr. Leech: Over 220 pounds is too heavy for export. Sometimes a hog from 200 to 220 pounds is worth more than some hogs that are not so heavy. Sometimes we have to draw the line on account of their running too fat, and sometimes heavy stuff is not so much in demand as lighter stuff. Sometimes their is a large number of small hogs going in and then light stuff goes down, and at other times light stuff is demanded in preference to heavy.

A Member: What is the minimum weight, everything being right?

Mr. LEECH: From 170 up to about 200, or from 160 up to 200 or 220. I have known them to go down to 140 when light stuff has been in demand. The old country markets rule it. The William Davies Co. give the limit from 160 to 220 and sometimes they run down to 150.

A MEMBER: During the months of June, July and August are the packing houses sufficiently provided?

Mr. LEECH: Sometimes there is a little slack time in the month of July.

A MEMBER: What is the principle reason that hogs have gone down in the last two or three years, in the month of October, to such a low price?

Mr. LEECH: I suppose there is no doubt they go down in the months of August, September and October in the old country, and hogs when they are on the hook in Canada in the month of August cannot be sold over there till September or October. I suppose last August was the biggest month we had in the year, and that meat would get on the market in September or October. It depends upon the demand.

Moved by Prof. DAY, seconded by Mr. BRETHOUR, that a committee be appointed to draw up a scale of points. Carried.

Professor DAY and the executive officers of the Swine Breeders' Association, including Mr. BRETHOUR, were appointed a committee to draw up a scale of points for the bacon hog.

Mr. F. W. HODSON was made a life member of this Association.

GRANT OF $100 TO WINNIPEG AND BRANDON FAIRS.

At Winnipeg $70 was divided among seven classes, $5 being offered of a sweepstake prize for best boar and sow, any age, in each of the pure bred classes. The prizes won were as follows:

Berkshire boar	Proud Victor, 4,601	R. McKenzie, High Bluff, Man.
" sow	Prairie Flower, 5,891	F. W, Brown, Portage la Prairie, Man.
Yorkshire boar	Snowman 11th, 3,627	A. Graham, Pomeroy, Man.
" sow	Millie 4th, 2,758	Jas. Bray, Longburn, Man.
Chester White boar	Egbert, 1,235	W. McBride, Portage La Prairie, Man.
" " sow	Lottie, 1,311	W. McBride, Portage La Prairie, Man.
Tamworth boar	British Champion, 1,270	W. E. Baldwin, Manitou, Man.
" sow	Maggy, 333	L. A. Bradley, Portage La Prairie, Man.
Poland China boar	Jones' Choice, 1,122	W. M. Smith, Fairfield Plains, Ont.
" " sow	Roxy, 1,116	W. L. Trann, Crystal City, Man.
Duroc Jersey boar	Jimmy, 272	W. M. Smith, Fairfield Plains, Ont.
" " sow	Bertha, 318	W. M. Smith, Fairfield Plains, Ont.
Suffolk boar	Merry Boy, 257	K. McLeod; Dugald, Man.
" sow	Mayflower 2nd, 168	K. McLeod, Dugald, Man.

At Brandon $30 was divided among the four classes for purebreds, $7.50 being offered as a Sweepstake Prize for best sow, any age. The prizes won were as follows:

Berkshire sow	Cora Belle, 5,237	W. F. Brown, Portage La Prairie, Man.
Yorkshire sow	Millie 4th, 2,758	Jas. Bray, Longburn, Man.
Tamworth sow	Maggy, 333	L. A. Bradley, Portage La Prairie, Man.
Chester White sow	Roxy, 1,116	W. L. Trann, Crystal City, Man.

THE ADJOURNED ANNUAL AND DIRECTORS' MEETING.

The adjourned annual and directors' meeting of the Dominion Swine Breeders' Association convened at the Palmer House, Toronto, March 30th, 1900, President, W. Jones, in the chair.

On motion the secretary-treasurer's report and financial statement were adopted, after being taken up clause by clause.

Moved by G. B. Hood, seconded by A. Elliott, that the part of the secretary's report dealing with advertising lists of stock for sale in the different provinces and the United States be adopted. Carried.

Annual Auction Sales.

It was moved by J. E. Brethour, seconded by W. M. Smith, that this Association regards with favor the proposition to hold public auction sales under the control of the executive officers of the Provincial Live Stock Association; and that this association hereby empowers its executive officers to take such steps and appoint such committees as may be necessary to the carrying out of said sales. Carried.

Permanent Location of Show.

R. H. Harding moved, seconded by J. E. Brethour, that in view of the protracted discussion which took place at the Sheep and Cattle Breeders' meetings yesterday (March 29th) it be not necessary to hear the deputations at this meeting. Carried.

A ballot was then taken resulting in favor of Brantford as the city for the permanent location of the Provincial Winter Show.

Delegates to Board of Provincial Winter Fair.

On motion of A. Elliott, seconded by G. B. Hood, the following gentlemen were elected :—President, Prof. G. E. Day, G. B. Hood, Guelph, and G. E. Brethour, Burford.

Moved by J. E. Brethour, seconded by A. Elliott, that it is the opinion of the Swine Breeders' Association that for the accommodation of live stock the provisions made for loading and unloading swine at the Provincial Winter Fair shall be such that the animals will be loaded and unloaded from the cars to the building direct, on the different lines of railways. Carried.

Judges Swine Department.

Poland Chinas, Chester Whites, Duroc-Jerseys and Essex—Thos. Teasdale and G. B. Hood, Guelph.

Berkshires, Yorkshires, Tamworths and Grades—Wm. Jones and R. H. Harding, Thorndale.

Bacon classes—Judges to be appointed by the executive committee.

Prize List and Rules.

Moved by F. W. Hodson, seconded by J. E. Brethour, that the rules of the Winter Fair remain as they are. Carried.

On motion Suffolks were struck out in classes 35, 47 and 49.

Moved by Geo. Green, seconded by J. E. Brethour, that "Improved" be struck out of the prize list in Yorkshire and Berkshire classes. Carried.

On motion of F. W. Hodson, seconded by R. H. Harding, resolved that all pigs that are killed at the Provincial Winter Fair must have been shown alive.

A discussion arose as to how to distinguish the different hogs after being dressed. Mr. Brethour and Mr. Drummond were of opinion that tags would be the best, but suggested it be left in the hands of the executive.

It was moved by J. E. Brethour, seconded by Thos. Teasdale, that the weights of hogs must be between 160 and 220 lbs. to be eligible to enter in the bacon classes. Carried.

Feeding Experiments.

On motion the section of the secretary's report dealing with feeding of swine was adopted.

It was also resolved that the grant to Winnipeg and Brandon Fairs be according to to the report of the secretary, and that the classification be left in the hands of the executive committee.

Swine Record.

It was resolved that the Dominion Swine Breeders' Association authorize the secretary to have the Swine Record published quarterly.

On motion it was decided that the recommendation of the secretary regarding the Swine Record be accepted.

On motion, Mr. F. W. Hodson was made a member of the directorate for the present year on account of services rendered the Swine Breeders' Association.

The executive committee was instructed to make such amendments to the by-laws, rules and regulations as they deem necessary to carry the above into effect.

It was also resolved, that the editor, as soon as he completes the work of proof-reading, binding, etc., of the Swine Records, shall pass the volumes over to the secretary of this association for mailing purposes.

On motion of J. E. Brethour, it was resolved, that all members of the Swine Association for 1899 receive volume X. of the Swine Record, and that the quarterly issues be sent to members for 1900.

Executive Committee.

President, Vice-President, and Secretary, and J. E. Brethour, and Jos. Featherston.

FINANCIAL STATEMENT.

Receipts.

Cash on hand from previous year as per last report	$1,784 84
Members' fees	760 00
Legislative grant	1,500 00
Interest	50 00
Record fees	1,019 10
	$5,113 94

Expenditure.

Grant to other societies, fairs, etc	1,967 44
Secretary's salary, $200; directors' fees and expenses, $150.63	350 63
Postage and stationery, $122.16; printing, $96.16	218 32
Cost of reporting	39 95
Miscellaneous—	
Typewriting and preparing annual report	126 94
F. W. Hodson testimonial	22 85
Printing Record, volumes 8 and 9	1,536 40
Caretaker office, $5; auditor, 1898, $5; auditor, 1897, $4	14 00
Grants to Winnipeg and Brandon fairs	100 00
Telegraph, telephone, express, etc	19 05
	$4,395 58
Balance	718 36

Wm. Jones, President.

A. P. Westervelt, Treasurer.

Examined and found correct, this 28th day of March, 1900. J. M. Duff, Auditor.

MR GEORGE GREEN,

Ex-President Dominion Swine Breeders' Association.

Mr. George Green, who for the past two years has occupied the honorable position of President of the Dominion Swine Breeders' Association is a thorough Canadian, and was born in the township of West Zorra, Oxford County, in 1850. Like the majority of our Canadian farmers he has followed agricultural pursuits all his life. His educational training, similar to that of nearly every farmer's boy of a generation or two ago, was acquired at the public school. Mr. Green's farm consists of 103 acres, and is located in the township of Downie, Perth County.

Mr. Green has been one of Canada's leading breeders of Berkshire swine and Cotswold sheep for more than twenty years, having begun his career in 1878. Like everyone else starting in the business, he selected these breeds because he had a fancy for them,

MR. GEORGE GREEN, FAIRVIEW.

and believed they were calculated to greatly improve the sheep and swine industries of this country. Mr. Green has made several importations of stock from the United States and Great Britain for the Fairview Herd, and has also purchased imported Berkshires from other importers. In this way he has maintained the standard of his herd at the highest point of excellence, and made a name for himself as a breeder of pure bred stock.

As a prize winner at the leading fairs, Mr. Green's record is a very enviable one indeed. He has won numerous prizes, diplomas and medals. One of the most notable of his winnings was the Prince of Wales' prize of $50 in 1888 for the best Berkshire boar and two sows of any age. Though a large share of his trade is done with the farmers of Ontario, Mr. Green has made a number of notable sales of pure bred stock to many of the leading breeders in the United States, Manitoba and the North-West Territories.

One might perhaps imagine that after so successful a career as a breeder Mr. Green might be inclined to rest on his oars a little. But this, evidently, is not his intention. He has in his herd at the present time the largest stock and the best individual Berkshires he has ever had, as was evidenced by his prize winnings at the fall and winter shows.

Mr. Green has always evinced a live interest in everything pertaining to pure bred stock, and has been an active worker in the Dominion Swine Breeders' Association for a number of years. He has been a member of the directorate for several years, and during the time he has occupied the responsible position of President he has filled that office with credit to himself and to the Association.

MEMBERS OF THE DOMINION SWINE BREEDERS' ASSOCIATION, 1900.

Name.	Address.	Breed.
Ash, Wm. R	North Ridge, Ont	Berkshires.
Allan, E. E	Grafton, Ont.	Berkshires.
Agnew, Robert	Acton, Ont.	Berkshires.
Aiken, Wm	Milverton, Ont.	Yorkshires,
Allin, Fred. J	Hampton, Ont.	Yorkshires.
Arkell, Henry	Arkell, Ont.	Berkshires.
Armstrong, A. B.	Codrington, Ont.	Yorkshires.
Arnold, J. B.	Easton's Corner's, Ont.	Tamworths.
Alkhern, Wm.	Fulton's Mills, Ont.	
Bray, Jas.	Longburn, Man.	Yorkshires.
Baldwin, W. G.	Colchester, Ont.	Tamworths.
Blain, N. M.	St. George, Ont.	Tamworths.
Brandow, A. W.	Walsingham Centre, Ont.	Tamworths.
Baker, Ed.	Amherst, N.S.	Duroc Jerseys.
Baldwin, Wm. & Son	Manitou, Man.	Tamworths.
Bradley, L. A.	Portage la Prairie, Man.	Tamworths.
Bratt, Geo. A.	Inwood, Ont.	Yorkshires.
Ball, Thos.	Innisfail, Alta	Poland Chinas.
Black, W. W.	Amherst, N.S.	Tamworths.
Ball, E. W.	Hamburg, Mich.	Berkshires.
Baldwin, W. E.	Manitou, Man.	Tamworths.
Barry, Jas.	St. Justin de Newton, Que.	Berkshires.
Brandon, C.	Souris, Man.	Berkshires.
Brethour & Saunders	Burford, Ont.	Yorkshires.
Bell, John	Amber, Ont.	Tamworths.
Bennett, Geo. & Pardo	Charing Cross, Ont	Chester Whites.
Bennett, Jos.	South Buxton, Ont.	Poland Chinas.
Bennett, H. & Son	St. Williams, Ont.	Berkshires.
Betzner, G. D.	Copetown, Ont.	Yorkshires.
Brien, E.	Ridgetown, Ont.	Berkshires.
Birdsall, F. & Son	Birdsall, Ont.	Chester Whites.
Bedford, F. M.	Louisville, Ont.	Yorkshires.
Bonnycastle, F. & Son	Campbellford, Ont.	Berkshires.
Boynton, P. W. & Son	Dollar, Ont.	Berkshires.
Bow Park Co., Limited	Brantford, Ont.	Berkshires.
Brown, F. W.	Portage la Prairie, Man.	Berkshires.
Bowman, W. R.	Mt. Forest, Ont.	Berkshires.
Brooks, Thos. & Son	Brantford, Ont.	Tamworths.
Brown, Wm.	Paisley, Ont.	Tamworths.
Boyes, John, Jr.	Churchill, Ont.	Berkshires.
Boyd, Arch.	Kars, Ont.	Berkshires.
Boynton, C. G.	Georgeville, Que.	Chester Whites.
Brown, J. Rankin	Northampton, N.B.	Berkshires.
Bowman, T.	Berlin, Ont.	Chester Whites.
Butler, Wm. & Son	Dareham Centre, Ont.	Chester Whites, Duroc Jerseys.
Bustard, Geo. W.	Vicars, Que.	Chester Whites.
Caldwell, Bros.	Orchard, Ont.	Berkshire, Yorkshire.
Campbell, John	Snelgrove, Ont.	Berkshires.
Clarke, Wm.	N. Wiltshire, P.E.I.	Yorkshires.
Capes, Henry	Kertch, Ont.	Poland Chinas.
Cairns, Jos.	Camlachie, Ont.	Chester Whites.
Callback, J. W.	Augustine Cove, P.E.I.	Yorkshires, Poland Chinas.
Campbell, Mac	Northwood, Ont.	Berkshires, Chester Whites.
Clark, John	Orangeville, Ont.	Yorkshires.
Cavanagh, Wesley	Frankville, Ont.	Berkshires, Tamworths.
Campbell, D.	Clifford, Ont.	Berkshires.
Carpenter, W. S.	Simcoe, Ont.	Berkshires.
Campbell, C. A.	Mt. Vernon, Ont.	Berkshires.
Carver, E. A.	Colpoy's Bay, Ont.	Tamworths.
Clark, Wm.	Myersburg, Ont.	Berkshires.
Clark, Robert	Ottawa, Ont.	Chester Whites.
Chalmers, C.	Low Banks, Ont.	Tamworths.
Central Ex. Farm	Ottawa, Ont.	Berkshires.
Cox, T. A.	Brantford, Ont.	Berkshires.
Cousins, John & Son	Harriston, Ont	Yorkshires.
Conroy, R, & W.	Deschenes Mills, Que.	Tamworths.
Collyer, F. J.	Welwyn, Assa.	Berkshires.

MEMBERS OF THE DOMINION SWINE BREEDERS' ASSOCIATION, 1900.—*Continued.*

Name.	Address.	Breed.
Connolly, P. J.	Middleton, P. E. I	Yorkshires.
Colwill Bros.	Newcastle, Ont	Yorkshires.
Coleman, T. J.	Markdale, Ont	Berkshires.
Cowan, John C.	Gainsboro, Assa	Berkshires.
Cole, T. J.	Bowmanville, Ont	Tamworths, Yorkshires.
Coxworth, S.	Dauphin, Man	Berkshires.
Coleman, Jas.	St. Thomas, Ont	Poland Chinas.
Crowell, W. N.	Napinka, Man	Berkshires.
Chute, H. J.	Somerset, N.S	Chester Whites.
Crozier, Arch.	Beachburg, Ont	Berkshires.
Copland, S. R.	Harriston, Ont	Yorkshires.
Cousins, Fred	Purpleville, Wis	
Davis, H. J.	Woodstock, Ont	Berkshires, Yorkshires, Tamworths.
Drake, S. F.	Pownall, P. E. I.	Chester Whites.
Dafoe, Geo.	Avon, Ont	Tamworths.
Day, N.	Powell's Corners, Ont	Yorkshires.
Davis, C. G.	Freeman, Ont	Berkshires.
Davis, J. F	Tempo, Ont	Yorkshires.
De Courcey, D.	Bornholm, Ont	Poland Chinas.
Decker, C. R.	Chesterfield, Ont	Berkshires.
Demaray & Son	Strathroy Ont.	Yorkshires.
Dedels, Henry	Kossuth, Ont	Yorkshires, Tamworths.
Dyment, S.	Barrie, Ont	Berkshires.
Denison, W. S.	Denison's Mills, Que	Chester Whites.
Dorrance, Jas.	Seaforth, Ont	Berkshires.
Donaldson, Jas.	Dewittville, Que	Tamworths.
Douglas, John H.	Warkworth, Ont	Berkshires.
Douglas, Hugh	Huntingfield, Ont	Berkshires.
Dolson, Samuel	Alloa, Ont	Berkshires.
Dool, E.	Hartington, Ont	Berkshires.
Duthie, Jas.	Melgund, Man	Berkshires.
Duck, R. F.	Port Credit, Ont.	Yorkshires.
Dunbrook, Geo. F.	Wookstock, Ont	Berkshires.
Edwards, W. C.	Rockland, Ont	Berkshires.
Evans, John C	Grimesthrope, Man	Berkshires.
Elliott, And.	Galt, Ont	Tamworths.
Endsley, T. L.	Charleston, Ill	Tamworths.
Elliott, Wm.	Springbank, Ont	Yorkshires.
Esdon, James H.	Curry Hill, Ont	Berkshires.
Everett, W. W.	Chatham, Ont	Chester Whites.
Ellah, Jos.	St Mary's Ont	Yorkshires.
Elder, Jas.	Virden, Man	Berkshires.
Frank, A. & Son	The Grange, Ont	Suffolks.
Fraser, I. O.	Fellows, Ont	Duroc Jerseys.
Fahner, Chris.	Crediton, Ont.	Duroc Jerseys.
Flatt, D. C.	Millgrove, Ont	Yorkshires.
Frazer, Wm.	Campbellville, Ont	Yorkshires.
Featherston, Jos.	Streetsville, Ont.	Yorkshires, Suffolks, Essex.
Ferguson J. J.	Smith's Falls, Ont.	Berkshires.
Ferrier, A. G.	Knowlton, Que	Tamworths.
Fenner, Adam	Comber, Ont	Berkshires.
Fisher, W. & A.	Benmiller, Ont	Poland Chinas, Berkshires.
Frood, D.	Renfrew, Ont	Berkshires.
Fox, J. P.	Winchester, Ont	Tamworths.
Fulton, John, Jr.	Brownsville, Ont	Tamworths.
Graham, And.	Pomeroy, Ont	Yorkshires.
Graham, A. R.	Shanty Bay, Ont	Berkshires.
Garbutt, T. C.	Claremont, Ont	Berkshires.
Glass, Chas. G.	Danville, Que	Yorkshires.
Green, Geo.	Fairview, Ont.	Berkshires.
Greenwood, Thos.	Douglas, Man.	Berkshires, Yorkshires.
George, Thos.	Mt. Elgin, Ont.	Tamworths.
George, H. & Son	Crampton, Ont.	Tamworths, Chester Whites.
Gemmell, J. D.	Egmondville, Ont	Berkshires.
Glendinning, H.	Manilla, Ont.	Berkshires, Yorkshires.
Greenshields, J. N.	Danville, Que.	Yorkshires.
George, E. D.	Putnam, Ont.	Chester Whites.
Greenway, Hon. Thos.	Crystal City, Man	Berkshires.
Gibson R.	Delaware, Ont	Yorkshires.

MEMBERS OF THE DOMINION SWINE BREEDERS' ASSOCIATION, 1900.—*Continued.*

Name.	Address.	Breed.
Gillies, A. J.	Muirkirk, Ont.	Chester Whites.
Gibson, Robt.	Galt, Ont.	Berkshires.
Gies, Anthony	St. Jacob's, Ont.	Berkshires, Yorkshires.
Gibson, D. J.	Bowmanville, Ont.	Tamworths, Berkshires.
Golding, Hy	Thamesford, Ont.	Chester Whites, Tamworths.
Golden, J. H.	Amherstburg, Ont	Berkshires.
Gosney, Thos.	Miami, Man.	Berkshires.
Godard, Chas. E	Cobourg, Ont.	Chester Whites, Yorkshires, Berkshires.
Gummer, G. A.	Colborne, Ont.	Chester Whites.
Hartman, J. W.	Elmhedge, Ont.	Berkshires.
Harding, R. H.	Thorndale, Ont	Chester Whites.
Hanley, J. C.	Read, Ont.	Poland Chinas.
Hallman, A. C.	New Dundee, Ont.	Tamworths.
Hauser, Ignatius	Weisenburg, Ont.	Yorkshires.
Hart, Alex.	Hampstead, Ont.	Berkshires.
Hamilton, Daniel	Harriston, Ont.	Berkshires.
Harris, G. N.	Lynden, Ont.	Berkshires.
Hawkshaw, W. S. & Son	Glanworth, Ont.	Tamworths.
Harkness, T. J.	Annan, Ont.	Yorkshires.
Hastie, A. C.	Comber, Ont.	Berkshires.
Hart, Henry	Woodstock, Ont	Tamworths.
Hall, H. B.	Georgetown, N.B.	Tamworths.
Henderson, W. C.	Keady, Ont.	Berkshires.
Herron, Hy.	Avon, Ont.	Poland Chinas, Chester Whites,
Henderson, W.	Thamesville, Ont	Tamworths.
Henry, J. R.	Chater, Man.	Berkshires.
Henderson, E.	Swan Lake, Man.	Berkshires.
Heard, John H. & Sons	Flesherton, Ont.	
Hill, Geo.	Delaware, Ont.	Berkshires.
Hood, G. B.	Guelph Ont.	Yorkshires.
Honey, R.	Brickley, Ont.	Yorkshires.
Holmes, C. W.	Amherst, N.S.	Poland Chinas, Chester Whites.
Hoover, P. R. & Sons.	Green River, Ont.	Tamworths.
Howe, Wm.	North Bruce, Ont.	Yorkshires, Berkshires.
Hoard, J. & Sons	Parkhill, Ont.	Poland Chinas, Yorkshires, Suffolks. Tamworths.
Holland, T. F.	Dereham Centre, Ont.	Tamworths.
Hoffarth, J.	Carlsruhe, Ont.	Tamworths.
Howard, W. J.	Dollar, Ont	Yorkshires.
Hood, C. I.	Lowell, Mass	Berkshires.
Hodson, F. W.	Ottawa, Ont.	
Hume & Co., Alex.	Menie, Ont.	Yorkshires.
Hyslop, Robt.	Brantford, Ont	Berkshires.
Hyde, G. A.	Shakespeare, Ont	Berkshires, Yorkshires.
Hunter, H. A.	Orangeville, Ont.	Yorkshires, Berkshires.
Hubbard, W. W.	Sussex, N. B	
Hurley, J. M & Son.	Belleville, Ont.	Yorkshires, Berkshires.
Isaac, John	Markham, Ont	Berkshires.
Jarvis, G. L.	Paris, Ont	
Jeffs, E. & Son	Bond Head, Ont	Berkshires.
Johnston, A.	Greenwood, Ont	Berkshires.
Julian, Geo	Heathcote, Ont.	Berkshires.
Johnston, John.	Underwood, Ont.	Berkshires.
Johnson, F. P.	Moscow, Ont.	Berkshires, Tamworths.
Johnston, Ben	Rodney, Ont	Yorkshires.
Johnston, C. L	Rosedene, Ont	Berkshires.
Kelly, John	Shakespeare, Ont.	
Ketcheson, D. H	Menie, Ont.	Tamworths.
Kitching, John.	Corwhin, Ont	Berkshires.
Kipp, E. A.	Chilliwack, B. C	Berkshires.
Kipp, Henry	Chilliwack, B. C	Duroc Jerseys.
King, Oliver	Wawanesa, Man	Berkshires.
Kitson, Wm	Burnside, Man.	Berkshires.
Lang, R. L.	Oak Lake, Man	Berkshires.
Lawrie, R. J. & Bros	Wolverton, Ont	Tamworths.
Laidler, J.	Neepawa, Man	Berkshires.
Latimer Bros.	Artport, N. Y	Yorkshires.
Lahmer, John	Carrville, Ont	Berkshires.

MEMBERS OF THE DOMINION SWINE BREEDERS' ASSOCIATION, 1900.—*Continued.*

Name.	Address.	Breed.
Lamb, Alfred	Foreman, Ont	
Lemon, S.	Kettleby, Ont.	Berkshires.
Leatherdale, E	Morden, Man	Berkshires.
Lee, J. & Sons	Dunham, Que.	Chester Whites, Duroc Jerseys.
Livingston, J. A.	Grattan, Ont	Tamworths.
Little, Thos., Jr.	Kirkwall, Ont.	Yorkshires.
Lloyd, E.	Stouffville, Ont.	Berkshires.
Lloyd, Moses	Hazzard's Corners, Ont	Duroc Jerseys.
Lyons, S. K.	Norval, Ont.	Berkshires.
Lowe, F. H. H.	Minette, Man.	Berkshires.
Lee, J. W.	Simcoe, Ont.	Yorkshires.
Martin, E. E	Canning, Ont	Berkshires.
Martin, R. G.	Marysville, Ont.	Yorkshires, Berkshires.
Martin, W. H	Warden, Que.	Berkshires.
Mayloney, F. A.	Chapeau, Que.	Yorkshires.
Master, J. F.	New Dundee, Ont.	Yorkshires, Tamworths.
May, W. A	Creemore, Ont.	Yorkshires, Tamworths.
Martin, S. E	Bloomfield, Ont.	Duroc Jerseys.
Major, W.	Whitevale, Ont	Tamworths.
Mather, C. L.	Rosebank, Man.	Berkshires.
Meyer, J. E	Kossuth, Ont	Berkshires.
Meredith & Dunlop	Thorncliffe, Ont.	Poland Chinas.
Merriton, G. A	Allanburg, Ont.	Berkshires.
Merser, Thos	Markdale, Ont.	Berkshires.
Morrow, R. O.	Hilton, Ont.	Tamworths.
Morgan, E. H	Stanbridge Sta., Que.	Berkshires.
Moore, R. H. & Son	Rosedene, Ont	Berkshires.
Morrill, F. A.	Way's Mills, Que.	Berkshires.
Mullen, J. A.	Cypress River, Man.	Berkshires.
Murphy, R. G.	Elgin, Ont.	Berkshires.
Myles, J. A	Thornbury, Ont.	Tamworths, Yorkshires.
Muirhead, John	North Tyron, P.E.I	Tamworths,
Mutch, J. F.	Pilot Mound, Man.	Berkshires.
McCrae, Wm.	Guelph, Ont.	
McCrae, David	Guelph, Ont.	Yorkshires.
McKay, J. F	Parkhill, Ont.	Poland Chinas.
McAvoy, C. C.	Atha, Ont.	Berkshires.
McFarlane, Mungo	Cowal, Ont	Tamworths, Ont.
McMartin, Alex	Evelyn, Ont.	Yorkshires.
McKenzie, John	Presque Isle, Ont.	Tamworths.
McEachern Bros.	Argyle, Ont.	Chester Whites.
McKenzie, R.	High Bluff, Man.	Berkshires.
McEwan, J.	Kertch, Ont.	Berkshires.
McEwan, Jas.	Gleudale, Ont.	Berkshires.
McPherson, Alex.	Rutherford, Ont.	
McCrea, A	Merrickville, Que.	Berkshires.
McNish, C. H.	Lyn, Ont.	Yorkshires.
McGill, J. A.	Neepawa, Man.	Berkshires.
McGillivray, J. A.	Sumas, B. C	Tamworths.
McGill, D. E	Hillsburg, Ont.	Berkshires.
McIntyre, D. J.	Whitby, Ont	Tamworths.
McGill, G. B.	Middleton, N. S.	Tamworths.
McDonald, R N	Morganstown, Ont.	Berkshires.
McDonald, W. R.	Ridgetown, Ont	Tamworths.
McDonald, J. B.	Muirkirk, Ont.	Berkshires, Yorkshires.
McDowell, H. T.	Shawville, Que	Chester Whites.
McClure, T. A.	Meadowvale, Ont.	Suffolks, Essex.
McCutcheon, W. H.	Brussels, Ont.	Tamworths, Chester Whites
Nesbitt, W. H.	Eastwood, Ont	Chester Whites.
Newell, J. R	Crampton, Ont	Tamworths.
Neish, R. C.	Cannington Manor, Assa.	Berkshires.
Nichol, Robt	Brussels, Ont	Yorkshires.
Nicol, J. C.	Hubrey, Ont	Tamworths.
North, Geo.	Marden, Ont	Tamworths.
Ontario Agricultural College	Guelph, Ont.	Berkshires, Yorkshires.
Odell, W. H.	Belmont, Ont.	Tamworths.
Oke, Francis	Alvinston, Ont	Chester Whites.
Owens, Hon. W.	Montebello, Que.	York-hires, Tamworths.
Oliver, Wm	Komoka, Ont	Berkshires.
O'Brien, John	London, West	

MEMBERS OF THE DOMINION SWINE BREEDERS' ASSOCIATION, 1900.—*Continued.*

Name.	Address.	Breed.
Parlee, M. H.	Sussex, N. B	Berkshires.
Patch, C. W.	Brome, Que.	Duroc Jerseys.
Patterson, Wm	Churchill, Ont.	Berkshires.
Pearson, S. J. & Son	Meadowvale, Ont.	Berkshires.
Patch, Frank H.	Brome, Que.	Berkshires.
Parr, D. W.	Tintern, Ont.	Chester Whites.
Parsons, Wm.	Woodstock, Ont.	Berkshires.
Plaunt, X	Northcote, Ont.	Berkshires.
Palmer, W. H.	Elm Hedge, Ont.	Yorkshires.
Potter, A. B	Montgomery, Assa.	Yorkshires, Berkshires.
Pomeroy, W. J.	Mildmay, Ont.	Yorkshires.
Ritchie, Jas.	Belmore, Ont.	Berkshires.
Revell, H	Ingersoll, Ont.	Tamworths.
Reed, R. & Co.	Hintonburg, Ont	Berkshires, Tamworths.
Reid, Isaac.	Ardtrea, Ont	Berkshires.
Richardson, J. A.	South March, Ont.	Tamworths.
Richardson, H. F.	Kerwood, Ont.	Berkshires.
Richardson, R. H.	South March, Ont.	Chester Whites.
Rogers, L	Cooksville, Ont	Yorkshires.
Row, W.	Avon, Ont.	Tamworths.
Ross, J. A.	Melita, Man	Berkshires.
Ross, A. W	Douglas, Ont.	Yorkshires, Berkshires.
Rudd, W. J.	Eden Mills, Ont.	Berkshires.
Rusnell, F.	Cedarville, Ont.	Berkshires.
Russell, J. A.	Precious Corners, Ont.	Berkshires.
Ruston, J. F	Woodslee, Ont.	Berkshires.
Runciman, G. A.	Warkworth, Ont.	Chester Whites.
Russell, Thos	Bobcaygeon, Ont.	Yorkshires.
Row, Fred	Belmont, Ont.	Tamworths.
Roberts, Harry	Sharbot Lake, Ont.	Yorkshires.
Robertson, H. P.	Beachburg, Ont.	Yorkshires, Tamworths.
Robertson, R.	Nappan, N.S.	Tamworths.
Sanderson, Geo.	Colborne, Ont.	Berkshires.
Snarey, B. & Son.	Croton, Ont.	Poland Chinas, Yorkshires.
Shaver, Sills & Son.	Winchester Springs, Ont.	Yorkshires.
Shannon, J. & Son	Cloverdale, B. C.	Berkshires.
Sargent, F. O	Eddystone, Ont.	
Shearer, W. C.	Bright Ont.	Berkshires.
Spencer, W. H	Guilds, Ont.	Berkshires.
Semple, J. R.	Brule, N. S.	Berkshires.
Seymour, R. F	Essex, Ont	Berkshires.
Snell, R. P.	Snelgrove, Ont.	Berkshires.
Steffler, A.	Formosa, Ont.	Tamworths.
Steacy, R. G	Lyn, Ont	Yorkshires.
Selby, N. T	Newcastle, Ont	Tamworths.
Stevenson, A.	Atwood, Ont	Yorkshires.
Stepplee, John	Morden, Man.	Poland Chinas.
Smith, W. M. & J. C.	Fairfield Plains, Ont.	Duroc Jerseys, Poland Chinas.
Shringley, John	Allandale, Ont.	Berkshires.
Siefert, J. H.	North Bruce, Ont.	Berkshires.
Smith, J. & Sons	Duntroon, Ont	Berkshires.
Shibley, W. J.	Harrowsmith, Ont.	Berkshires.
Simenton, J. H.	Chatham, Ont.	Tamworths.
Smith, J. E	Wanstead, Ont	Berkshires.
Siprell & Carrol	Carholme, Ont.	Berkshires.
Smith, H. D.	Compton, Que.	Yorkshires, Tamworths.
Stirtinger, F. H	Fenwick, Ont.	Poland Chinas.
Shibley, J. E.	Harrowsmith, Ont.	Duroc Jerseys.
Smith, A. B.	Morrisburg, Ont.	Berkshires, Tamworths.
Spicer Bros	Yeovil, Ont.	Yorkshires.
Smith, W. J	Kilsyth, Ont.	Yorkshires, Berkshires.
Smith, J. H.	Highfield, Ont.	Berkshires.
Silver, J. R	Danville, Que.	Berkshires.
Stover, Samuel	Puce, Ont	Berkshires.
Somerton, Thos	Pakenham, Ont.	Tamworths.
Smythe, R. L.	Fargo, Ont.	Poland Chinas.
Scott, Samuel	Stonewall, Man	Berkshires.
Sutherland, Angus.	Eganville, Ont.	Berkshires.
Snyder, Gideon	Jarvis, Ont.	Chester Whites, Berkshires.
Tape Bros	Ridgetown, Ont	Duroc Jerseys.
Trann, W. R.	Crystal City, Man.	Poland Chinas.

MEMBERS OF THE DOMINION SWINE BREEDERS' ASSOCIATION, 1900.—*Concluded.*

Name.	Address.	Breed.
Treverton, Chas	Belleville, Ont	Tamworths.
Terrell, A	Wooler, Ont	Yorkshires.
Terhune, F. W	Brantford, Ont	Duroc Jerseys.
Teasdale, Thos	Concord, Ont	Berkshires.
Tierney, J. H.	Norham, Ont	Chester Whites, Tamworths, Berkshires.
Titmus, G. A	Ralphton, Man	Berkshires.
Thompson, G	Bright, Ont	Berkshires.
Thompson, S. J	Carberry, Man	Berkshires.
Thompson, Wm	White Rose, Ont	Berkshires.
Topley, Wm.	Morden, Man	Poland Chinas.
Thompson, Wm	Longford Mills, Ont	Berkshires.
Thompson, Jos	Sardis, B. C	Chester Whites.
Thompson, Robt	St. Catharines, Ont	
Thorndike, W. N	Oakwood, Ont	Berkshires.
Tumelty, W. J	Madoc, Ont	Duroc Jerseys.
Thurston Bros	Warkworth, Ont	Yorkshires.
Uglow, Wm	Port Hope, Ont	Berkshires.
Vance, R	Ida, Ont	Berkshires.
Vrooman, A	Carthage, N. Y	Yorkshires.
Watt, J. & W. B	Salem, Ont	Berkshires.
Wallace, R. H	Antrim, Ont	Berkshires.
Webster, R. A	Andrewsville, Ont	Poland Chinas.
Wells, A. C. & Son	Chilliwack, B. C	Berkshires.
Wilson, W. C	East Oro, Ont	Yorkshires.
Wright, W. E	Glanworth, Ont	Chester Whites.
Willis, R	Glen Meyer, Ont	Poland Chinas.
White, R. J	Colinville, Ont	Yorkshires.
Wilson, Mrs. A. J	Pittsfield, Ohio	Yorkshires.
Wrigley & Fox	Turgoose, B. C	Berkshires
Wright, Robt	Binbrook, Ont	Tamworths, Berkshires.
Wiley, Nelson	Wisbeach, Ont	Tamworths.
Wright, J. H.	Red Deer, Alta	Tamworths.
Wills, Henry	Winger, Ont	
Wylie, R. M. & Bros.	Cardinal, Ont	Berkshires.
Yuill, J. & Sons	Carleton Place, Ont	Berkshires.

JOINT PUBLIC MEETING.

A public meeting was held in the City Hall, London, on the evening of December 13th, 1899. The Hon. Sir JOHN CARLING occupied the chair, and delivered the following address of welcome :

I can assure you it gives me great pleasure, indeed, to be here to-night to meet so many of the prominent agriculturists of this Province and of this Dominion. I was born in this country, and brought up on a farm until I was twelve years old, and there obtained a slight knowledge of farming, and know a little about the management of a farm—as much as a farm lad could at that age. Ever since that time I have taken a very deep and warm interest in the welfare of farmers, and the prosperity of the agriculturist in this great Dominion. I have had opportunities to show my desire to further the interests of the agriculturists in the Province of Ontario and also in the Dominion of Canada, and it is cheering to me to see the very great interest and the very great progress that has been made in the advancement of agriculture in the Province and throughout this wide Dominion. I am sure Canada stands high to-day as an agricultural country. The products of Canada at the present time are sought for in the markets of the world, and especially in Great Britain our great mother country, the country which we all delight to honor, and which we are all proud to see prosper and also give us a share of her patronage. I am sure, that it is gratifying to note the different interests in Canadian agriculture, and to see the large increase of the sale in cheese, butter, and of cattle, and of horses, and sheep, and meats of all kinds, and fruits of all kinds. All these are being thought well of in the metropolis of the Empire. I have no doubt that as Canada improves, and as agriculture improves, that in the markets of Great Britain, which are always open to us, these exports will increase year after year so long as our country prospers. It will prosper, and I am satisfied the people of Great Britain will not want for bread or for food as long as the Dominion of Canada progresses as it is doing to-day.

ADDRESSES.

HON. JOHN DRYDEN, MINISTER OF AGRICULTURE FOR THE PROVINCE OF ONTARIO.

I want to say, Mr. Chairman, on behalf of the members of the Live Stock Associations, under whose auspices we are gathered here to-night, that we accept with gratitude the kind words of praise with which you have spoken of the calling in which we are engaged. I think the city of London is peculiarly situated for an exhibition such as that now being held here. It is the centre of a very large and rich agricultural district. It is not only the centre of a rich agricultural district, but in that district we have some of our most enterprising, energetic and skilful farmers, and the railway arrangements which have been made in connection with this exhibition enable the stock breeders all over the Province to be present also, and so I assume we have here the representatives of the best skill and thought among our agriculturists in the Province.

I think we deserve well of our neighbors and citizens who follow other callings ; we deserve the sympathy of the people who live in our cities and towns. We are carrying on an industry which has within itself immense possibilities for the advantage and prosperity of the country, an industry which affords scope for the keenest intellect of our most thoughtful men. We are not dealing with dead matter which a man can shape with chisel and hammer according to the artist's design, but we are dealing with living animals. The breeder finds that in carrying on his work he has to deal with the most subtle influences of nature's law, so that his operations are at times very difficult. But we who engage in this industry must have our IDEAL. This is not presented before us in all its perfection, for we seldom reach perfection in this industry, but it must exist in the mind of the breeder. We require to have eyes almost like " X Rays " which penetrate beneath the surface of the skin of the animal with which we are dealing, because we must study not outside form merely, but we must study the quality of the flesh which the animal produces. Fortunately for us we may by permitted to build on what our predecessors have done before us, but if we maintain the position of those who have gone before us, or if we attempt at all to improve, we shall require to exercise the same skill which made them famous in their day.

Then our work is made more arduous because we are obliged to wait sometimes for years for the development of the animal before we are able to tell whether we have made success or failure ; thus we learn patience, perseverance and courage in our work, and sometimes we profit equally by our failures as by our success. Some of us have learned that it is easy for us to waste a good deal of our capital by improper investment, but if we do we adopt the schoolboy's motto which is "If at first you don't succeed, try, try again." And so we keep at it day by day, and year by year, and hence I think these men deserve to be held in the highest regard by their neighbors and citizens who follow other callings.

If we make our calling a success we shall be able to add millions of wealth to our country, millions of wealth which does not remain in the hands of those who first produced it, but wealth which scatters itself through all the channels of our commercial life. We cannot in this live stock industry take advantage of the training of one man as the farmers do, who pay attention to the manufacture of cheese and butter, but you will find the work is done and must always be done in perfect isolation, each man attending to his own affairs and working by himself, one here and another there, scattered all over the country ; and so to-day we have all over this Province these stalwart men, laboring with their hands, watching with their eyes, with the keenest interest, the development of the animals which they have in hand, and steadily pondering with their brain what is the next best step to take, in order to reach that perfection for which they are aiming We are brought together on occasions like this so that we may show one another just what our thought and skill has been, and that we may show the world also the success we have made. And looking at the exhibition which I had the privilege to visit for a few moments, I say that no Canadian should be ashamed of what these men have accomplished.

What is the object which we have in view ? The first object is to stimulate and to help each other. "As iron sharpeneth iron, so does the face of man that of his friend ;" and some of us know how important these gatherings are, when we look at it from a personal view, when we are able to suggest new thoughts to each other and new ideas. Perhaps we do not value this part of our gathering as much as we might, but it has its benefits upon other men who engage in work of this kind, and then when we go and witness the success of our neighbor it stimulates us. How many of our young men in this country have received their first inspiration by coming to just such an Exhibition as this, and by looking at those beautiful animals as they are presented in the ring, and resolving that they might by the same thought and skill and enterprise accomplish just such results as they have seen.

Then the second thing is that we might decide what ought to be the right ideal towards which we should aim. Will you let me say that those who occupy the position of judges at an exhibition of this kind have placed upon them a very serious responsibility. Perhaps they sometimes say, "It goes no further than the exhibitor ; it is just a question as to whether I shall give this man so many dollars or the other man." But I say there is far more in it than that. That judge is saying to that young man, "In my opinion that is the ideal towards which you should aim ;" and therefore shows of this kind become an educative medium which has a very great advantage.

Then I would like to say another thing in reference to this ideal. The buyers of our animals, by proper discrimination, may be also able to assist our young men in deciding what is the right ideal. We are just now trying to decide in this country, and trying to establish if we can what is the right ideal for the bacon hog. It is a little difficult to make a proper impression upon our farmers. Those who judge these animals here will be able to do something in that line ; but the people who buy them, if they will only pay attention to a proper discrimination in the market will do a great deal more. I have complained publicly, and I want to complain here again, that we don't have in this country sufficient discrimination in the purchase of our live stock. (Hear, hear). The man who produces an inferior article very often gets the same price as the man who produces the superior article ; and the result is, while the man who produces that which is superior is discouraged, the man who produces the inferior animal is encouraged. It is not so in England ; it is not so anywhere in Great Britain. You put upon the British market that which is superior and you get a price corresponding. Here the drover goes out, and he decides if he is purchasing beef, that he will pay so much a pound, and pork so much a pound, that settles it, good or bad. That is one of the disadvantages we have had to

meet with in this country, and I hope to see some improvement the near future, because the buyer has something to do in deciding for our people what is the proper ideal towards which they are reaching. The third object which we have in view is that these exhibitions should be an educative medium reaching out to all classes of the community. That there are some skilful men conducting this business is proven by what you see at this exhibition, but we want to bring light and inspiration to all our people engaged in this industry. What we want is not here and there one man who can produce something very superior, but we want to see the average of our products in this country rise above the standard it has to-day. In order to attain that we have to keep on with this educative work year by year. We are wanting to make our farmers all over the country feel that the man who produces inferior articles is standing in the way of the progress of the country. We want to make him feel that the man who presents for sale an inferior article is an enemy to his country. I would like to say right here that the man who places in a barrel of apples the good apples on top and bottom, and in the middle rubbish, is a criminal, and ought to be punished. (Applause.) I tell you that he is a thief; he is trying to steal, or if he does not steal, he has destroyed the reputation of his country while he is injuring himself. If he only injured himself I could let him go; but he is injuring his neighbor and his country. My friend, Mr. Fisher, is here and hears me say it, that by some way or other we must put a stop to this injury to our common country, and I might say the same thing with reference to the bacon, about which I was speaking a moment ago. We want to make our farmers realize that the object which they ought to have in view is to produce the right article, so that we may be able to capture the best market in the mother country.

I think we must make some effort to bring the packer and the feeder and the breeder together. Surely these people have a common interest. The packer cannot produce good bacon unless you give him the raw material, and I would like to say to the packer that he cannot get his raw material unless he is willing to pay sufficient price for it, so we want to bring these people together. I have had considerable correspondence with reference to this question with one of the managers of a large packing house. I have been trying to ascertain for myself and for your benefit why it is at certain seasons of the year, without any apparent cause, the prices of these products are reduced so very much. Without giving you the details of our correspondence I have come to this point. He says there are certain seasons of the year when these products always drop in the English market, and we must prepare for this drop. That season of the year is generally about Christmas time—in December and part of January. The market is more or less filled up with all sorts of food products, and so these men, in order to protect themselves (the raw material having to go through a six weeks' preparation), reduce the price before the price is reduced in the old country; and so I have their opinion that the farmers ought not send so many hogs during the months of October and November. They want a very much less number at that season of the year, and instead of receiving a less number they receive a much greater number. If that little piece of information is of any value to any of you here, you will remember it. Keep away from the months of October and November and try to prepare your products for the other months, when the prices are almost sure to range higher.

I want to say further that our buyers will give us a fair price if we have a fair article, but we must have some ideal before us. You might just as well expect a sculptor to take a piece of marble and chisel it by chance and make something out of it, as to expect a man without any object in view to produce an article that is wanted to capture this market. We want the educational interests of this exhibition to reach all the people of this country. This year we have numbers of our lecturers to the farmers' institutes here. They are receiving at this exhibition a message which they will be able to carry to the farmers' institutes all over the country of what is taking place here. It will be presented in every nook and corner of our country, so that we will be able to produce something nearer the desired article, to furnish to the pork packers just what they want. I repeat again, we would like in all this work to have the influence of our town and city friends. Especially we would like to feel that they are sympathetic with us in the work. But whether we do or not, I believe among our live stock men, we have pluck enough and perserverance enough to work out the problems we have before us to the credit of ourselves and the benefit of our country. (Applause).

The Chairman : We have had the pleasure of listening to a speech from the Minister of Agriculture for the Province of Ontario, and we are now to be honored by an address from the Minister of Agriculture for the Dominion, the Hon. Mr. Fisher. It is very pleasant indeed, that at a meeting like this we can talk about things interesting to the farmer and to the country, and have no politics in our addresses. I am sure this assembly is made up of all classes and of all thoughts politically, but we all have at heart the great interest and welfare of this Province and the welfare of the Dominion, and I am glad to know that politics are not thought of here to-night, and that the great agricultural interests of the country are first in all our minds. I will now call upon the Hon. Sydney Fisher to address you.

Hon. Mr. Fisher, Minister of Agriculture for the Dominion.

I want to thank you personally, Mr. Chairman, especially for your kindness in introducing me to this audience. I appreciate the fact that amongst the distinguished men who have preceded me in the responsible position which I now occupy, there was no one of them who had more at heart, the interest of agriculture than yourself. (Cheers). I feel it an honor to occupy the position in succession to yourself and others, and I am glad on this occasion to come before an audience which is representative of the back-bone of this country and especially of this Province of Ontario. In the course of the day at the exhibition, I have been struck, as I am struck here to night looking over this audience, by the fact that I am in contact with the men whose names are known through the length and breadth of Canada, and in many instances far outside the bounds of Canada, as the live-stock breeders of this country, the men who have helped to make Canadian agriculture what it is. And speaking to them as I am to-night, inexperienced in this business in comparison with many of them, I feel a diffidence in saying anything ; and yet having been charged with these vast interests, I feel it necessary to say a few words upon some things which should be of interest to us all.

In the first place I would like to say, looking from the point of vantage which I occupy in the Department of Agriculture, that this has been a prosperous year for the farmers of Canada. It has been prosperous in almost, if not absolutely every branch of our business ; it has been prosperous generally through the whole length and breadth of our country ; and this prosperity has been pretty fairly and evenly distributed over all classes and all branches of husbandry. I think this is a subject for sincere congratulation to those who are interested in this business. It is true that in some particular places there has been an occasional deficiency, but, fortunately for us farmers in the Dominion of Canada, fortunately for agriculture in our country, these deficiencies have been special or local and comparatively of small account, while in the great variety of our products, notwithstanding local deficiencies, there has been prosperity among the farmers of the country. It has been the custom for speakers to present to audiences the grandeur of the exports of agricultural products, and it is a theme upon which we can dwell with pride and satisfaction, this year as heretofore—perhaps this year in greater measure than ever before. But when we discuss this measure or export we are apt to forget that after all the export part of the products of our farm is but a very small part of that produced by the farmers of this country. We consume in our home markets here, by far the greater portion of our agricultural products, cheese being the single exception to the rule. The export of butter this year has increased enormously, something like 70 per cent. over last year, which again was a very much larger export than the year before ; yet in Canada, we still consume more than double the butter we export. When we come to discuss our agricultural interests, therefore, we must not forget that first of all we feed the people of Canada, and that we consume most of our own farm products here at home. This is an important item, because if we discuss exports solely we might imagine that certain classes of our products were far more important than they really are. Five-sixths of the products of our fields are fed to the live stock of our country, and not to the people. Some of you may have thought of this and worked it out. I confess that when I came to discuss the question in my mind, I was rather startled to find that not only in bulk, but in value also, putting aside the pasture of our country and simply dealing with the hay and other crops of our land, five-sixths of its value as well as five-sixths of its bulk goes into the animals of our country. You can well understand the importance of the

live-stock of the land, how important the live-stock man and the breeder of this country is to the development of agriculture and to the prosperity of the whole country. (Applause). Our season's work in live-stock has been this year more satisfactory than any other part of our work. It is true we have had a very bountiful harvest of grain, but notwithstanding this the business of our live-stock both in the home and the foreign market has been unusually satisfactory ; we have had better prices for our cattle, we have had better prices for our sheep, and our horses of good quality have brought better returns than for some time past. Our hogs, it is true, have not brought us per pound equally as much as they have in recent years, but still, after examining the matter carefully, I venture to say that the aggregate money paid to the farmers of this country for their hogs sums up to a greater total than we have ever had before in the history of Canada. Again, if you take poultry and eggs, we find we have produced and are exporting a larger quantity of these than ever before, and though our prices are good, and though poultry and eggs are better, and are constantly improving, our daily products have occupied perhaps the brightest spot in our agricultural growth. This year not only have we had a larger product than usual both for cheese and butter, but we have the extreme gratification of knowing that in Great Britain, which is our principal market for dairy products, our cheese has maintained its splendid position, first of all imported cheese. Our butter also has made more substantial and visible gains, as is shown by the fact that Canadian butter this year has received a price at least two cents higher than it ever did before in the English market. (Applause). I speak of these things in connection with the live-stock industry, because after all live-stock is not simply the live animal. A portion of that business is also the beef produced from the cattle, the mutton produced from the sheep, and the pork, bacon, and ham produced from the hogs, the poultry and eggs produced from the fowl, and the butter and cheese that comes from our cows,—these are all included and directly dependent upon the live-stock interest and live-stock men of the country, and do not forget that into this live-stock goes five-sixths of all the crops that are raised in Canada.

I have listened with a great deal of pleasure and a great deal of satisfaction to the words of warning and the words of advice which have this evening dropped from the lips of the Honorable Minister of Agriculture for Ontario. Mr. Dryden has spoken not as a theorist, but as a practical breeder of stock, and he has earned the right to do this, for like many others among you his stock is known both throughout Canada and in the United States. He has given you advice and warning from the richness of his own experience and knowledge, and I was especially glad to see that he dwelt with a good deal of emphasis upon what he called the *ideal* to which the live stock breeder must work. I wish to say a few words upon that point myself, because, while I feel that you hardly need such advice, and while you generally do what Mr. Dryden advises you to do, still I believe it to be true that generally throughout Canada the average farmer, the men who are handling the greater bulk of the live stock of this country, they who have it in their power to make that live stock better or worse—these men generally have not appreciated and have not thought of the full importance, the full value of breeding to a type. In this room there are a very large number of Institute workers of the Province of Ontario, the men who have the very responsible position of teaching the farmers of the country—not the boys and girls, but the men and women. I am glad to know they are here, and I hope they will deliver to the audiences they address throughout the Province the message which Mr. Dryden has given.

Where do we go for our instruction in connection with live stock matters? Where do we go when we want to improve the herd we have? We go to Great Britain, and if you take to-day the names and breeds of live stock which are the standard of excellence in any particular line the world over, what do you find? You find that these breeds are named from counties or districts in that land—although no doubt the original foundation of many of them is laid by individuals—but they are named from the county and district, and why? Because through a long term of years not one individual, but a whole neighborhood, were breeding the one type which they found to be the standard, that had the greatest number of good qualities, suitable to the market and to the condition in which they lived. The result has been that the counties of Durham, Hereford and Ayrshire, and the islands of Jersey and Guernsey have produced certain breeds of cattle ; other counties have produced certain breeds of sheep and hogs. And what is the result to-day

of this work through a long period of time? I grant you not by one or two scattered individuals, one here and there, but by a whole group of men working together and breeding to a particular kind, what is the result to day? If one of you experienced live stock men were to be transported and set down in Ayrshire in Scotland without being told where you were at all, if you were to drive five miles along the road, you could tell you were in Ayrshire from the class of cattle you saw.

If you went into Leicestershire you will see the same thing, but in this county the sheep would be your guide, and this is descriptive of the counties and localities where the best breeds of animals have been created. Is there any part of Canada to-day of which the same thing could be spoken? I have not found it. On the contrary wherever I go —and I have travelled from one end of this country to the other, and as a farmer I have been watching the stock wherever I have gone—I find our stock varied in character, not of any particular type in any particular district, but apparently the product of crossing with every conceivable breed of every description. This being the case, can it fairly be said of our stock in Canada, that it is of the highest possible quality? I know that in this audience there are a number of men who are just as good breeders as tread the face of the earth, I know that in this audience there are a number of men who understand this thing, and have been doing their very best to remove that blot upon the live stock of this country; but I venture to say, that what I have said here to-night is true of the general live stock of this land, and until that is removed we cannot be satisfied, and you must not be satisfied in the work you have been doing for the improvement of the live stock of Canada. I believe that it is a very important matter to get a whole section or a whole neighborhood to breed the same kind of stock, and with some type or ideal before them.

In certain sections of this country it is quite true that, where Durham cattle have been introduced, good beef steers can be more easily bought than any other classes of animals, but I venture to say that if a buyer were to go into one of these sections he would find fully half the animals that he saw such as would in no way suit his purpose or fill his ideal, because they had been bred in another direction, bred perhaps for a different purpose or more probably they had been bred with no skill or with no object at all. If, on the contrary, the buyer could go into a certain section of this country and know that he was sure to find there the animals he wanted, beef animals, dairy cows, sheep for long wool purposes, or good mutton sheep, whatever it may be he wanted; if he could be sure that in any particular section of the country he could go and find a thousand, one hundred, or even fifty farmers breeding a certain type, then he would always go there and would always be able and willing to pay higher prices for the animals which he found there than he can or will pay.

This is a matter which I believe to be of the utmost importance to the live stock development of this country, and I trust that the words which I have uttered, and reinforced by and perhaps enlarged upon by the kindly warning and advice of Mr. Dryden, you will do something in this direction.

Now, I have felt that the live stock interests were so vastly important in this country, and still so far behind what they might or ought to be, that last season I took upon myself to ask from Parliament a grant of money to aid the work which was being done in the dairy branch of my department. I proposed then, and I propose still, to devote that sum of money to doing what can be done by Government to aid the live stock interests of the land. I am sure you gentlemen here to-night still sympathize with me in the satisfaction I feel in having secured the services of Mr. F. W. Hodson, for Live Stock Commissioner. Knowing the good work he had done through the Live Stock Association of Ontario, and seeing the results of that work in many of the agricultural meetings which I have had the opportunity of attending, I feel his experience and knowledge, his energy and untiring zeal in the work he has been engaged in here, will be of the utmost value in the greater sphere of usefulness to which he has now been called, and I may say that in securing Mr. Hodson I acted with the full concordance of the Minister of Agriculture for the Province of Ontario. I trust that he may be spared to do for the other provinces what with your aid and co-operation he has been able to do for Ontario. I am satisfied that in that wider sphere and in that more arduous labor, he will be working not only in the interests of the other parts of the Dominion, but equally in the interests of the live stock men of Ontario just as he has in the past. (Applause.) This work the Government cannot do except with the co-operation and sympathy of the live stock men of the

country, and, therefore, I come before you tonight and ask you, the Live Stock Associations of the Province of Ontario, to give us that support and sympathy, and to aid us in the work which we hope to be able to accomplish with the whole Dominion. The markets for your thoroughbred stock will be enlarged just as soon as the farmers in the Maritime Provinces and in Quebec, and in the Great West awaken to the necessity of raising pure-bred stock. They must go largely to you to get it, just as you have been going in years past to Great Britain to get the stock for the work which you have done here. Therefore, you are personally and financially interested in this greater work. I am glad to know that in other parts of the country there are men scattered here and there—true in no great numbers as there are here, nor with so great experience as you have, still a few in the Province of Quebec and in the Maritime Provinces, and in the Great West—who have been working and doing what they could to improve the live stock of their several localities, and I trust that through the efforts and energies of Mr. Hudson we may be able largely to organize these men into such Live Stock Associations in their respective provinces as you have done here with such magnificent results. I am sure that in the other parts of the country, these men will be able to look to you for guidance and for knowledge and for sympathy and for co-operation, and I trust that they will not look to you in vain.

Mr. Chairman, I have spoken perhaps too long. These things are very close to my heart, and I feel the greatest interest in them and the full responsibility which rests upon my shoulders in doing this work, but I hope to-night as in times past I have the co-operation, sympathy, and support of this audience, which comprises the leaders of the live stock interests of this great Province, and with all that support and sympathy I feel satisfied that I and my officers shall be able to do something more for the live stock interests of Canada. (Applause.)

DR. JAMES MILLS, PRESIDENT ONTARIO AGRICULTURAL COLLEGE, GUELPH, ONT.

I realize the truth of what a gentleman said to me since I came upon the platform, that we have gathered around us to-night a very considerable group of the brightest men in Ontario and some from outside this Province. I recognize a great many familiar faces, prominent breeders and other prominent men who visit the Agricultural College from time to time. It is said as regards these shows that the larger the city the less sympathy and the smaller attendance. That is the reason that this great show has gone from the city of Toronto, and London is having just this one trial, and, if they do not turn out in larger numbers, it will be an excellent reason why the smaller city of Guelph should have it next year. I feel that these new countries we are all apt to set up false standards of excellence and false standards of propriety. I see a great difference in the people who visit us from time to time in Guelph We have ladies from the old country and ladies from the Dominion of Canada at the College at Guelph from time to time, and our Canadian ladies, especially those from London and Toronto, and other important places, are very much interested in the green houses and might possibly visit the laboratories, but they shy off when you speak of the stables and the barnyards. They think it is hardly the place for a lady in this great Dominion of Canada. I find a different feeling among the English ladies. They first place they want to visit is the barnyard. They want to see good cattle and sheep and swine, and they go in among them and handle them and call them by their right name. (Laughter and applause.) It is hard for the men and women in the large city to understand that they have anything to do with cattle and sheep and hogs and even poultry. Now, I venture to say that this is a tremendous mistake. You know in England Her Majesty has her herds and flocks, and men make money in law and medicine and merchandise in that land and buy land and farm it at a loss because of the social status it gives them. (Applause.) And I want the ladies and gentlemen of these thriving cities of this new Dominion of Canada to bear that in mind, and I want those who are here to-night to tell hundreds that ought to be here that we expect to see them at the fat stock show to-morrow, and that they will never spend a quarter to better advantage than they will in visiting that show. (Applause).

I want to say first of all, that I am specially pleased to night to see the Hon. Sir John Carling in the chair, presiding over this meeting. (Applause). I never before had

the opportunity of addressing a meeting where Sir John Carling was in the chair, and my reason for being so specially pleased is, that to Sir John Carling belongs the honor of having taken the first steps towards founding a school of Agriculture in the Province of Ontario, the first important steps, which meant a great deal more than mere talk, and also the credit of having at a later day established the Dominion Experimental farms. (Applause) I feel therefore that the Province of Ontario and the Dominion of Canada are largely indebted to Sir John Carling, and I think the least we can do is to thus publicly acknowledge our indebtedness.

Now I bring greetings from the Ontario Agricultural College. Several members of our staff are assisting in this great show. We are all very much interested. It is a Provincial Fat Stock, Dairy and Dressed Poultry Show, and is doing excellent service for the Province of Ontario. The great development of the show during the last few years is no doubt due to several causes. I would say first to the assistance which the Government gives to the various Live Stock Associations ; secondly, to the loyalty of the Cattle, Sheep, and Swine Breeders' Associations and their liberality in making large grants of monies for prizes from year to year ; and thirdly, and chiefly, to the popularity, enterprising zeal, push, sound judgment and untiring endeavors of F. W. Hodson, the Secretary of this Association and the manager of the Show. You have lived long enough to know that in any business,—in agriculture, and in shows or anything else you can name,—everything depends on the management. Mr. Hodson has left us now in a sense, but I venture to say he has given life and vigor to the Live Stock Associations of this Province, and he has successfully assisted them to make this show a success. He soon learned he could never make the show what it ought to be without having the backing and sympathy and support of these live stock men, and he has succeeded in that respect.

Eight years ago the Dominion Live Stock Associations had a membership of fifteen, and annual receipts amounting to fifteen dollars. To-day the membership is nearly six hundred and the annual receipts of the Cattle, Sheep and Swine Breeders' Associations is over six thousand dollars, and the work done by these Associations within the last few years has been, I think, of the greatest advantage to the farmers and breeders of the Province, first in securing better judges and judging at the shows of the Province ; secondly, in obtaining greatly reduced rates for the transportation of pure bred stock, and thirdly, in developing interprovincial trade in pure bred stock. Where it formerly cost $30 to $100 to send an animal to a certain part of this Dominion, it now costs from $10 to $18. About three years ago the trade between the Provinces in pure-bred stock was scarcely worth naming, and since that time over $200,000 worth of pure-bred stock has gone from Ontario to the Provinces east and west. That certainly is something worth thing about.

I am pleased to notice several new and important features in the show this season : First, the dressing and packing of poultry, and the dressing of poultry by experts, not by men only but by the dainty hands of a woman. Then the block tests of sheep and swine with the addresses of judges of sheep and bacon classes of swine, illustrated addresses on the ideal sheep by a graduate of our own College, Professor J. A. Craig, of the State College of Agriculture, at Ames, Iowa, and an address to the Farmers Institutes by A. W. Campbell on "Good Roads," and I say "The Lord help Mr. Campbell to get better roads." If ever there was in any country an exemplification of utter inefficiency and waste of money I think we have it in our statute labor system. If there is any parallel to be found in it anywhere it is in the utter inefficiency and disgraceful condition of the streets in our smaller cities. If you travel for miles in the country with a clean buggy you can be sure that when you reach one of these smaller cities you will have it muddy.

I am also glad to see that they have an engine here to run a cream separator. All this I say makes for education, and that is why we are so strongly in favor of this winter fair. It provides an education of a most valuable and practicable kind. The time has now come to think what is the best education for the people of this country.

Those who visit the show, and I hope you all do, find illustration after illustration there of what can be accomplished by skill and energy in the proper selection and feeding of animals. I have come to the conclusion that the prosperity of the country does not depend so much upon its natural advantages as upon the industry and qualities of its people. Why did this Province make such a distinctive record at the Centennial Fair and the World's Fair, Chicago ? Many of the States across the line are ahead of us in climate,

but our success was due to the high standard of industrial intelligence among our people, and that is one thing we have to consider—how we can improve the industrial qualities of our people—and that raises the whole question of practical education in this country. The people are turning now towards practical education. What about the London Normal School that is going to be opened? I think the time has come that it should be insisted upon that our daughters should have a thorough training in domestic economy. The session of the Normal School should be extended for one year, instead of for six months. One year is short enough, and if you extend this for one year you could send the ladies out trained to teach our girls sewing and darning and cooking, and it is time we did. (Applause). If the course lasts only half a year, however, you cannot do it. Now, I say, we have lots of teachers, they are just tripping one another. Why should we be in a hurry to extend them to enlarge the number of them? I say extend the term one year and teach them domestic economy. We should not allow any girl to go out and teach our children if they cannot teach them practical things. In London you have a new Normal School. The head man is a scientific man—Mr. Dearness is one of our best biologists—and there is the place to begin. Is it not time that we had four or five Technical Schools in this country? I am not speaking against our High Schools. I taught a Collegiate School for twelve years, and in some counties we have a few more of that kind than we need, and we ought to have at least four or five Technical Schools, and I say to the new Minister of Education and the new Premier that we ought to have five Technical Schools at least. I am very glad to meet so many of you, and I say if these London people do not turn out as they ought to you will have to come to Guelph next year.

Mr. W. E. Skinner, Chicago.

I find myself at considerable disadvantage to-night, in that I am not at all a public speaker. When I met Mr. Gibson, Mr. White and Mr. Hobson at Chicago, during the Breeders' Meeting recently, they discussed the Dominion Cattle Breeders' Association meeting, as well as the other Live Stock meetings that would be held here at this date, and it was then suggested that it would be a good time to bring to the attention of the Canadian people the great International Live Stock Show to be held in Chicago in December, 1900. I expected to-night to come before probably twenty-five or thirty "cowmen," as we call them in our country, to talk to them hand-to-hand. I am a pretty good hand-to-hand talker, though no public orator; but I must say that I feel proud to be here to-night as a representative of the largest live stock centre in the world, identified with its prosperity, and to say to you that I am one of you by birth is a great pleasure to me. (Applause.) I was born in the little town of Waterdown, just six miles from Hamilton. I am proud to see such a large representative body of men here to-night, either in the industry or aiding it with their presence. There will be in Chicago in 1900, from the 1st to the 8th of December, an International Live Stock Exhibition, which will be held in the Union Stock Yards of Chicago. Mr. Skinner then went fully into the details of the show, and gave some very interesting figures showing the magnitude of the live stock interests of Chicago, and concluded by hoping that the Live Stock Breeders of Ontario would find some incentive in the figures he had given to enter vigorously into the breeding of live stock, and he hoped to see them all in Chicago in 1900.

A musical program was rendered under the direction of Capt. T. E. Robson, Ilderton. The program was made up of selections from the following: The London Imperial Male Quartet, Miss Grace Wilson, Burford; Capt. T. E. Robson, Miss A. Scott, Mr. A. E. Galpin, Mr. J. T. Dalton, Mr. Court Irwin and Mr. Albert Riddle.

PROVINCIAL FAT STOCK, DAIRY AND DRESSED POULTRY SHOW.

The Sixteenth Annual Ontario Provincial Fat Stock, Dairy and Dressed Poultry Show was held in the City of London, December 11th to 15th, 1899, under the auspices of The Dominion Cattle Breeders' Association, The Dominion Sheep Breeders' Association, The Dominion Swine Breeders' Association, The Cheese and Butter Association of Eastern Ontario, The Western Fair Association, The London Board of Trade, The Middlesex County Council, The London City Council.

REPORT OF THE EXHIBITS IN FAT STOCK, MILKING COMPETITION, BLOCK TEST, AND DRESSED POULTRY.

By G. DeW. Green.

The 16th Annual Provincial Fat Stock, Dairy and Dressed Poultry Show was held in the live stock and machinery buildings of the Western Fair, London, Ont., during the week commencing December 11th to 15th. In nearly every department the exhibits were ahead of previous years. The attendance, however, was far from satisfactory, being supplied chiefly from the rural districts. Apart from the attendance, everything else was satisfactory. The officials, one and all, worked well, and exhibitors were well pleased with the treatment they received.

There were many novel and interesting features in this year's show. The block test, that final criterion of an animal's worth, from the consumer's point of view, was extended to sheep. This part of the exhibition was very largely patronized by those present, who watched with great interest the killing and dressing of the many hogs and sheep slaughtered. To those who had never seen hogs killed, scraped and hung up in our up-to-date slaughter houses, the speed and thoroughness with which this was done by the skilled hands from the Canadian Packing-House Company's establishment, in spite of the absence of apparatus, which would have enabled them to do even better, was a revelation. The carcasses were most closely examined by the spectators, many of whom learned their first lesson here as to thickness of fat required along the back of hogs for the export trade, the length of side, fulness of loin, etc. No more valuable object lesson could have been given.

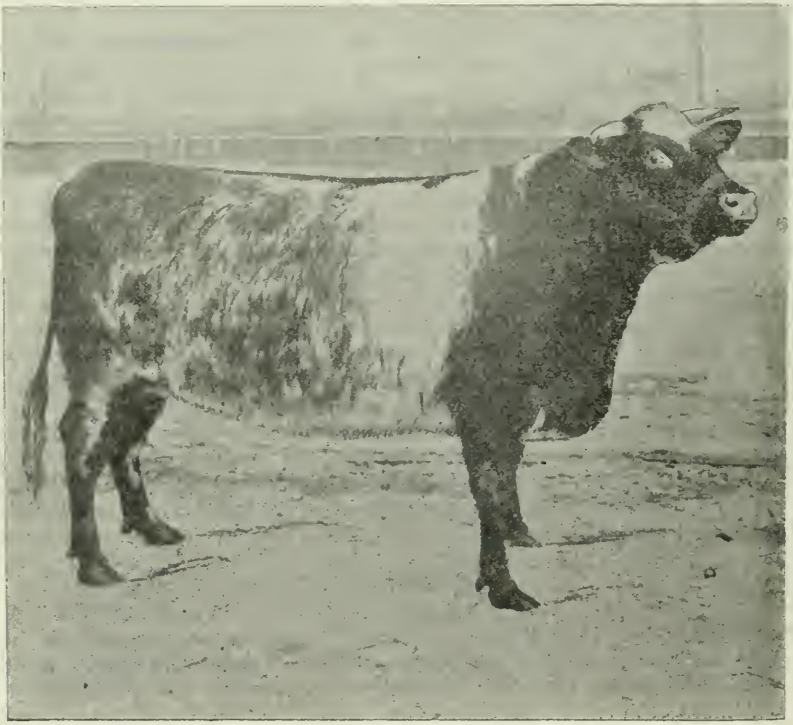
Another new feature was the feeding of poultry by the cramming process. Here Mr. and Mrs. Yuill, of Carleton Place, in their usual thorough manner, explained every detail of the proceedings to a large crowd, who assembled as the feeding hour drew near. At other times lectures and addresses were given by Mr. W. R. Graham, Manager Poultry Department, O. A. C., who had another object lesson in a case of poultry, in which could be seen fowls as ordinarily marketed by farmers, and some as fed at the Guelph Experiment Station—on corn and on skim-milk and crushed oats. The comparison was a painful reflection of the losses sustained by farmers who market their poultry carelessly and improperly dressed.

Cattle.

Shorthorns: The "Red, White and Roans" were not as numerous as in previous years. Only two two-year-old steers were entered. These were Harry Smith's Free Trade, a white that won at the Fat Stock Show as a yearling last year, carried premier honors at Guelph the week previous, and which has been victorious in show-rings since he was a calf, and Messrs. Fried's Honest Billy, a big red that carried a great amount of flesh. Free Trade was brought out in first-class shape. He is blocky, evenly fleshed, full of quality, with a capital shoulder, thighs and back, and not a

sign of patchiness visible anywhere. He was awarded 1st prize and Honest Billy the 2nd. We understand that Free Trade changed hands at a price between 10 and 11c. Fried & Sons had the only yearling steer, a good one, but not too overburdened with flesh. Capt. Robson's white calf, Oswald, was the only representative in his section. The Captain was again to the fore for cows three years old and upwards with Rosina 2nd, a well fitted roan that was smoother than her opponent, Roan Lily, shown by Fried & Sons, which was rather overdone. A fair, lengthy, three-year-old heifer, owned by F. Martindale, York, was the sole entry in the next section, while Harry Smith's Barmaid, a promising white, had the yearling section all to itself. The same owner's white steer again beat all comers in the sweepstakes for steers, and also as the best animal in the class, while Capt. Robson's Rosina 2nd occupied the same position as regards females. There was a close contest in the section for two animals. T. Robson eventually won with Rosina 2nd and his white steer calf, although Harry Smith's white steer and young heifer had many admirers.

Pure-bred Shorthorn Steer, Free Trade, 25691, winner of sweepstake over all breeds at the Provincial Winter Fair, 1899. Owned by H. Smith, Hay, Ont.

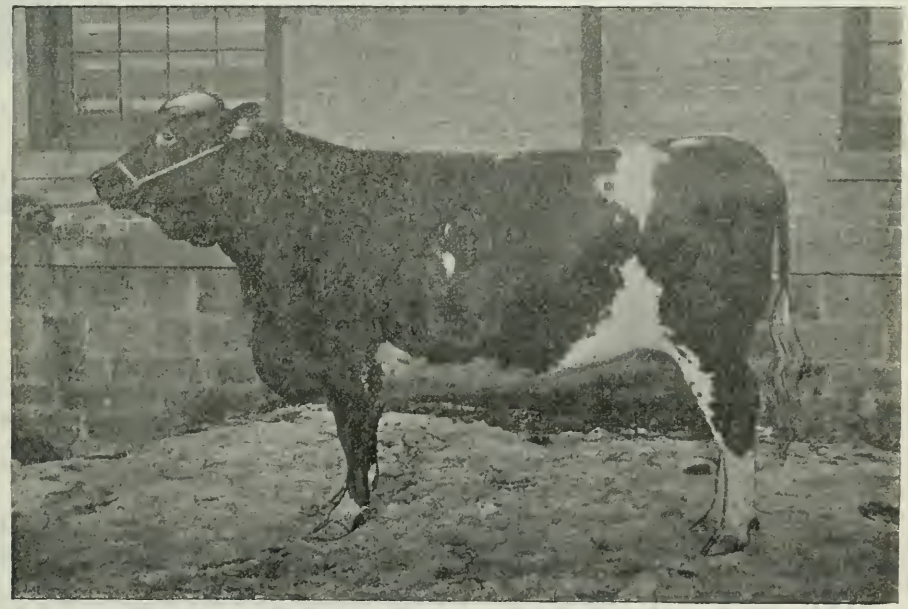


Shorthorn Heifer, under two years. The property of J. Fried & Sons, Roseville, Ont. Shown at the Ontario Provincial Fat Stock, Dairy and Poultry Show.

Polled Angus: Herefords and Polled Angus had to show together, but the former were conspicuous by their absence. In spite of this the blacks put up a good show by themselves. Walter Hall had his grand steer Robin, which was fitted out in great style and was an easy first. Jas. Bowman's Elm Park Mayflower was second. Bowman had two good ones in yearling steers, which were 1st and 3rd, with Hall's fine Newton's Promise 2nd. Bowman was first again for calves, followed by three of Hall's youngsters. Bowman had no opposition for cows, but the three he showed were all good. Hall won the sweepstakes for a single animal, and Bowman that for two animals in this class.

Pure-bred 2 year old Angus Steer, Robin, 325, winner of 1st prize in his c'ass and reserve for sweepstake, Provincial Winter Fair, 1899. Owned by Walter Hall, Washington, Ont.

Galloways and Devons: We have never seen a better display of Galloways at a fat stock show than were here present, while Rudd took some prizes for Devons. A. M. & R. Shaw won first in all the sections except that for three year-olds, where D. McCrae's two extra good cows, Adela of Flamboro and Semiramis E., were first and second. Messrs Shaw's two-year-old Irvena deservedly won the sweepstakes for best single animal, and they also captured the sweepstakes for best pair with Irvena and Minnie May, both well-fitted animals of good type.



Grade Shorthorn Heifer, under three years. The property of Jas. Leask, Greenbank, Ont. Shown at the Ontario Provincial Fat Stock Dairy and Poultry Show, 1898.

Grades and Crosses: This class was good and well filled except in section one for steer one year and under three, where only Leask and Lloyd Jones & Sons had entries,

the former showing a shorthorn grade, the latter a Galloway grade. After a close competition they were placed in the order named. Fried & Sons secured first for yearling steers, beating Leask's very thick, solid son of Moneyfuffel Lad, which was placed above their steer at Guelph, and which was a favorite with very many. Leask had the best calf, followed by Robson's and Fried's entries. Fried won for cows over three years old, Leask being second. The former were also easy winners for two year-olds. In yearlings Leask had a capital pair, a red and white and a roan, which were 1st and 2nd, and he also won 1st with them for pairs. Messrs. Fried captured the Dominion Shorthorn Breeders' Association's prize for Shorthorn grade steers, and Harry Smith's steer carried off the championship prize after a close fight with Hall's Angus steer. The wonderful evenness of the former placed him above his opponent. The judges in all the cattle classes were Jas. Smith, Brantford, and John T. Gibson, Denfield.

Dairy Cattle: Shorthorns were very well represented in this department, and made a satisfactory showing. First for cows over three years old went to Alex. Smith's Rene, a red, whose udder, though not large, looked servicable. This exhibitor's roan cow was a fine example of a general purpose animal. F. Martindale and H. J. Davis came in 2nd and third. Martindale won for cows under three years old, with Fairbairn's two entries 2nd and 3rd.

Ayrshires, while not numerous were good. N. Dyment, Clappison's, was strong here, and won all three prizes. As usual, Holsteins were well represented and good. Rettie Bros. had the honor of making a new record for a test on fair grounds with their cow, Aaltje Posch 4th, This firm was also 2nd, and Clemons came third with Queen de Kol 2nd Rettie Bros. carried off the red ticket for cows under three years as well, and won two specials offered by the American Holstein Association, also that offered by the R. A. Lister Co., of Montreal. Messrs. Rice won the gasoline engine offered by the Northey Mfg. Co., Toronto, for two best heifers. There was only one Jersey present, and but a handful of grades. No Guernseys were entered. A tabulated statement of the results of the milk test will be found on page 125. A feature of this department was a Melotte cream separator which was run by a Northey gasoline engine. This separator was donated as a special prize by R. A. Lister & Co., Montreal, Que.

Nellie Gray 2057, winner of first prize in Ayrshire class, Provincial Dairy Show, 1899. The property of N. Dyment, Clappison, Ont,

Sheep.

Never was there a better exhibit of sheep than that which filled the pens. With very few exceptions, every breed was well represented, and there was the strongest competition in every class but Lincolns, where Gibson & Walker were the sole exhibitors of a fine lot of long wools. A very notable feature in the sheep department was the number of sweepstakes won in their classes by ewe lambs of different breds.

Cotswolds: The Cotswold sections were mostly very full, and a capital lot of sheep were forward. John Park & Son, Burgessville, had a grand ewe which for wool, typical head and conformation could not be beaten. She not only took 1st in her class, but also the sweepstakes for the breed. These exhibitors were also to the fore in the two wether sections, with a couple of very superior animals in each, winning both 1st and 2nd. Their three wethers were also placed 1st. T. Hardy Shore, Glanworth, and John Rawlings, Ravenswood, had a very nice lot of well fitted sheep, which were well placed. The latter also won 1st for the pen of three ewes, with a very nice, well mated trio. Geo. Allen, Oriel, was 2nd for pen or three wethers under 1 year, and won other minor prizes.

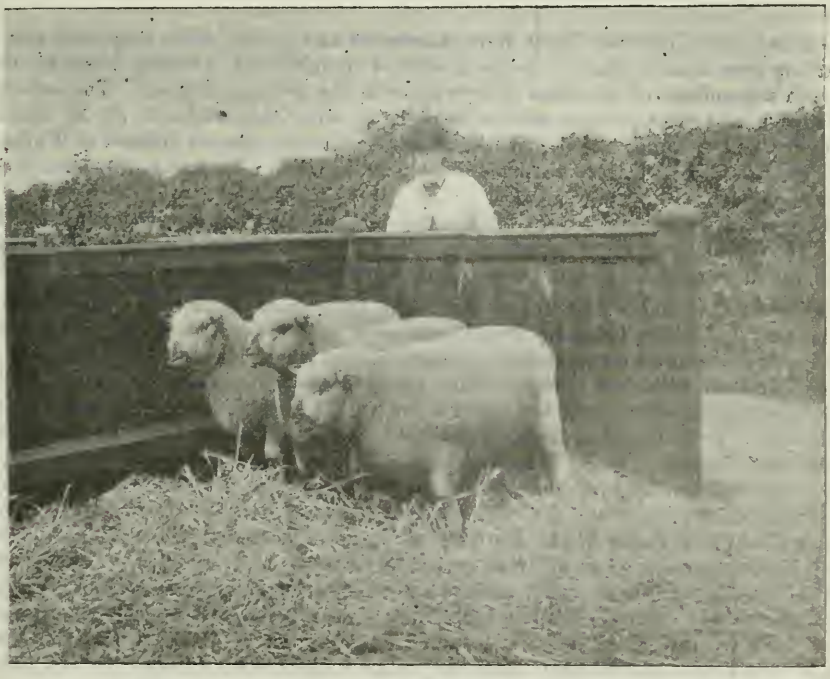
Leicesters: The Leicester ewe lambs were the feature of this class. There were 13 in number, and competent sheep judges, who knew of what they were speaking, declared

that there had never been a ring of Leicester ewe lambs to equal them at any exhibition, not excepting the Royal. In this section John Kelly's grand entries were 1st and 2nd, and J. M. Gardhouse's typical lamb 3rd, with Orr & Lillico's pair highly commended and commended. Orr & Lillico won in both sections for wethers, with John Kelly 2nd for wether lambs. Kelly's ewe lamb won the sweepstakes for Leicesters.

Leicester Ewe Lamb. The property of John Kelly, Shakespeare, Ont. Shown at the Ontario Provincial Fat Stock, Dairy and Poultry Show 1898.

LINCOLNS: Although Gibson & Walker had no opponent in their class, they made a good display of their own, having two or more animals in every section but one.

OXFORDS: This class too, furnished a good lot of ewe lambs. Kenneth Finlayson's (Campbellton) two lambs came in 1st and 2nd respectively. They were a grand pair, while Andrew Elliott, Pond Mills, was 3rd and 4th, and J. H. Jull, Mt. Vernon, 5th. Andrew Elliott had no opposition in the wether sections, but his wether was good enough to win the sweepstakes for the breed. Finlayson's trio of ewe lambs came in ahead of all competition when shown as a pen of three.



Shropshire Wether Lambs. The property of R. Gibson, Delaware, Ont. Shown at the Ontario Provincial Fat Stock, Dairy and Poultry Show, 1898.

SHROPSHIRES: There was not a weak section in this class. As in other classes, ewe

lambs were very strong. A straight, lengthy, typical ewe lamb, nicely covered, shown by Messrs. Hanmer, came in first. Richard Gibson's lamb, which handled well, came 2nd, followed by two of John Campbell's and a second of Richard Gibson's string. The next section, for yearling wethers, contained as good a lot of fat Shropshires as were ever brought together in any show ring. Here Richard Gibson came in 1st and 3rd while John Campbell won 2nd with a grandson of Newton Lord. A very square, thick wether of John Campbell's, another of Newton Lord's descendants, headed the wether lamb class, being a clear winner. His nearest competitors were a couple of well-fleshed sheep of Messrs. Hanmer's. This ring, too, was a capital one. Hanmer's wethers won 1st for 3 wethers under one year, with R. Gibson's trio 2nd; while John Campbell had the best 3 ewes of the same age, with the Mt. Vernon flock 2nd. The sweepstakes fell to Richard Gibson's yearling wether after a close contest with John Campbell's lamb. The judges thought the lamb was the most typical, but the yearling was a little better on the shoulder, the flesh firmer, and would dress a little better.

Southdowns: John Jackson & Sons, Abingdon, were more than strong in this class, winning all the firsts and three seconds. Richard Gibson's fine yearling wether came in second in its class, and Messrs. Telfer won the blue ribbon for 3 wethers under the year, besides some other prizes. T. C. Douglas, Galt, Messrs. Hamner, and W. H. Beattie, all exhibited, the two first named, securing a share of ribbons.

Dorset Horns: R. H. Harding, Thorndale, had nearly all this class to himself, winning everything except first for yearling wethers and 3rd for young wethers, which prizes fell to W. H. Beattie, Wilton Grove, and W. E. Wright, Glanworth, respectively. Harding's lot were nicely fitted, and one of his sheep which was killed in the block test showed a nicely-marbled carcass. Beattie's yearling wether won the sweepstakes.

Hampshires and Suffolks: There were two Hampshires shown by John Kelly, both ewe lambs. They came in 1st and 2nd against Suffolks, and the best of the two won the sweepstakes for the breed. W. J. Rudd entered Suffolks, and won all the three money prizes for yearling wethers and the same for young wethers. The first prize yearling wether was especially good. Jas. Bowman showed Suffolks, and won part of the prize money.

Grades and Crosses: These were numerous and good. John Campbell was strong in yearling ewes and wethers. He won with a daughter of Newton Lord in the ewe class, and a grandson of the same prize-winner in the wether section. The sweepstakes for grades went to the former, after a close fight with the wether. J. M. Gardhouse, Highfield; Orr & Lillico, Galt; W. H. Beattie, Wilton Grove; Gibson & Walker, Denfield; W. E. & G. L. Telfer, Paris; and W. E Wright, Glanworth, all won a share of the prize money.

The grand sweepstakes went to Messrs. Jackson's yearling wether, and 1st for the Prince of Wales' prize for five pure-bred sheep to John Campbell's pen of Shropshires, four of which were by Newton Lord. Jno. Rawling's secured 2nd with five Cotswolds.

Dressed Carcasses of Sheep: As might have been expected, John Park & Son won 1st and 2nd in the class for dressed carcasses of Cotswolds, George Allan being 3rd. Gibson & Walker had no competition in the Lincoln class, nor had John Kelly in Leicesters, nor Andrew Elliott in Oxfords. Five breeders had entered for Shropshires. Richard Gibson's wether lamb received 1st honors, Beattie's was 2nd, Hanmer's 3rd and 4th, and Wright 5th. T. C. Douglas went to the front in Southdowns, beating Messrs. Gibson, Jackson and Telfer. R. H. Harding had the only Dorsets, the best of which cut up nicely. In Suffolks Jas. Bowman's first prize carcass was decidedly the best, showing a very nice mixture of lean and fat. The judges considered the 1st prize Shropshire wether lamb, the 1st-prize Oxford, and the 1st prize Suffolk carcasses as standing in the order named, in comparison with all the carcasses entered. A Southdown carcass was the fattest of the lot, and, though the carcass was otherwise excellent in quality, the waste in consequence of the extreme fatness more than counterbalanced the quality of the lean. There were, in the block test, a number of reversals of judgments given when the animals were alive, and in some instances animals that had not won on foot took high places when hung up as dressed carcasses. Of course, a comparison was not always possible, because animals from more than one section had to show in the single class in the block test.

Swine.

Any one comparing the swine exhibit at this show with that of, say, three years ago, would be struck, not only with the great change of type and the lesser amount of fat carried by the animals of to-day prepared for exhibition, but also with the wonderful increase in the numbers. Step by step there is improvement on the lines advocated by all interested in the raising and feeding of bacon hogs ; but, while this advance is being made, there is evidently much to be learned yet as regards proper feeding. Of this we shall have occasion to say more when we come to the block tests.

While all the classes were well filled, to Chester Whites belong the honor of heading the breeds, as regards the number on exhibition.

Berkshires : This good old sort was strong in numbers and quality. George Green, Fairview ; T. A. Cox, Brantford ; George Hill, Delaware ; and W. J. Rudd, Eden Mills ; were the four who exhibited, but the two last named had only one or two animals entered. Berkshire barrows under nine months were all good. Here T. A. Cox won 1st and 3rd, with Geo. Green sandwiched in between. In young barrows George Green came in 1st and 2nd with a pair of smooth pigs, which were afterwards placed 3rd in the block test for Berkshires. Cox again came to the front for sows between 9 and 15 months old. This was a strong class, having eight good sows in it.

Geo. Hill had a capital young sow which showed great quality and substance, and which stood at the head of the class between 6 and 9 months.

The best pair of Geo. Green's pigs, however, as regards bacon type, were the two sows that won 1st and 4th in the section for sows under 6 months. These sows won 1st in the bacon class as well, 1st for dressed Berkshire carcass, and were 2nd in the block test for all breeds. Green also won 1st for 3 pigs, the offspring of 1 sow. T. A. Cox carried off the sweepstakes.

Yorkshires : Yorkshires were about the same in point of numbers as the preceding class, and also notable for their quality. J. E. Brethour, Burford ; Jos. Featherston & Son, Streetsville ; H. J. Davis, Woodstock ; W. R. McDonald, Ridgetown ; and R. Gibson, Delaware, were the exhibitors. Brethour won for barrows under 9 months with a lengthy, deep pig, light in the head and shoulders, as is required for pigs of a bacon type. Messrs. Featherston's barrow under 6 months, a smooth, well-grown pig, took first honors, beating Brethour's entry, which was a little fleshy, though otherwise good. Brethour's 14 months old sow, a long, smooth pig with deep sides, which won at the Toronto Fall Fair in the class under 12 months, headed its class here. Featherston had a lengthy pig with a good head which came in second. Brethour's sows under 9 months old were too fleshy, and 1st and 2nd went to Featherston and H. J. Davis respectively, the former showing a very nice, smooth pig and the latter a lengthier one of good type. An extra long pig with good hams, and head and shoulders of the right kind, carried first honors for Brethour in the section for sows under 6 months. Second place went to a pig of good bone and smoothness shown by Featherston. The sweepstakes went to Brethour's 14 months old sow, and 1st for 3 pigs also went to the same exhibitor.

Chester Whites : As mentioned above, this class outnumbered any single one of the other breeds of swine. The prizes were rather divided up, but Bennett & Pardo, Charing Cross, who had a very well-fitted lot of pigs, won three out of the six first prizes, viz., for a barrow under 6 months, a sow under 6 months that girthed well, and for 3 pigs, the offspring of one sow. D. DeCourcy, Bornholm, secured 1st on a barrow under 9 months and 2nd on a barrow under 6 months old, the first an even, deep pig of good quality, the other of a lengthier type. W. Butler & Son showed a roomy, well-fed sow under the 15 months' limit which won 1st and also the sweepstakes. This firm took other prizes as well. Jos. Cairns, Camlachie, secured the remaining first prize, that for sows under 9 months. The other minor prizes were divided among the four exhibitors named, and H. George & Sons, Crampton, and W. E. Wright, Glanworth, all of whom had good, useful animals.

Poland Chinas : W. & H. Jones, Mt. Elgin, and W. M. Smith, Fairfield Plains, were the only two exhibitors of Poland Chinas, but there were always sufficient animals in each section to take all the prizes. Messrs. Jones took all the 1st prizes and the sweepstakes, but in the bacon class W. M. Smith secured a reversal of the verdict as

regards his barrow under 6 months, and he also came out ahead in the bacon test. This was due to the fact that Messrs. Jones' pigs were too highly fed to suit the export bacon trade, although otherwise of good type.

Essex: Suffolks and Essex were classified together, but none of the former were entered. Jos. Featherston & Son, Streetsville, and T. A. McClure, Meadowvale, were the two who exhibited this black breed. The bigger proportion of the honors rested with Messrs. Featherston, but McClure won, among other prizes, 1st for sow under 9 months and 1st for 3 pigs. The sweepstakes went to Messrs. Featherston.

Tamworths: This breed was very fairly represented, but the entries were not quiet so numerous as might have been expected from the big exhibit of these red pigs at the fall fairs. Two barrows under 9 months were shown by A. Elliott & Son, Galt. The 1st prize one was a pig of exceptionally good bacon type. These exhibitors had the best barrow under 6 months as well, a deep pig but inclined to thickness. W. R. McDonald, Ridgetown, showed a couple which were of fairly good Tamworth type. W. M. Smith beat all comers for sows under 15 months with a nice sow. Messrs. Elliott's entry came 2nd. This sow was sold to go to Sir William Van Horne's farm. Sows under 9 months were all large, typical sows, and the class was good. J. R. Newell & Son, Crampton, and W. R. McDonald, took the three money prizes. Messrs. George & Sons' sow under 6 months beat Elliotts' pair that had won 1st at Guelph in the bacon class, and which here were 2nd and 3rd as individuals. Messrs. Elliott won for 3 pigs and the sweepstakes.

Duroc Jerseys: Tape Bros., Ridgetown, had the Duroc Jersey class nearly all to themselves, there being only two others, which were entered by W. M. Smith, Fairfield Plains, both of which were 4th in their sections. Messrs. Tape's were good, strong pigs.

Grades and Crosses: While the grades shown were few in number, they were all of good type. They were principally of a Tamworth and Beckshire cross, with, in some cases, a dash of Yorkshire or Chester White blood. Andrew Elliott & Son, Galt; T. A. Cox, Brantford, and W. Butler & Son, Dereham Centre, supplied the winners in this class.

Bacon Hogs: There was a class for bacon hogs for each of the breeds shown. These classes were judged by C. C. L. Wilson, Ingersoll, and Jas. Leach, of the Wm. Davies Co., Toronto. In the Berkshire class, Geo. Green scored 1st and 2nd, and W. J. Rudd, 3rd. The judges could not agree at first about the order of the Yorkshires, one wishing to give first to J. E. Brethour, the other to J. Featherston & Son. The former had more size; the latter had quality and style. Eventually, the judges agreed to give 1st to Featherston and 2nd and 3rd to Brethour, on the understanding that when the sweepstakes were judged this should not prejudice the latter's chance to it, should a referee see fit to give the 1st to him. As will be seen, this was done later on. H. George & Sons, Jas. Smith, Harrietsville; and A. Elliott & Son, Galt, was the order in the Tamworth class for export bacon hogs.

D. DeCourcey well deserved the leading place he won among the Chester Whites, Messrs. Butler and George coming 2nd and 3rd. W. M. Smith's Poland Chinas beat Messrs. Jones' two entries, as the judges considered it a more suitable pig for the export trade. Tape Bros, won 1st and 2nd for Durocs, and Featherston & Son the same awards for Essex. Elliott & Son's Tamworth-Berkshire crosses won in the grade class.

The sweepstakes took some time. Prof. Day was called in and gave 1st to Brethour's pigs, Featherston being next, George's Tamworths 3rd, and Green's Berkshires 4th.

Dressed Hogs: This department was one of the most frequented in the show. The pigs were killed on Wednesday Dec. 13th. George Green won 1st for Berkshire pairs dressed. The lean and fat on this pair were all right, except being a trifle thick on the shoulder, and the loin, perhaps, was somewhat deficient. Rudd's 2nd prize pair were too fat on the back and shoulder. On Green's 3rd prize ones the fat on the back was uneven and rather thick, the pigs too were a little short. Brethour's Yorkshires, which won 1st, thus justifying Prof. Day's decision in the bacon sweepstakes, were not quite perfect with regard to the fat, but the meat was well distributed and juicy. Featherston won 2nd. This pair were a little thick in fat on the back and shoulder, but otherwise good. Major Hood's pair were too short and also thick and fat. Several of the Yorkshires killed were too fat, and this also applies to some of the Tamworths, thus proving that animals of breeds that are known as model bacon breeds can easily have their value lowered by improper

methods of feeding, or feeding too long. Another fact as regards feeding was evident—that some of the pigs slaughtered had been held back so as to keep them from gettin g too fat, and in consequence, their flesh was not first-class, and would turn soft after curing. Elliott & Son, A. C. Hallman, and W. R. McDonald were the three prize winners in Tamworths; Harding, Butler and George in Chesters; while W. M. Smith took the lead in Poland Chinas, beating both of Jones' entries. Tape Bros. were first for Durocs, Featherston for Essex, and George for grades. The sweepstakes for two dressed hogs of any breed fell to Brethour, with Green 2nd, and Featherston 3rd. All the dressed carcasses, both of sheep and swine, were purchased by the Wm. Davies Co., Toronto.

Dressed Poultry.

The quality of the turkeys, geese and ducks exhibited was much above the ordinary, and they were a good object lesson. The turkeys made a particularly fine display. The chickens were not so good a lot as might have been expected, but there were some notable exceptions, especially the first prize pair of Plymouth Rocks. The chickens were a fine lot for object lessons as some were well fatted and well dressed, while others were very inferior in these respects.

Mr. and Mrs. Yuill of Carleton Place, had on exhibition, under the supervision of Professor Robertson, a coop of chickens and a cramming machine. The machine was operated three times, morning, noon and evening. Mrs. Yuill explained fully the benefits to be derived from using the machine, how the machine was operated, and the small amount of danger to the health of the birds. It is needless to say that this exhibit attracted much attention and was very instructive to the parties interested. The last day of the show the birds were killed and plucked according to the English method. After plucking they were placed on a shaping board where they were allowed to cool, after which they were packed in a case ready for shipment. This was one of the most interesting as well as the most instructive features of the show.

A Good Object Lesson.—The Ontario Agriculture College had on exhibition a case of fowls showing the amount of edible meat on the ordinary market chicken, on a medium fat chicken and a very fat chicken. This exhibit attracted a large amount of attention, not only by the farmers and poultrymen, but by the town-people, who were surprised at the extra amount of the edible portion in the medium fat and the well fatted fowls. This is well shown in the following table:

	Average weight undrawn.	Weight when drawn.	Weight of offal.	Percentage of offal.
LOT I.				
Fair representatives of the ordinary chickens sold on Guelph market at 45c. per pair....	2 lb. 12 oz.	1 lb. 14½ oz	13½ oz.	30.68
LOT II.				
Chickens fattened for 11 days.....	4 lb. 1 oz.	3 lb. 6 oz.	11 oz.	20.37
LOT III.				
Chichens fattened for 5 weeks.....	5 lbs.	4 lb. 2 oz.	14 oz.	21.21

	Weight of edible portion when cooked.	Weight of bone.	Percentage of bone.	Relative value to consumer at market price.	Value when undrawn at market price.
LOT I.					
Fair representatives of the ordinary chickens.	1 lb. ½ oz.	6 oz.	36.37	22½c.	22½c.
LOT II.					
Chickens fattened for 11 days	1 lb. 15 oz.	7 oz.	25. 8	42.625	31.1
LOT III.					
Chickens fattened for 5 weeks	2 lbs. 4 oz.	8 oz.	22.22	49.5	40.7

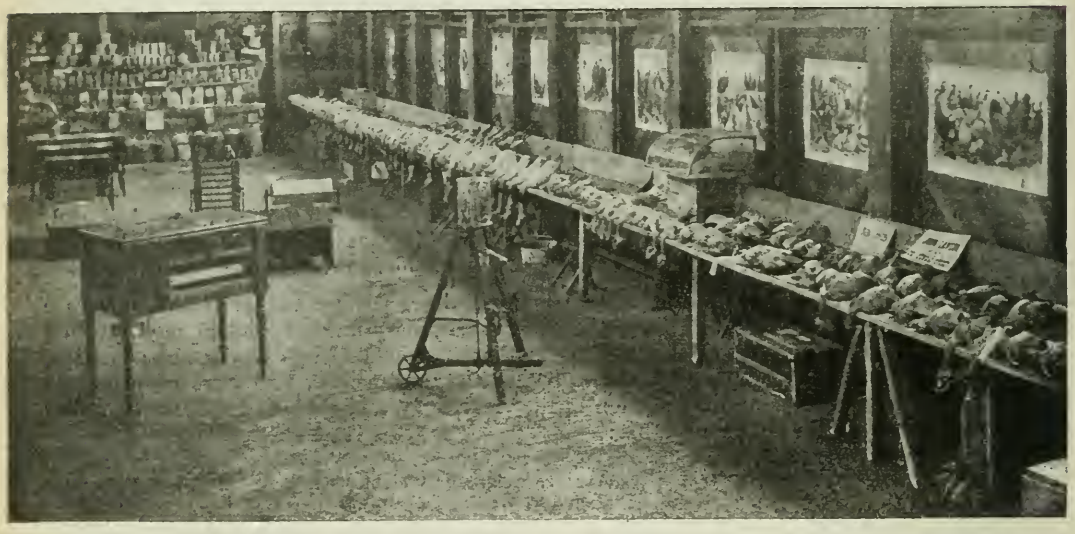
The most interesting feature of their exhibit was a pair of cross bred Cochin-Rock pullets. These pullets were full sisters, and had up to some eleven days previous to the show run in the same yard and received exactly the same food. During these eleven days one pullet was fed on a mixture of ground oats and buckwheat moistened with

skim-milk, and the other one was fed on yellow corn with a small amount of meat food. When killed, the pullet fed on the oat ration presented a creamy white appearance, while the other was of a deep yellow shade, showing conclusively that it is possible to supply two markets or customers with distinctly different tastes as to the shade of flesh with chickens from the same flock.

Dressing and Killing Poultry.—During the last day of the show fowls were killed, plucked and dressed in the pavilion on the grounds. Mrs. Gilbert showed how the fowls were dressed for home markets and for shipment to England. Her talk on dressing poultry brought out many interesting and instructive points. While the plucking was being done Mr. Gilbert addressed the audience on "The Care of Fowls."

During the show Mr. Meyer gave an address to the audience on the breeds of chickens, pointing out clearly the advantages and disadvantages of the numerous breeds as market fowls as well as egg producers.

Mr. Gilbert addressed the meeting illustrating well dressed and properly fattened poultry and those not so well done. He went carefully over the fowls on exhibition, skilfully pointing out the good and bad qualities of each bird.



The Dressed Poultry Exhibit, Provincial Winter Fair, 1899.

Mr. Graham explained the value of well fattened poultry, showing that it was not only advantageous to the producer but economical for the consumer even when buying by the pound to purchase well fattened stock. He also explained how to fatten fowls.

Lessons From the Block Tests.

It was surprising, especially in the sheep classes, to see on some of the carcasses a mass of useless fat, which, though it did not lower the quality of the meat, yet reduced the price to such an amount as to make the returns unprofitable to the feeder. Without doubt the feeder of such an animal had not looked at it in that light when he so lavishly fed it up to show off well alive at the show. Now, however, he can see that the market does not call for the overfat sheep or hog, and so he will regulate his feeding accordingly.

Among the swine, the block tests were equally instructive. Pigs of nearly all breeds were entered here. Some of the carcasses were clearly overdone; some were too much over the proper weight for bacon hogs, and consequently could not be scored as of best quality. Others were plainly under-fed, in the hope that this method of treatment would cause them to be lean, and so rank as bacon hogs. As regards this, such feeding must result in a carcass which turns out soft bacon. It is somewhat in line with the Irishman's method of producing fat and lean, who fed his pig well for a week and then

starved it for a week, so that the fat and lean would (as he thought) be laid on alternately in the carcass. It cannot be too strongly impressed on those who feed for the export trade, that feed of a suitable nature must be fed generously from birth to slaughter. We must get pigs of a proper type, feed them suitable rations, and market them when they are ready for the block (from the packers' point of view), and then we shall not only secure good prices for our hogs, but also enable our packers to get a more satisfactory share of the British markets for bacon.

Breed Not Everything.—Speaking of breeds at the show, one fact was quite evident, that it was possible to feed pigs of such breeds as Yorkshire and Tamworths (which the bacon curers have so often told us, are pretty near the ideal as bacon breeds) so as to have the carcasses rank quite low on account of the thickness of fat on the back, shoulder and flank, and also as regards width of back and quality of flesh. Breed is thus not everything; feed is just as important, and it is evident that some have yet to learn how to feed bacon hogs. We shall see continuous improvement in this respect from now on, because this year's block test has set feeders thinking to some purpose.

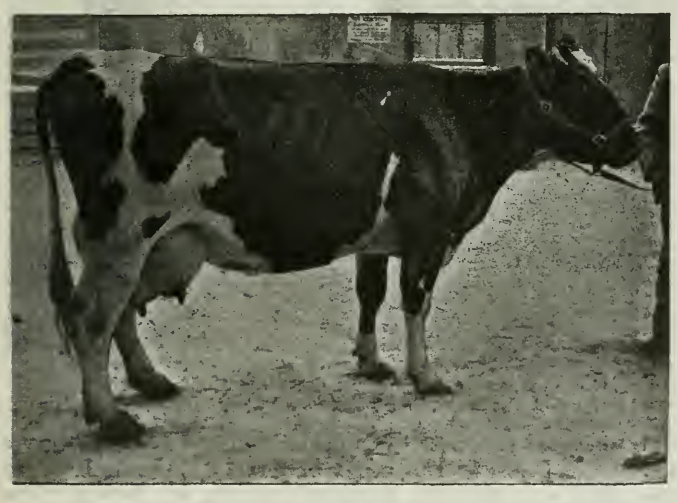
REPORT ON DAIRY DEPARTMENT.

By James Stonehouse, Port Perry.

The Dairy Show held at London in connection with the Provincial Winter Fair has been the most interesting dairy test ever held in Canada, from the fact that the world's record for a butter-producing cow has been broken and the standard raised a notch or two higher than it has ever been before, and that by a cow which has entered the public arena for the first time.

The test this year discarded every side issue, and the awards were made solely on the butter-fat and other solids in the milk, a few points only being given for time of lactation —20 points being allowed for each pound of fat, 4 points for each pound of solids not fat, and 1 point for every 10 days in milk over 30 days up to 10 points, and no cow was awarded first prize which was not producing at the rate of 10 pounds of butter per week.

A Record-breaking Holstein.—Last year at Brantford the Holstein cow, Calamity Jane, made the wonderful record of 21½ pounds of butter per week by the Chicago World's Fair standard of 80 per cent. of butter-fat, but the Holstein cow, Aaltje Posch 4th, owned by Rettie Bros., Norwich, has made the phenomenal record of nearly 4¼ pounds of butter per day, or 29.6 pounds per week, according to the World's Fair standard; but, figuring it on a basis of 85 per cent. butter-fat, which is our Canadian standard, her record would be nearly 28 pounds per week, which, at the higher standard, leaves all other records in the shade.



Aaltje Posch 4th, the phenomenal milker and sweepstakes winner in the Dairy Department of the Provincial Winter Fair, 1899. Owned by Rettie Bros., Norwich, Ont.

As soon as it became known that a record-breaker was in the show the dairy stables at once became the centre of attraction, and the number of visitors who were constantly around the cow began to tell injuriously upon her before the test was over, and caused a shrinkage

in both quantity and quality in her last milking. She was milked three times per day—3.30 a.m , 1.30 p.m. and 9.30 p.m. The first two milkings weighed 49 lbs. 6 ozs. and tested 4.5 per cent. fat; the next three milkings, 74 lb. 2 oz., testing 4.8 per cent. fat, and the last milking 23 lbs. 6 oz., testing 4.3 per cent. fat, making a total of 6.785 lbs. of butter-fat produced in 48 hours. This great record may be better understood when it is remembered that the average cow on the ordinary farm does not produce more than 4 lbs. of butter per week, or 130 lbs. per year, but here is a phenomenon which is as good as *seven* ordinary cows.

The same exhibitor had two other pure-bred cows and a heifer in the test, all of which are great milk producers. "Woodland Josco," over two months in milk, gave 127 lbs. of milk producing 4.3 lbs. of fat, equal to 18½ lbs. of butter per week; Fanny F. 134 lbs. of milk with 3.4 lbs. of fat, or 14 lbs. of butter per week, and a heifer under three years making 14½ lbs. of butter per week.

Rettie Bros. won 1st, 2nd and 3rd on Holstein cow over three years old, $45; 1st on heifer under three years, $20; 1st and 3rd for Canadian Holstein, special, $35; 1st and 2nd for American Holstein, special, $40; 1st for grade cow, $20; 1st for best three cows or heifers of one breed, a Melotte separator, $100; and an extra special of a $50 silver cup for best dairy cow on ground.

Shorthorn Dairy Cow, over 36 months old, the property of H. K. Fairburn, Thedford, Ont. Shown at the Ontario Provincial Fat Stock, Dairy and Poultry Show, 1898,

Other Breeds.—Jerseys, which are supposed to be pre-eminently butter cows, were very conspicuous by their absence, and why? The prizes were the same as in Holstein class except in the specials, yet there were thirteen Holsteins and only one Jersey. The Jersey Association has not heretofore given special prizes at the show, as the Canadian and American Holstein Breeders' Associations have done for a number of years past. This may or may not have had something to do with the slim showing. Had this one Jersey been in better hands, she would undoubtedly have made a better showing. Even though she had been carted in to the show by waggon five miles on the day the test

commenced and was put under the care of a stranger, to be fed and milked, yet she gave at the rate of 16½ lbs. of butter per week, her highest test being 7 per cent. butter-fat.

The Shorthorns were well represented, there being twelve in this class, and some of them made a very creditable record, the best being 81 lbs. of milk with 3 of lbs. fat, equal to 12½ lbs. of butter per week.

The Ayrshires were represented by three cows owned by N. Dyment, Clappison's Corners. The 1st prize cow gave 81 lbs. milk with 3.4 lbs. fat, equal to 14 lbs. of butter per week.

Shorthorn Dairy Cow, under 36 months, the property of Thos. Russell & Son, Exeter, Ont. Shown at the Ontario Provincial Fat Stock, Dairy and Poultry Show, 1898.

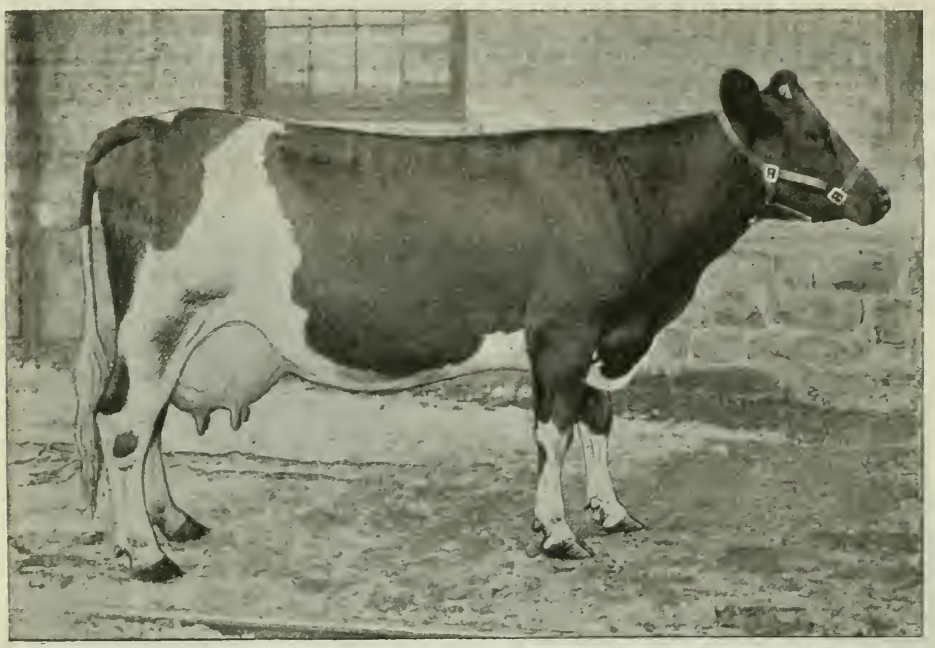
There were four good grades, the lowest making at the rate of 15 lbs. of butter per week and the highest 16½ lbs., and here again Rettie Bros. stood at the head with a fine grade Holstein.

The Fat Stock Association took charge of the milk given by the cows during the show. The milk was run through a Melotte separator donated by the Lister Co., of Montreal, as a special for the best three pure-bred cows; the separator was run by a gasoline engine donated by the Northey Manufacturing Co., Toronto, as a special for the best three heifers.

The skim-milk was disposed of on the ground, and, as there were no facilities for churning the cream, it was sent to the Dairy School, Guelph, to be made into butter. Prof. Dean kindly had it made up free of charge to the Association. The proceeds were divided amongst the exhibitors, according to the amount of butter fat supplied by each.

A Comfortable Building Indispensable.—While the dairy test is growing in favor it is not what it should be, considering the importance that is attached to it. It is, like all the rest of the show, an educator of the most practical kind, and should act as a stimulant to all who are engaged in the dairy business.

Two of the classes were very well represented, but the others were very slim, and, no doubt, there is a reason for this. Those having extra good cows generally give them the best of care, and, unless an exhibitor is certain of comfortable quarters for his animals, he will be indifferent about letting his cows go at this season of the year. While the



Calamity Jane, sweepstakes winner in the milk test at the Provincial Winter Fair, 1898.
Owned by A. & G. Rice, Curries, Ont.

people of London may have done their best, under the circumstances, to provide comfort and accommodation for the show, the result brings out the fact very plainly that, if the show were permanently located, a good building could be provided with proper facilities for heating as required.

Special arrangements should be made for the dairy cows, as they require more warmth than any other class of stock if they are to do their best at the pail.

Why could not prizes be given for dairy products in connection with this show? It would interest another class and add to the interest of the whole show.

MANUFACTURERS GIVE SPECIAL PRIZES.

The list of special prizes offered this year by manufacturing and other firms were very numerous, as the following list will show: The estate of the late John Battle, Thorold, cement to the value of $50; Isaac Usher & Son, Queenston, cement, $50; T. C. Wallace, Toronto, Albert's Thomas Phosphate Powder, $125; Thom's Implement Works, Watford, Scuffler, $10; B. Bell & Son, St. George, Ensilage Cutter, $45; Goold, Shapley & Muir, Brantford, Maple Leaf Grain Grinder, $45; J. Fleury's Sons, Aurora, Grain Grinder, $40; Massey-Harris Co., Toronto, Corn and Field Cultivator, $40; Wilkinson Plow Co., Toronto, Walking Plow; Wortman & Ward Mfg. Co., London, Spade Harrow, $25; McClary Mfg. Co., London, Feed Cooker, $40; Windsor Salt Co., Windsor, 10 barrels of salt; Sherwin-Williams Co., Montreal, 10 gallons paint; Bank of Commerce, Guelph, Silver Medal; Frost & Wood Co., Smith's Falls, Disc Harrow, $26; Ripply Hardware Co., Grafton, Ill., Feed Cooker, $54; Spramotor Co., London, Spramotor; Noxon Co., Ingersoll, Disc Harrow, $25; Ingersoll Packing Co., Ingersoll, $50; R. A. Lister & Co., Montreal, Melotte Cream Separator, $100; Gurney Scale Co., Hamilton, Platform Scale; Northey Mfg. Co., Toronto, Gasoline Engine, $140; Forest City Business and Shorthand College, London, Silver Cup, $50; J. E. Meyer, Kossuth, Incubator and

Brooder, $30 ; John S. Pearce & Co., London, Incubator and Brooder, $20 ; Robert H. Essex, Toronto, Trio of Buff Plymouth Rocks, $10.

The Gurney Scale Co., Hamilton, also donated to the Show Association for use in conducting the dairy test a scale specially fitted for this purpose. These scales were found very satisfactory, and the company deserves the thanks of the Association for their kindness. The scales will be used each year.

REPORT ON THE BLOCK TEST IN SWINE DEPARTMENT.

By Prof J. B. Reynolds, Ontario Agricultural College.

For breeders, feeders, consumers and expert judges of live stock, the block test held this year was most interesting and instructive. Breeders were driven to the conclusion that, whatever the breed of the animal, a definite type and conformation is necessary to meet the demands of the market. Feeders, by noting the effects in the carcases of over or under-feeding, or too long feeding, and from hints thrown out by judges and prize-winners, could learn how to feed and how not to feed. Consumers were enabled to obtain the opinions of expert judges as to the selection of meat for the table. Live stock judges might compare their own decisions given in the ring with the decisions given upon the same animals killed and dressed, and possibly in this way obtain a hint or two.

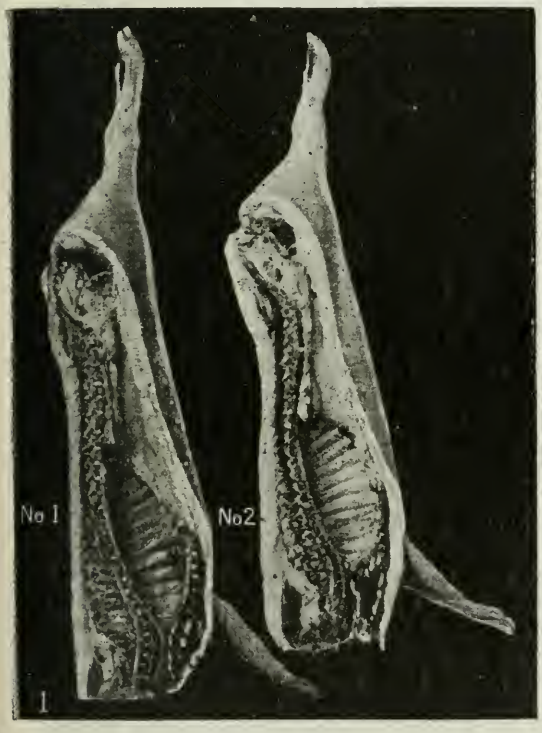


Fig. 1.

Fig. 2.

The hogs slaughtered were, of course, all of the bacon class. It may be safely said that many of them were over-fed or fed too long, rather than under-fed, and many excellent bacon hogs lost in quality through these causes. Many also were of the wrong type, and no carefulness or science in feeding would put these on a par with those of the

required type. Hence to a close observer of the dressed carcases, two points stood out most prominently: (1) The animal must be of the proper build and conformation, and (2) it must be carefully fed. Every exhibitor should be able to recognize the type, and should know what to feed and how long to feed.

Influence of Individuality and the Importance of Selection.—Mr. Andrew Elliott, of Galt, showed two Tamworths of the same litter, the two having been fed in exactly the same way. The one was fat and comparatively chubby and the other a typical bacon hog. (See Fig. 1.)

Feeding too Long.—Mr. J. Brethour, of Burford, showed a hog which, two weeks before the show, was, in his opinion, the best he had, but which from that time lost quality from over-maturing. This hog weighed 237 pounds, and dressed 188. It was good meat, but not exactly what the bacon market demands.

Holding Back.—Some of the carcases gave evidence of having been, for some time before the exhibiting, under-fed, with the view to keep within the desired limits of weight and fatness. This treatment shows very plainly in the carcase, and injures the quality of the meat. What judges call the "bloom" of regularly fed animals is lacking in hogs that have been held back.

Breeds.—Of the breeds, as such, little need be said. There were good bacon hogs in all the breeds shown, and at the same time every breed contained individuals that were not of the bacon type. Yet it was clear that in some of the breeds a larger percentage were of the required type than in others. Two breeds in particular gave evidence of the rapid change of type brought about by breeding and selection—the Improved Yorkshire and the Essex. Nothing along this line is more significant than the change that has taken place in the Essex breed—from a short thick-set, stubby conformation to one of much greater length and lightness.

Following is the report of the breeds:

Breed.	Number slaughtered.	Average live weight.	Per cent. of shrinkage.
Tamworth	16	210	25
Chester White	15	197	26
Yorkshire	11	207	23
Duroc	8	204	25
Berkshire	6	210	24
Essex	7	185	22
Poland China	6	179	25
Grades	4	218	22

These hogs were supposed to be slaughtered in pairs, and to be paired before slaughtering; but in three instances an additional animal was slaughtered; in the Yorkshires and the Essex by Mr. Featherston, and in the Chester Whites by Mr. Butler.

Shrinkage.—This test is not of so much value as it might be, on account of the fact that no uniform practice was followed as to fasting. Some animals were not fasted at all and some had been fasted twenty-four hours. It is recommended by the committee that a uniform rule be adopted and insisted upon, so that whatever there is in a shrinkage test may be presented and accepted without modification.

Some Special Educational Features.

In Fig. 1 are two Tamworth sides that were shown in the test. No. 1 is in every respect superior to No. 2. The side is longer, giving a greater amount of valuable cuts; it has about the proper thickness of fat down the back and around the ham, while No. 2 is too fat. No. 2 is also hollow in the loin—a part where the most valuable bacon is obtained. In addition to this, No. 1 has the proper form of ham for the bacon hog—long, rather than thick.

Fig. 2. shows two Yorkshire carcasses. In this cut it is specially interesting to note the quality of the bacon as indicated by the general shape. In No. 1 the short thick head and heavy jowl suggests the excessive fat that can be seen over the back; this one is not a prime type of bacon hog. In No. 2 the long tapering ham and head and the light jowl indicate a type that, with proper feeding, will produce a first-class article of bacon. The latter is one of the prize carcasses, both in class and in the sweepstakes.

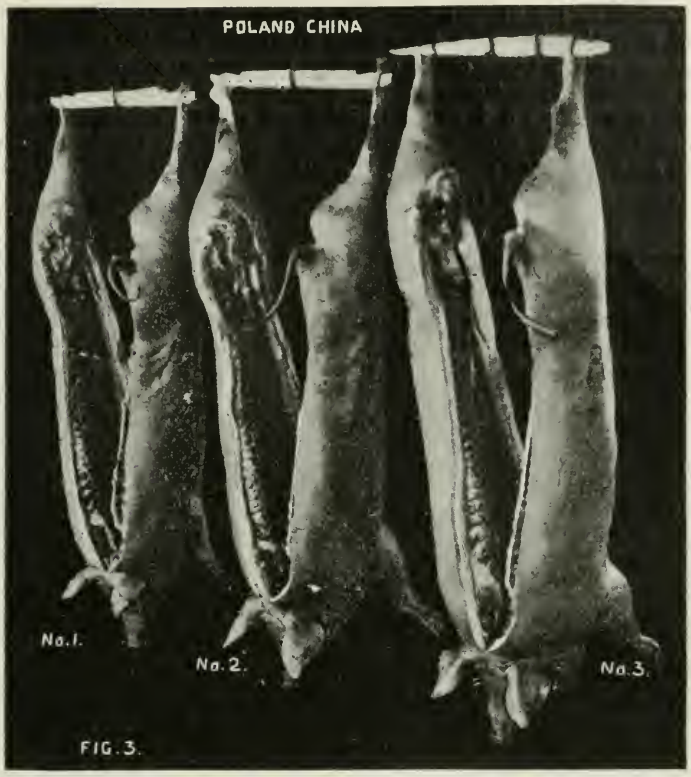


Fig. 3.

In Fig. 3 is shown a group of Poland Chinas, all of them undesirable as bacon. No. 1 is too short in the body ever to make first-class bacon sides, and besides, is quite unfinished. No. 2 is rough and uneven. No. 3 is also of the wrong type, as indicated by the thick head and heavy jowl. As might be foreseen from the shape, the animal has run too much to fat.

REPORT ON SWINE CARCASSES.

By Wm. Davies Co., Toronto.

We beg to report upon the several lots of dressed hogs shipped to us from London, and which we understand were hogs exhibited at the recent Fat Stock Show.

15 Tamworths.—Generally speaking, this lots of hogs was very disappointing. Nearly all of them were unfinished and decidedly tender; some were distinctly mean and unfit for bacon. If the hogs had been better fed and better finished they would have been firm in texture; the unfavorable points also in this bred would not have been so noticeable. Two or three hogs in the lot, however, had been fed until they were quite too heavy and fat for export bacon, and were only suitable for coarse Canadian trade. A favorable characteristic was the evenness of the fat down the back and the generally fleshy condition of the sides. In cutting the middle lengthwise, separating the belly from the back, there was, however, less lean meat that was desirable. The adverse criticism we pass upon this particular lot of hogs must not be taken as any adverse criticism upon the breed as a whole; we are only passing upon the fifteen hogs which were submitted to us, and most of which were not in a condition representative of finished bacon hogs; many of them were only good, strong stores, and the bulk of the remainder had been fed in such a faulty manner that they were tender or soft.

4 Durocs.—Generally undesirable. These hogs are very short between the shoulder and ham, and Wiltshire sides made from them will be open to the adverse criticism of the English retail merchant who requires a side with plenty of cutting it and hence wants length. The arching of the "crown" will generally result in bacon made from hogs of this type being classed as No. 2, owing to the depth of fat on the shoulder, notwithstanding that the fat down the back may not be excessive. The loin had a pinched, narrow appearance in contrast to the shoulder. In cutting the middle there was very little clean meat shown where the belly separated from the back.

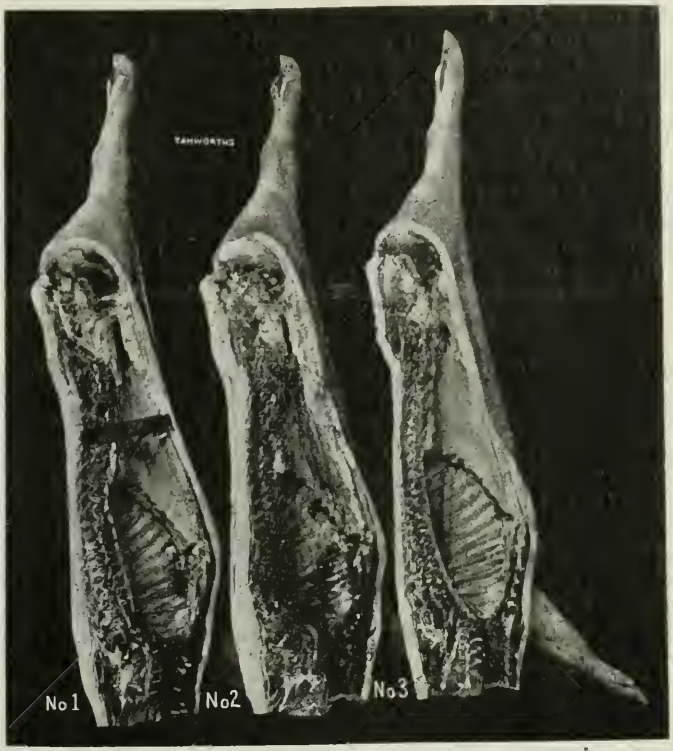
The exhibit of one-third of the swine carcases at the Provincial Winter Fair, 1899.

6 Essex.—These hogs were very lengthy, with plenty of cutting between ham and shoulder. The fat was singularly even down the back. Three out of the six hogs, however, were not sufficiently well finished to form a definite opinion as to how much fat would be put on if they had been fed longer. The three which were better fed had a tendency to run to fat. On account of larding somewhat heavily, the bellies inclined to be thin. This is serious fault in export bacon, and one to which particular reference has been made by our English agents this fall, who have repeatedly complained of the thin "streaks" in our sides; "streaks" being the technical term for bellies cut from Wiltshire sides.

6 Berkshires.—These hogs made long and even sides of good general excellence. Three of them, however, were quite tender, and three firm, evidently owing to a difference in feeding. There was a slight tendency to arching at the crown. The ham was good and well developed, the bellies thicker than in the Essex, and generally useful. In separating the back from the belly, however, there was less lean meat than is desirable.

6 Poland Chinas.—One of these was too mean and unfinished to be as anything else than a good store. Some of the others were soft and slightly off color in the fat. In the best of them the fat had a greasy, lardy feeling, and not one of them would have made a No. 1 side owing to being tender. The skin was coarse. The head and shoulder, however, were an inprovement on those of a good many hogs of this breed. In separating the back from the belly there was an absence of lean in the side.

13 Chester Whites.—Generally undesirable. There was an absence of lean meat, whether down the back, or in separating the back from the belly, or in the ham and shoulder. The whole tendency of these hogs seems to be to run to fat. As a whole this lot of hogs were firm, some two or three only being slightly tender. The sides were too short to be good, even in the lean hogs, and from the generally fat character of the lot we judge that if any attempt were to be made to feed the hogs longer, the sides would



No. 1. The fat down the back is even, and is the right depth for No. 1 selection. The photograph rather indicates a thin belly.
No. 2. Too stout and fat for No. 1 selection. Classed as No. 2 selection.
No. 3. An unfinished hog. Too thin to be suitable for an export side.
All three sides show a poorly developed loin and ham.

become so fat that they could be classed as No. 2 bacon for export, of to be made into long, clear bacon for the Canadian trade.

Yorkshires.—There was considerable irregularity in these hogs. Some were fed until they were quite too fat, and were unsuitable for best sides. One or two were quite unfinished, but though unfinished the meat was very firm. The parcel as a whole was the firmest of the whole shipment, the fat on some of the hogs being strikingly firm. Some of the hogs were bred much finer in the bone than any Yorkshires we have hither to seen, and while, as a result, if marketed as thoroughbred stock they will make much more desirable sides than the old type of Yorkshires, yet in this finer breeding there seems to be loss in the distinctly lean character of the hog, as well as in the evenness of fat down the back, and for cross-breeding they will probably prove least valuable. All these finer-bred Yorkshires showed a tendency to arch at the crown (the shoulder). There was a very noticeable point of merit, however, in all the Yorkshires in contrast to the other breeds, viz., when the middle was cut and the back separated from the belly there was good distribution of lean with the fat. The importance of this cannot be overrated; each of the other breeds showed more or less a want of lean when the middle cut was in two, and the presence of this lean in the Yorkshire side constitutes a point of merit of very great importance.

Four Grades.—One of these was a very coarse, rough hog, with a mean, thin ham, a great forearm, with rough bone but plenty of flesh, and even in fat down the back, but too rough and coarse for desirable sides. Two of them were smoother and smaller, with firm texture and good, useful sides. The other was quite unfinished, and was only a good store hog.

One of the serious faults that the writer has seen demonstrated over and over again in England, when sides made from American hogs were cut in two, was that little or no

lean was found with the fat, notwithstanding that the appearance of the back before it was cut cut seemed to indicate only a moderate degree of fatness. Any breed of hogs which when converted into bacon shows good development of lean when the sides are cut cannot be too much encouraged. In this respect the Chester Whites were the least desirable, and the Yorkshires altogether the most desirable.

It is to be regretted, very much to be regretted, that soft and tender hogs were in such marked evidence in the whole shipment. Again, it is regrettable that so many hogs were unfinished and fit only to be classed as good feeders. Farmers cannot learn too thoroughly the lesson that the hog which is useful for the export trade is not a mean, thin, half-fed animal in contrast to a thick, fat, stout pig ; but a well-fed, well-bred pig which predominates in lean, and has been fed so as to give good firm texture.

The Type of Pigs Improving.

While we have plainly stated our criticisms of the various breeds of hogs represented in this shipment, we desire also to express satisfaction with a manifestly successful effort of the breeders to produce a long, even-sided pig, with in most instances an even depth of fat down the back. Thoroughbred males having these characteristics, if distributed through the country, must have a very beneficial effect upon the general character of the stock marketed. On the point of feeding, evidently very much has to be learned, and it may be worth while in future exhibits to make the texture of the meat one of the essentials to prize winning in the dressed hog class.

It is somewhat interesting to note that in the Chester Whites the one or two hogs that were distinctly lean and full of flesh were soft, seeming to indicate that whatever food had been used, while it produced lean meat which was satisfactory, yet gave meat of a soft texture that quite destroyed its value. If we must have faulty stock let it be firm, fat stock, rather than soft, lean stock. We do not think either is necessary.

REPORT ON THE BLOCK TEST IN SHEEP DEPARTMENT.

By Prof. J. B. Reynolds, Ontario Agricultural College.

The number of sheep slaughtered was 26. Many of them were too fat ; and fat was discounted severely by the judges. In the Shropshire class a little thin lamb, dressing 52 pounds, was awarded the first prize on the ground that it had a much better proportion of fat and lean through the back and ribs. In nearly every case the best prizes went to the smaller and leaner carcases. Following are some figures showing the connection between weights and prizes : Suffolks, first prize weighed (dressed) 93 pounds ; second, 107 ; third, 113. Southdowns, first, 94 ; second, 96 ; third, 124. Shropshires, first, 52 ; second, 99 ; third, 63. Lincoln, first, 88 ; second, 131.

Fig. 4.

From the view point of consumers and producers.—The fact that in the majority of cases the animals had been fed beyond the mark considered most desirable for the con

sumer, and the other fact that the decisions of the live stock judges were reversed or set aside entirely in many instances by the judges of the dressed carcasses, together go to show that a radical change must be made somewhere. Either the breeders, feeders and judges of live stock are ignorant of the present demands of the market, and are persisting in breeding, feeding and awarding prizes to a type and quality that the consumer won't have, or else the most desirable carcass for the consumer, taking the carcass as a whole, is not the most profitable for a breeder to raise or the feeder to produce. If the former is the case, the remedy is plain : the producers should make themselves better acquainted with the present markets, and the judges must make a corresponding adjustment in their notions of excellence. But if the consumer's and the producer's interests clash, a change should be made in the rules upon which the awards are based, until such time as a scale of prices may make their interests coincide.

Report of the Breeds of Sheep.

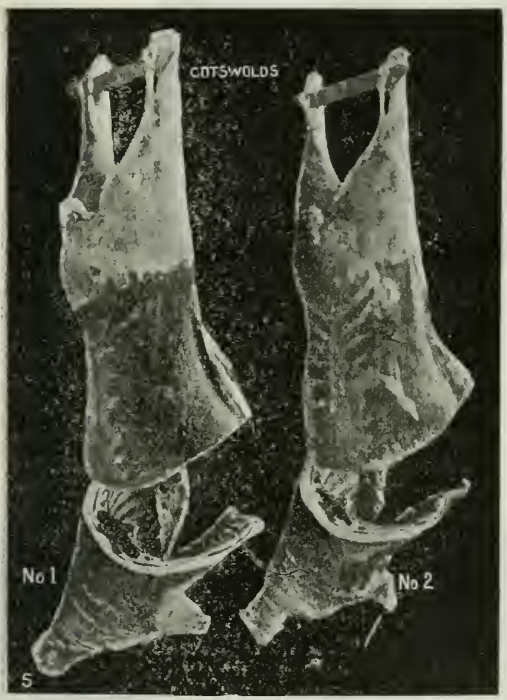


Fig. 5.

Breed.	Number slaughtered.	Average live weight.	Per cent. of shrinkage
Southdown	8	167	38
Shropshire.	5	153	44
Cotswold..	4	173	45
Suffolk ...	3	195	46
Dorset....	2	139	48
Lincoln...	2	194	43
Leicester..	1	159	41
Oxford ...	1	181	41

Fig. 4 shows a cut of the first-prize Southdown, and of one that was too fat for any prize. No. 1 is a fairly good sample of the "streakiness" of meat that the best market demands.

Fig. 5 shows two Cotswolds, No. 1 being first prize and No. 2 winning no prize. No. I has a much superior "leg of mutton," and has considerably less useless fat over the rump. The decision was given principally on these two points. For photographing, the carcases were cut as shown in the figure, and No. 1 has an additional slight advantage in streakiness, having more lean and less fat at the back.

Fig. 6 shows the carcases of three breeds. No. 1 is first prize among the Dorsets; and if a sweepstakes had been offered, this carcass would, according to the judges, have won it. The cut shown in the forequarters below is a first-class sample of streaky meat. In addition to this, the leg is plump and well-proportioned, and the meat throughout is fine and even.

REPORT ON SHEEP CARCASSES.

By Wm. Davies Co., Toronto.

The Wm. Davies Co., Toronto, purchased all the sheep carcasses from the block tests as well as those of the swine. The report of their beef and mutton buyer and of the fore man of their retail depots on the suitability of the sheep carcasses for the needs of the markets of to-day is as follows :

"All the men in charge of our various retail depots express the same opinion, viz., that what lean there is in the mutton is of very great excellence. Several speak of some

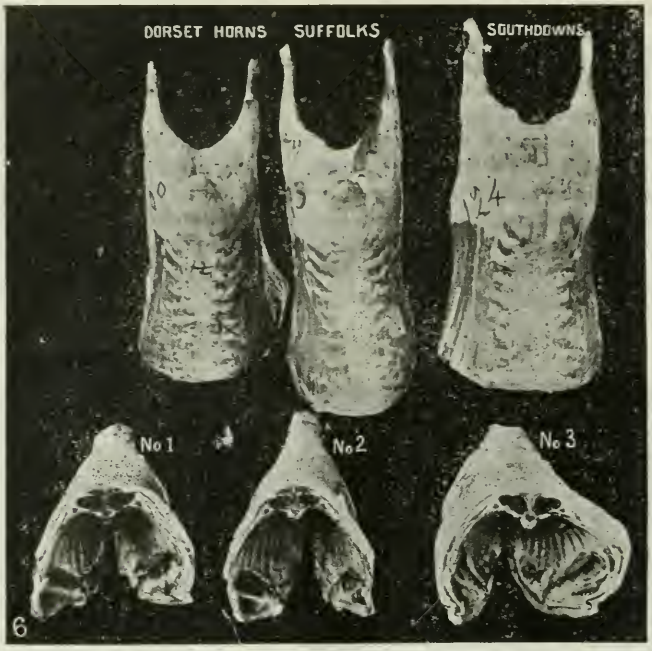


FIG. 6.—No. 2 is first prize among the Suffolks. It is not such a prime carcass as No. 1, but exhibits a fair degree of streakiness, and is not too fat. No. 3 is third prize Southdown. It is rather fat, and somewhat coarse.

A View of some of the Sheep Carcasses, Provincial Winter Fair, 1899.

of their customers who are critical, and who have always found fault with Canadian mutton, stating in relation to this mutton that it resembles English stock more than anything they have ever received in Canada. Every foreman, however, advises, that, owing to the excess of fat there is a very limited demand for it, and that what they are selling of it is very unprofitable, owing to the fat having to be trimmed off before the buyers will take it. The waste in this respect seems to run about one third. One of the foremen advises that the president of our company purchased a saddle weighing 28½ lbs., but required 9 lbs. of fat to be trimmed off it. This doubtless, proved very satisfactory eating, but you will easily see that this method of sale was very unprofitable to the retailer.

11. The general report furnished by our beef buyer, who is responsible for the fresh meats handled at our various depots, is as follows :

Cotswold.—A good fleshy sheep ; does not carry too much suet, but fat on the back is too thick.

Leicester.—A little leaner sheep than the Cotswold ; suet about right ; reasonably fleshy.

Lincoln.—Fat too thick on the back ; too heavy in suet ; what flesh there is is good.

Horned Dorset.—A nice retail lamb, but hard to sell to the retail butcher because it it heavier in the front quarters than other lambs.

Shropshire.—Makes a nice sheep in all parts, but the flesh wants to be of a better quality.

Southdown.—Cuts very thick and fat ; an absence of flesh, but what there is is of exceedingly good quality ; altogether too much suet.

Suffolk.—Very full of flesh, but not of so good a quality as the Southdown ; does not carry too much suet."

The Foremen's Reports.

(1) " I might say in regard to the sheep purchased at the Provincial Fat Stock Show, that although the quality was A1, they would be very unprofitable for us to to handle, but altogether too fat for our trade."

(2) "In reply to your letter asking for report on the prize mutton received I would say that the public do not seem to appreciate it on account of the abundance of fat. The few who have tried it, speak in high praise of its quality.

"It is useless trying to sell it without trimming, fully 40 per cent. being fat. This brings the cost of the whole up to about 8c. a pound buying price."

(3) "In regard to the show sheep received by us before Christmas, I beg to report that the quality was all that could be desired. We found, however, that it was hard to realize a reasonable price, and think that stock of this description would be unsuitable for this locality."

(4) "The sheep received by us, from London Fat Stock Show, we found much too fat to be of any use for our local trade. The public simply refused to buy at any price. The only way I was able to dispose of it was by cutting it upon the counter after trimming 45 per cent. of fat from it. The breast and flank were only fit for the fat box, and there was altogether too small a proportion of lean meat for it even to be of any use for our retail trade in Parkdale."

THE BREEDING AND FEEDING OF PRIZE WINNERS AT THE ONTARIO PROVINCIAL WINTER FAIR, 1899.

Ten per cent. was added to the prizes won by any exhibitor in any class upon furnishing the Secretary within 14 days after the close of the Exhibition, with a detailed statement setting forth how his animal or animals were *bred*, how and what *fed*, and how *cared for* from the time of birth to the date of the Show. It was expected, if possible, *the cost of the feed* consumed should be given, if not exactly, approximately. The exhibitor furnishing the most valuable information in the cattle department received an additional prize of five dollars. A similar prize of five dollars was given in each of the other departments, viz., sheep, swine and poultry. In the cattle department, the prize was

awarded to D. McCrae, Guelph; in the swine department to J. E. Brethour, Burford, and in the poultry department to J. Poole, Lambeth. In the sheep department the judges were unable to decide between the essay by Mr. John Campbell and that by Mr. John Jackson; they therefore recommend that a prize be paid to each of these gentlemen.

It was hoped that more of the exhibitors would have supplied information regarding the feeding and care of their stock, but some exceedingly practical and valuable information has been given, and is printed herewith. The experience of those who have for years been successfully showing animals in the face of keenest competition should be of much service to those who are younger in the business and still have the experience to gain. This department should be well patronized by all who exhibit at the Show. No one knows it all. Everyone has something to learn, and each one should assist in the teaching.

The judges were Dr. Jas. Mills, Guelph, and Mr. John I. Hobson, Guelph.

CATTLE.

By D. McCrae, Guelph.

Breeding. Seven of the eight Galloways shown were strong in Scottish Borderer (669) blood with a mixture of *Harden* (1151), the most famous Galloway bull of late years. Both the yearling heifers were sired by Canadian Borderer, 5945, the oldest bull and best known Galloway in Canada. He is by Scottish Borderer out of a cow by Harden. The winning cow or heifer three years or over, was Adela of Flamboro, 12783, by Canadian Borderer, a low down type of a cow very round in barrel with long quarters, fleshy hams and the shortest, broadest head in the show of any breed. Maid Minnie, 12959, the two year old second prize, is by College Boy, 10395, he by Galloway King (5489), by Harden out of a cow by Scottish Borderer. Maid Minnie is out of Maid Marian B, 9750, by Canadian Borderer. There were two Semiramis heifers shown, and they were descended from Scottish Borderer through Semiramis 19th bred at *Tarbreoch*. One was by College Boy and the other by Norfolk, 6764, descended from Crusader (2858), Champion and winner of silver cup at Edinborough in 1884, and he was the most famous son of Scottish Borderer. Of the calves one was by Czar, 12807, a son of College Boy, and the other Calla Lily, 14615, is the one in the lot of quite different breeding, by Norfolk, 6764, by Black Ronald, 3342, a *Blackie of Balig* and from a *Culmain* cow, on both sides of quite different breeding from the others. The aim has been to breed round, smooth animals, with short legs and beef well spread on the most valuable parts. Straight lines above and below have been secured and moderate quality of bone. Fineness of bone is desirable in a quick feeder, but is not fancied on our North-west ranches, where strong heavy bone is looked upon as very desirable for that country. The two calves shown were dropped in September, and all the eight animals shown were fall calves, except one dropped in March. For our condition in Western Ontario, fall calves have been found by experience to be most profitable. If early in the fall they have the advantage of fine weather and a life of grass for the cows or other fall feed always abundant; if later when the cows are housed they have comfortable pens with exercise and the best of care and attention. The calves are allowed to suckle twice a day, and in addition are fed a little chopped oats and bran, and as soon as they care to nibble at it, well cured clover hay. It is a great help to a growing calf to have early learned to take additional food. By the time the grass is good in the spring, some will be ready to wean, and others may require the dam's care a little longer. By this time the sexes have to be separated, and usually the bull calves are kept near the barn, to be fed the few mangels that may be left till May and June, and cut winter rye when it is tall enough to be fed in the house. If they have a good grass field near the barn, so much the better. Next comes the oats, peas and vetches sown together and making good soiling for summer, and then the first green corn followed by the white turnips, if the rape be not available. The heifer calves have been sent to pasture in a wood lot during the summer, without any extra feed till the fall rape is ready. Have found rape an excellent food for young stock when carefully

used. They should be well fed before going on the rape, and should have free access to a field of rough pasture at all times, as well as abundance of salt. They may be left out till the snow flies if they are sheltered during the cold autumn rains, and well watched after hard frosts, if the rape be still rank. It saves feed, however, to house them earlier and give them cut corn and roots, soft turnips preferred for the fall feed—with all they will eat of good straw.

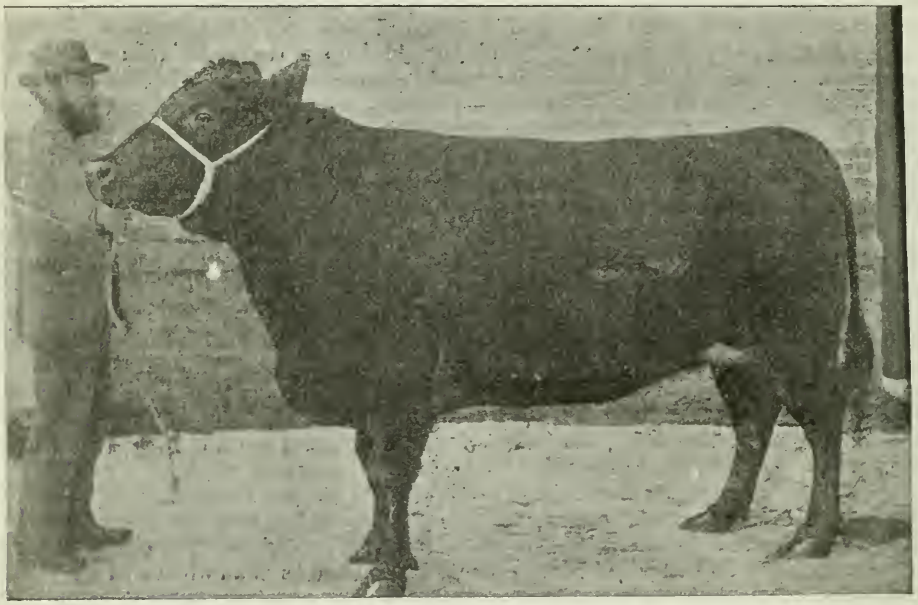
Yearlings. The wintering of yearlings has to be carefully done. They need close attention and good care. At no time in the animal's life may they be more easily spoiled than when taken in for the first winter feeding. They need rather more nourishing feed than older animals. They may also be changing teeth during the winter, and that has to be watched and suitable provision made for well cut food. The food for the whole stock is cut and mixed. Corn cut moderately green, shocked, and housed when dry enough is used for part of the ration, while chaff or cut straw makes up the coarse food. This is fed twice a day at six in the morning and five at night. At noon a ration of roots is given, and these are sliced only for animals teething. With the coarse fodder is the corn at least fairly well matured. For the yearlings, instead of the straw, cut rye or clover hay is substituted twice a week, or oftener as may be required. As the winter advances the supply of dried corn becomes exhausted, and silage is substituted for that part of the ration, and with it is used a small feed of chopped oats two parts, bran or shorts two parts, and chopped peas one part. This is sprinkled upon the coarse fodder at the afternoon feed. As the winter advances and spring time comes nearer, the roots, which have been white or yellow turnips in the fall, and swedes by about Christmas time, merge into mangels, which are best in the spring time. The roots usually last till there is good grazing, which will be from the 10th to the 15th of May. During the summer if pasture is bare, care is taken to supplement with other feed, or such soiling crops as have already been mentioned in the feeding of the younger stock.

Two Year Olds. The fall feeding of yearlings applies to those two year old, except that if these are to be furnished for beef in the fall, they are given the best of the pasture and a more liberal allowance of chopped feed. They are put into the stables earlier than the younger cattle, and fed more liberally of chopped grains and oil cake. The grains grown on the farm are first consumed as being the most economical, but if more be needed, oil cake is an excellent finishing food. In the mixed grain ration as feeding time advances the chopped oats may be increased as well as the chopped peas, and the bran reduced. So much has to be left to the careful feeder, who has to treat each animal according to its special needs, that unless a careful weighing is made of the food consumed the expense can only be estimated. Such a careful weighing of food consumed is too expensive for the ordinary farmer, and is usually left for the experimental station. Unless compiled with care any guess of value is only misleading and is not to be attempted. It has been found that where animals can be fed in loose boxes with plenty of room to move about they do better and make faster gains in weight than when tied up. During the period in which the animals are housed, they are out once every day for water, which is pumped by wind-mill into a tank in the yard. If plenty of roots are fed, it is found that feeding cattle will hardly touch water. Salt is provided, and may be fed with food as well as put within reach. A feeding steer will require from 3½ to 4½ ozs. of salt per day, while 1 oz. is sufficient for a horse of the same weight. The brush and curry comb are very useful, and while always short of straw for bedding purposes, the cattle are much the better for careful cleaning and good grooming, and it pays to have it done as frequently as time will permit.

By James Bowman, Guelph.

We raised them all except Flirt's Own, the second prize heifer over three years, we bought last February, and since then we have used her and Black Beauty as near alike as possible. The pure bred calves we generally let suck their dams, and when they are from three weeks to a month old put some oat chop and pulped roots where they can get it. If we feed from the pail we take them away from the dam as soon as they are dropped and rub them dry in a warm, well bedded box stall; and after they are a few hours old and begin to be anxious to get some nourishment, we milk the cow but not dry for at least forty-eight hours. Since we have followed this plan we have had almost no trouble

with garget or caked udders. This we learned at an Institute meeting from a practical dairyman. The calf is given about two quarts of new milk at first, and this is gradually increased as the calf requires it. Feed three times a day for the first week; be careful not to overfeed, as when scours are once started it is not easily stopped sometimes. When two weeks old add a little warm skim-milk and gradually increase until it is all skim-milk. A little meal may now be put in the milk, chopped corn, middlings and oil cake, with a little salt in proportions of 4,4,2, in order named, about two tablespoonfuls at first, and increase as calf relishes it. It is not good to mix coarse meal in milk, as it bothers the calf when drinking. When three or four weeks old put some oat chop and pulped roots where the calf can get it; put very little at first, and increase it as it is licked up clean. Let them do it very clean. I believe there is no way they will eat so much as by teaching them to leave a real clean manger. We try to feed regularly both in time and quantity. Apart from the sucking and drinking from pail, we treat our calves about all alike. When flies are bad in summer they are kept in a moderately dark place in day time and run in pasture at night. In October and November they are fed



Grade Polled Angus Cow, over three years, the property of James Bowman, Guelph, Ont. Shown at the Ontario Provincial Fat Stock, Dairy and Poultry Show, 1898.

mostly on rape with chaff or hay on cold nights. When well prepared for winter in this way we require to feed very little meal. Our winter feed has been chaff, pulped roots, and a little meal and hay mixed, and a little whole hay. Last winter when we started to feed Black Beauty for beef, we fixed her feed about equal bulk of chaff and roots and from two to three quarts of mixed chop peas and oats. When mixed feed was cleaned up we fed a little whole hay. In spring when roots were finished, we fed meal and hay, meal dry. We mixed a little cake also to keep the bowels in good state, regulating quantity to suit the animal, as we find they vary quite a good deal, and the feeder requires to study each animal to keep them doing their best. We did not feed any green grass to the fat heifers during the summer; we found it too loosening, but after corn was pretty well matured they relished it, and it agreed with them all right. During the last few months we fed corn and pea meal and decreased the quantity of coarser food, and added a few pulped mangels as soon as they were fit. For the last few weeks we scalded the feed one meal ahead, and added a little molasses to increase the appetite.

By A. M. & Robt. Shaw, Brantford.

The Galloway two year old heifer, Irvena, 13219, calved April 29th, 1897, and out of Gem 3rd of Drumlaurig, 9187, was sired by MacCartney, 9739, was fed the first six months on milk, oil cake and grass at a cost of $1 per month; the following six months on turnips, cut feed and oat chop, valued at $1 per month; next summer on pasture alone, and the following winter on turnips, straw and a little barley meal, and the last summer on pasture up to the 20th of August, when she was fed on additional feed of two quarts of barley meal till October 20th, when she was put in and fed 10 lbs. of meal and one peck (or 15 lbs.) turnips, mixed with wheat chaff.

Summary.

First 6 months.	Milk, oil cake and grass at $1.00 per month	$6 00
Second 6 months.	Turnips, cut feed and oat chop, $1.00 per month	6 00
Next 16 months.	" 1.00 "	16 00
" 2 "	With an addition of meal 2.00 "	4 00
Last 43 days.	10 lbs. meal at $1.00 per 100 lbs.	4 30
"	15 lbs turnips at 6c. per bush	66
"	Wheat and chaff, value $3.34	3 34
	Total cost	$40 30
	Total value of prizes won in 1899	$103 50
	Live weight on December 12th, 1899, 1,200 lbs. at 6c. per lb	72 00
		$175 50

Minnie May, 14210, was calved March 1st, 1898, out of Flora McErin, 5735, and by MacCartney, 9739, and was fed very similar to Irvena, but being ten months younger would be $10 less cost, say:

Total cost	$30 30
Total value of prizes won during 1899	$70 00
Live weight, 1,050 lbs. at 6c. per lb	63 00
	$113 00

Valentine S., 15042, calved February 2nd, 1899, out of Maud of High Park, 11737, sired by College Gambler, 12,808, was partly fed on whole milk until six months old, and and afterwards on meal and hay until October 20th, when she was put up to a full feed of six pounds of meal per day.

Cost for first 6 months	$12 00
" 80 days	3 00
" 43 "	3 50
	$18 50
Value of prizes won	$39 00
Value of animal for beef	30 00
	$69 00

Mary Anderson 2nd, 10383, calved October 2nd, 1892, out of Ailie Anderson, 6668, sired by Count Monk, 5728, was valued on October 20th, 1899, for beef at $40. She was fed per day for the next forty-three days same as two year old heifer, Irvena.

Value of cow, October 20th, 1899	$40 00
43 days' feed	8 30
	$48 30
Value December 12th, 1899, at 5c. per lb	$63 50

Note.—The judges expressed their dissent from Mr. Shaw's estimates of the cost of feeding.

SHEEP.

By John Jackson, Abingdon.

The sheep we exhibited were all pure bred Southdowns. Beginning with the three shearling wethers, dropped about the middle of March, 1898, these had no extra care before going out to grass where they ran with their dams without other food till the 1st of July. They were then weaned and put on oat stubble, where 1½ lbs. of rape seed per acre had been sown with the oats. About the 20th of August these were castrated, being the culls of the ram lambs. Castrating was done by cutting off end of scrotum and taking out testicles in the ordinary way, pouring in a twenty per cent. solution of carbolic acid, and kept in a rather dark box stall for ten days. It is important that the operation be done as quickly and with as little excitement and worry to the lambs as possible; better results would be obtained by castrating when two or three weeks old. These lambs were again put on the stubble. The rape made a fine growth through September. About the middle of October they were put inside, fed a mixed food of oats, bran, and a little oil cake, commencing with ½ lb. and increasing to 1½ lbs. per day, with two or three pounds of mangels and what clover hay they would eat up clean. This was continued for six weeks, when they were shown as lambs at the Provincial Fat Stock Show, Brantford, 1898, where they were 1st and 2nd in class, and 1st for pen of three. They were then run through the winter with the ewe lambs on about ½ lb. of the mixed feed and 2 lbs. mangels with hay for about 150 days, and again turned on grass without grain. The one that was first in his class at London, Sweepstake in Southdown class, and Grand Sweepstake of the Show, was run in this way till the middle of October. Having no rape this year, owing to drouth, part of the time pasture was very poor indeed. The other two wethers, one of which was third in class and the other fifth in dressed carcass class, were put in with the show sheep on the 8th of July, getting an average of 1 lb. mixed grain feed per day, with green food, vetches, peas and oats and out in pasture at night till about the 8th of August, after which they were kept inside and clover hay substituted for the green food. These two were shown for about six weeks at the fall shows which brought them to the middle of October.

The wether lambs, born in April, that won first and second prizes in class, were castrated when young, and run on the pasture till and after being weaned, without grain feed up to the middle of October. The other one shown, first prize pen of three, was castrated in November. This is not recommend.

The six ewe lambs were dropped in March and April, fed in the ordinary way till turned on grass, about the first of May, got nothing more till weaned the 8th of July. Four of these were gradully fed the grain mixture till one pound per day was reached, with green food as above, then took the round of the fall shows, which brought them to the middle of October. The other two (twins), one of which won first prize in the class, ran on the grass and stubble till the middle of October. The lot was awarded first, second and third in class, with first and second for pens of three. After the middle of October up to time of show, some 56 days, the whole lot was kept inside on clover hay, three pounds of roots, and an average of one and a quarter pounds of the mixed grain feed per head a day.

To sum up the results, we find the grand Sweepstake wether was in prime condition, and from birth, in feeding and fitting for the two years shows had consumed about 200 lbs. of grain fed at a cost of one cent per pound, or $2. The other two wethers feeding and fitting for the two seasons, including the fall shows, had consumed about 300 lbs. of the grain feed each, or $3. These were quite too ripe and overdone, and when put on the block were entirely too fat to win, one dressing 66 per cent. of his live weight, and that without shrinking, being within one pound of the heaviest carcase in the show.

The first and second prize wether lambs were in prime condition for the Christmas market, and had consumed only 70 lbs. of grain feed each at a cost of 70 cents.

The four ewe lambs fitted for the fall shows had consumed 170 lbs. each of grain feed at a cost of $1.70 each. It will be seen that in knocking about for six weeks at the fall shows a large portion of this would be lost from a mutton standpoint. The other two lambs, which included the first prize winner, consumed only 70 lbs. at a cost of 70 cents

each for the grain feed. This leads to the conclusion that six weeks is about the right length of time to feed lambs to put them in prime condition for the market It must be born in mind that well bred lambs (not necessarily pure bred) of good quality feed at less cost per pound than rough ones of any breed; and that quality counts far more to the feeder than size, as well as being worth more per pound to the consumer.

It is difficult to arrive at the exact value of hay and pasture consumed, but in this case Southdowns being such small consumers, especially when on a good feed of grain it would not figure very high. The result goes to show that the most profitable time to market sheep is before they are a year old. They will gain more in a given time up to that age than after. As an illustration and approximate estimate of the profits in feeding well-bred lambs, on the 23rd of October when we had got these six ewe lambs fairly started to feed, we weighed them and they ran from 87 to 108 lbs. each, or a total of 568 lbs. for the six. We weighed them again November 29th, when they went from 105 to 130 each, or a total of 705 lbs., an average gain of 23 lbs. in 37 days. This would add to their value nearly three times the cost of the grain feed consumed in that time. Another way of arriving at the profit: Take for example these six lambs, their average weight 117 lbs. at five cents, $5.85 each, and deduct from this the cost of grain and roots fed, which would be about $1 each; this would leave a good margin on the rough feed in favor of the producer.

By John Campbell, Woodville.

Six pure-bred Shropshires, and nine grades sired by registered Shropshire rams were entered. Starting with the shearling registered wether, Blue Bell, 112222, winner of second prize in class 16, section 2, and also second in Shropshire special competition, his breeder was Mr. James Bale, Woodville, Ont. The dam was Canadian bred, tracing several generations back to imported ancestry. His sire, bred at Fairview, was Tantalizer, 59972, a son of Royal Doncaster, 30989, winner of second prize at the Royal Show in England, and fourth at the World's Fair, Chicago.

The Model, 133210, a wether lamb, bred at Fairview, winner of first premium in class 16, section 3, first in Shropshire Specials' competion, and first in pen of five lambs, winning the "Prince of Wales" prize, was sired by The Best Type, 58775, a son of Newton Lord, 30983. The latter won at World's Fair, Chicago, five first premiums, including the championship for being the best Shropshire ram of any age in the show. The Best Type at Toronto in 1897, won first place with one of England's most noted Royal Champions in the ring, viz, Darlington.

The Model's dam, Campbell's 776, 99634, was bred by S. Nevett, England, and won first in pen of five at the Shropshire Show in 1897. My registered ewe lambs which won first in pen of three, class 16, section 5, were bred at Fairview. Their sire was Newton Lord, and the dams were Campbell's 664, 98582, sired by Fair Star (5177); Campbell's 666, 98584, by Fair Star, and Campbell's 582, 77180 by Settler 58985.

The two dams by Fair Star, one of England's most noted sires, were bred by Mr. A. E. Mansell, Shifnal, England. The third dam was bred at Fairview. Her sire, Settler, was bred by Mr. Daniel Eardley, of Market Drayton, England. Settler sired Campbell's 540, 68735, winner as a lamb of the grand sweepstakes at Guelph Fat Stock Show in 1894. My fourth ewe lamb, sired by Newton Lord, had Campbell's 667, 98585 for dam. She was bred by Mr. A. E. Mansell. Her sire was Montford Dreamer, another of the noted stock rams which so largely helped to make Mr. Mansell's flock famous, in that he sired for him two rams which won the championship at the Royal, besides other winners of less renown. The latter mentioned ewe lamb, with my winning pen of three ewe lambs, and first prize wether lamb—The Model—formed the pen of five which won the "Prince of Wales" prize offered for the best five lambs of any breed. The awarding committee of four, who were unanimous in making the award, were a breeder of Oxfords and Southdowns, one of Oxfords, another of Cotswolds and one of Leicesters. All were bred by neighbors who used well-bred Shropshire rams in their flocks. My first prize yearling wether in class 29, section 2, was sired by Fairview Sort 99, 519, a son of Newton Lord and Campbell's 508, 56994, a first premium ewe at Madison Square Garden Show New York City. The dam of wether was a good common Leicester grade ewe. Besides winning in his section this wether won first in Shropshire Specials Class.

Shropshire Yearling Ewe. The property of John Campbell, Woodville, Ont. Shown at the Ontario Provincial Fat Stock, Dairy and Poultry Show, 1898.

The grade yearling ewe, winner of first place in class 29, section 1, was sired by Newton Lord. Her dam was a high grade Shropshire ewe, bred up from a common grade of some twelve years ago, by the continual use of high-class Shropshire sires. This winning ewe, later on was declared the best grade sheep in the show. The wether lamb, winner of second prize in class 29, section 4, and first in Shropshire specials, was also sired by Fairview Sort. His dam was a Shropshire grade, bred from a common grade ewe and by a Shropshire ram. The pen of three grade wether lambs, class 29, section 3, winners of second honors, were sired, two by Fairview Sort, and one by Harrison's 235, 61709. Their dams were ordinary grade ewes, except as stated in description of single lamb in class 29, section 4, which was one of the pen of three. My second premium ewe lamb in class 29, section 5, was sired by Fairview Sort, with dam a good common grade ewe of no particular breeding. I have given the breeding in detail in order to show conclusively how important the use of first-class sires is in the flock, and how they will transmit their good qualities, even when used on grade ewes of mixed blood and varied type.

How Fed. During the first three weeks of the young lambs' existence, the growth and development were maintained by feeding the mothers liberally with milk-producing feed. Clover hay cut when in full blossom, with a sufficient supply of pulped turnips, bran and crushed oats, all mixed together a few hours before using, kept up a flow of milk such as is essential to the rapid growth of the lambkin. Later the use of the creep, and the regularly cleaned out trough, in which finely pulped turnips, with whole oats and bran spread over the turnips were placed fresh twice daily, caused a steady growth of plump form, which is much easier maintained than regained if once lost. I found a roomy sunny yard for lambs to take exercise in very helpful in late winter and early spring weather. When turned on grass the roots fed were gradually lessened in quantity, and a little peas added to the oats and bran, to which they had access every night when the flock was yarded to save it from dogs. After weaning in July, aftermath and rape were ready for their use. Morning and evening they had a run on rape, with a few hours

on the aftermath between. Tares were ready to cut for feeding inside at noon, about the middle of July. A small feed of the mixed grain and bran, to which about five per cent. of ground flax seed was added, was given night and morning. Not more than half a pound was allowed each lamb at first, and when the cool fall season set in a third feed of same quantity was given at noon, when rape and pasture depreciated in succulence, turnips were ready to use instead at the rate of some eight pounds to each sheep and lamb, divided in three feeds daily. A very small amount of milk, not more than a pint to each lamb daily, was fed during the two months preceding the show, but I cannot say that it resulted in any noticeable improvement, comparing them with the grade lambs which did not come into my possession until August, and had no milk after weaning at that date. The latter appeared to fatten more rapidly than the former when fed altogether in the same pen. Before I purchased the grade lambs they were pastured throughout the spring and summer on the roadside, and had no feeding except what they helped themselves to.

The yearlings in my exhibt were last year fed similarly to the lambs, as stated above, and were carried through the winter on unthreshed peas for the morning feed, about four pounds each of cut turnips at noon, a full feed of clover hay at 5 p.m., and four pounds of cut turnips to each at 7.30. In April, mangels in about half the quantity, replaced the turnips. The spring feeding was one pound of grain—same mixture as lambs had at 5 a.m., then to grass till 11 a.m., and when let into barn at that hour three pounds cut mangles and clover hay were placed before them. One pound of grain at 5 p.m., and out to grass till bed-time completed the day's attention.

When rape was ready for use they were turned on it morning and evening, fed grain as formerly and green tares given as a noon feed in barn. During harvest and fall they and the lambs were penned together, and had the same feeding as previously described. Fresh water was always within reach, and the salt boxes were kept well supplied. No condiments were used.

Cost of Feed Consumed. Here I halt, as it is not possible for me to give even an approximate estimate of cost. That is not considered in fitting animals for the showing. While it is wise to count the cost as closely as possible in nearly every line of operations on the farm, in my humble opinion, the person who will pay much attention to the cost of feeding, or value of the constant labor required to successfully prepare show animals for such a contest as that of our Provincial Fat Stock Show, is one who will find it a very difficult matter ever to win in close competition.

By John Rawlings, Ravenswood.

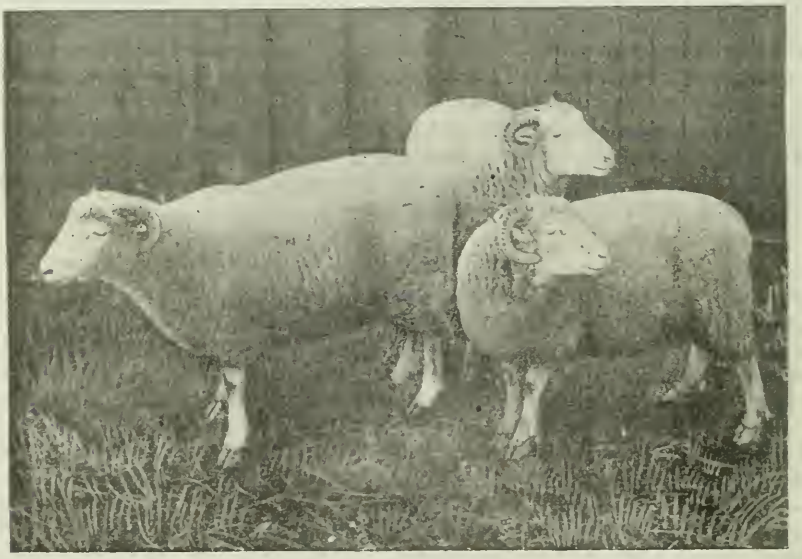
Breeding and feeding of the three ewe lambs that won 1st prize and five lambs that won second place for "Prince of Wales" prize at Provincial Fat Stock Show.

Our flock of registered Cotwolds was founded in 1896 when we purchased four imported ewes from Mr. James Snell, Clinton. On these ewes we used such sires as Grey Face, 7865 (bred by Charles Gillett, England, and imported by J. C. Ross, Jarvis, Ont.), Ross, 7866 (also bred by Charles Gillett, and imported by J. C. Ross, a prize winner at Toronto and London, and also in the States), and Standon 4117, (bred by John Snell & Son, Edmonton, out of imported stock). In 1892, we added to our flock four shearling ewes from John Snell & Son's flock, out of imported ewes. After this we used Charity 4794, bred by J. G. Snell & Bro., an excellent stock sheep, and the sire of some of the best ewes we have. Royal Topin, 8974, Commander, 8375, and Blucher, 8376, were also used with success. Blucher, 8376, especially was an all round sheep, carrying the best fleece of wool we ever saw on a Cotswold sheep. In 1899, we purchased from Mr. S. Coxworth, Whitby, Ont., Brilliant, 4491, imported by Joseph Ward, Marsh Hill. He is the sire of a great many prize winners, and has left good points in our flock. Our present stock ram, Lord Walton, 8771, the sire of the lambs exhibited at London, was imported by J. G. Snell and bred by T. Gillett, England. He was never beaten in the show ring as a lamb, and is a wonderfully good getter. As regards feeding and care of our lambs, we always aim to have our ewes in a good healthy condition when the lambing season arrives, by giving them plenty of out door exercise, with plenty of good nourishing food and pure water. As soon as the lambs arrive we build a creep in the sunniest part of the sheep barn, where the lambs soon learn to lie. As soon as they are old enough to eat, a trough

is placed in the creep with oats, bran and a little oil cake ; a second trough with pulped roots, and a crib with the very best clover hay, lucerne or alfalfa preferred. As soon as warm weather comes we supply them with good clean water, which they relish very much. When the sheep are turned on the pasture in the spring, we build a creep in the field and feed the lambs once a day with oats, bran and oil cake. We wean our lambs about the 1st of July, after which we feed grain twice a day. The ewe lambs we had at London were turned out in a good clover meadow and rape about the 1st of August, and received no grain till the 10th of November, when they were placed in an acre plot of lucerne and rape mixed, and fed four quarts of bran, oats and oil cake mixed, equal parts of each twice a day with all the lucerne hay they could eat.

By R. H. Harding, Thorndale.

My Dorsets were not subject to pampering. The lambs are principally dropped in January, and while they are suckling their dams I supply the little fellows with a creep pen, where they can be fed a little grain and roots, without being interfered with by the older sheep. At the same time I feed the dams liberally upon grain, pulped roots and clover hay, always allowing plenty of exercise, which I consider very essential in the growing of early lambs. As early in the spring as possible I let them have the run of a pasture field. I find this plan works well so far as the lambs are concerned, as it tends to increase the milk flow of the dams, but I find that the ewes lose flesh to quite an extent at this season, as the taste of fresh grass and the warm sun has a tendency towards sluggishness, turning them against eating hay. As soon as the weather is warm enough we shear the whole flock (unwashed). About a week after shearing, we dip the lambs to destroy ticks, as they have mostly left the shorn sheep and found shelter on the lambs by



Dorset Ewe Lambs. The property of R. H. Harding, Thorndale, Ont. Shown at the Ontario Provincial Fat Stock, Dairy and Poultry Show, 1898.

this time. I have used both Little's and Cooper's dips (at different times) with excellent results. As soon as the grass is good enough I wean the lambs, putting them on nice fresh pasture. I also feed a mixture of oats, bran and oil cake to those intended for exhibition, aiming to make them firm and plump, at the same time trying to avoid building up a carcase of tallow, by allowing plenty of exercise and making the grain ration principally oats. I aim to have a patch of early rape fit to turn the lambs into about the 1st of July, letting them run in the rape by night and in the pen by day. When the rape is fairly well eaten down, we usually have some second growth clover to turn the lambs

into, but last season was an exception to the rule on account of the drouth. As the weather gets cool (if I want to increase the fat) I add a small quantity of peas to the grain ration.

So far as the cost of growing and fitting my stock is concerned, I cannot give anything like an exact account, as the number included in the feeding lot varies from time to time, but I will append the following estimate, allowing an acre to pasture six head and allowing another acre to grow their winter feed :

Rating the land as worth $3.00 per acre, rent, would equal $6.00 for the two acres, or $1.00 per head for the pasture. Hay and roots, allowing $1.50 per acre for labor, 50c. per head, and allowing them one pound of grain per head daily for the first year, estimating the grain at 80c. per hundred pounds. $2.92 per head for grain, or a total of $4.42 per head. To the average reader this will no doubt appear to be unprofitable feeding, and to such I would say that these are estimates on feeding and fitting Show Sheep, and I am satisfied many old exhibitors will say I am far within the mark, but we do not fit all our sheep for the shows.

Concerning the breeding of my exhibit of sheep, they are all home bred, and mostly from home bred sires and dams, but I have taken care to avoid inbreeding in selecting sires. However, I am working new blood into my flock by using two first class imported sires, one of them a first prize winner at the Royal, 1899. From these I expect good results. Concerning the block test, the yearling Dorset wether that I had dressed was proclaimed by several experts to be either the first or second best carcase in the Show. One of these experts was Mr. McKerrow, of Sussex, Wis.

By John Park & Son, Burgesville.

The sheep we exhibited at the Provincial Fat Stock Show were bred by ourselves and were got by imported rams and registered Canadian-bred ewes. They were dropped the last of March and first of April. The ewes with the best lambs were put by themselves and fed clover hay night and morning, with an additional feed of bran mash at night and in the morning a feed of grain, consisting of one part peas, two parts bran and two parts oats. At noon they were fed a liberal feed of cut turnips and also fed threshed pea straw. On fine days, ewes and lambs were given a run in yards. As soon as grass was ready to turn out on, the ewes were put on good clover and changed from one pasture lot to another every two weeks. This was all the care the ewes and lambs got until weaning time.

When lambs were weaned they were turned on three or four acres of rape, oats and barley, turned on this green feed about two hours in the morning and taken into the shed before noon, and fed a grain ration consisting of bran, oats and a little oil cake. They were turned out for two hours in the evening, and turned on a pasture lot for the night. This method was continued for the summer. The cost to fit a sheep till a shearling is about five dollars. Sheep should have plenty of exercise. With this method you will have the right sheep for the flock.

By James Bowman, Guelph.

The shearlings, Suffolks, that took first and second in Dressed Carcase Competition were reasonably well wintered last winter and run in good grass pasture all summer, with access to running water. About October 1st they got a little grain, about one and a half pints each day of oats and peas mixed. This was continued until about the 10th of of November, when they were put in a pen and fed what pulped turnips and grain they would eat, with bran and oil-cake mixed, about a quarter of a pound of cake to each sheep per day. They were fed twice a day, and when they had cleaned up the grain and roots they got what they would eat. They also had access to salt and water. The Suffolk ewe lamb that got third prize was fed in the same way, except that she got rape for about three weeks.

SWINE.

By J. E. Brethour, Burford.

In making a report of the system of feeding and care given to the pen of hogs which won Sweepstake at the Provincial Winter Show at London in 1899, I would say first that I took special care in the selection of these pigs that they should have the required length and form necessary to produce carcases suitable for the English trade. The pigs having been selected carefully, they were treated in the following manner: They were allowed to suckle the sow until two months old, then weaned and fed upon wheat middlings and a small quantity of skim milk, given four times daily until three months old, adding a small quantity of barley and corn meal as they grew older and were able to stand stronger feed; but after three months old their feed was composed largely of green clover, and later in the season green corn and rape. For six weeks previous to the commencement of the finishing period they were allowed the run of a small field of artichokes, which they dug and ate at their own free will, being given a small quantity of whole corn, scattered broadcast. This system of feeding was inexpensive and promoted a good development of muscle and a healthy condition. The finishing period lasted about a month, when they were confined to the pen and fed upon a mixture of chopped wheat, oats and corn, which was fed to them in liberal quantities during the finishing period. One danger to guard against in the production of high-class bacon is to avoid over-feeding while the pigs are young and during the growing period. Such food should be given as will develope bone and muscle, and sufficient exercise should be allowed to induce good healthy digestion. One cause of soft pork is too high feeding when young, and sufficient attention not being given to the development of a healthy, vigorous condition of the pig. Soft pork is not so much a matter of what you feed as how it is fed, and the form or condition the pig is in to properly utilize the food given. It is useless to try and make a bacon hog from a pig that is inclined to be short and thick. This class of pig must be underfed to induce a growth of bone and muscle, and when finished it will have a hard, coarse quality of lean meat, with the fat soft and oily. A hog having good length and depth of side, when well fed from birth, will furnish a carcase full of lean, juicy meat with an even distribution of fat throughout the entire carcase. I would say in conclusion, that to produce an ideal "Wiltshire side" the form of the pig is of as great importance as the food given. Food is only wasted in trying to produce bacon hogs from short, thick pigs.

By R. H. Harding, Thorndale.

My pigs were a little over eight months old. They were allowed a small run of pasture during the summer, their principal feed (additional) being skim milk and a little mixed chop, composed of oats, peas, goose wheat and flax (principally oats), occasionally a little corn, chop or shorts. They were fed comparatively cheaply until about three weeks before the Show, when the meal was increased and they were given nearly all they could eat. They were home-bred, from Canadian sire and dam. They dressed eighty per cent. and eighty-two per cent. respectively. The latter (I believe) was the highest percentage dressed in the show. We hear a good deal said against the Chester White as a bacon hog, which is in some instances quite correct, but the same thing is noticeable in all other breeds, yet I believe with careful selections and proper feeding (this I think should be done in a grass plot during the summer instead of keeping them enclosed in pens), they can be made an ideal packer's hog and be produced at a profit—profit being what the producer is aiming for, but what I am sorry to say he does not always get.

POULTRY.

By J. Poole, Lambeth.

We keep about seventy thoroughbred always replacing them ever third year, which I think is quite long enough to be profitable. We generally have our hens commence to sit about the 1st of March. We find if set earlier than this the per cent. of chicks that live is very small. By looking well after our eggs, so as not to get them chilled, we obtain a pretty fair brood, provided the hen and rooster are not over two or three years old. Our plan is to set, if possible, two or three hens on the same day, so that when they hatch we can take all the chicks and put them with one hen and set the others again; in this way a hen can take care of thirty or forty chicks. We have had hens sit for nine weeks and hatch three broods, but six weeks, I think, is long enough, for if they sit for nine weeks it takes too long for them to commence to lay again. When setting a hen the second or third time be sure to make a new nest or the lice may bother you. Always use shallow boxes for nests, say about 15 or 18 inches square, on the floor if possible, and in a portion of the hen house protected from the laying hens. If a hen should break an egg the others should be washed with a little warm water, as a dirty egg will seldom hatch.

Now, as to care of chicks, provide suitable coops for the hen so that the little ones can go in and out at will so as to be protected from rain. The very best feed for the little ones is small or cracked wheat, which almost every farmer has of his own. It is a dry, healthy feed that cannot be beaten for the first five or six weeks; after this they will take any coarse grain that a farmer has to hand, but to make your chicks grow fast use plenty of wheat and corn and avoid wet or sloppy food as much as possible. I believe soft food is the forerunner of all disease. As soon as the hen starts to lay the chicks will take care of themselves. We give them full liberty and allow them to wander at will; by so doing they gather fully half their living, and we allow them to do so till fit for market. By this method we manage to raise from three to five hundred every year, making the average from 50c. to 60c. per pair in our local market, which is London. Our style of dressing is this: The chicks are starved for twenty-four hours before killing. By so doing they are quite empty before being stuck, which is done with a penknife by inserting it into mouth and cutting the roof, which I think is the neatest and cleanest. They are allowed to hang by the heels for a few minutes so that the blood may drain out, then the feet and head are washed clean and the fowl is ready for plucking, which is done dry, and I think chickens will look cleaner and more attractive than if done in any other way. Our style of tying up is to fasten strings securely around each foot, turn the feet back by the side of the breast, pass the strings down between the wings and the body and tie them together on the top of the back; take another string pull through the legs drawing them tightly together at the joints, and also passing the string around the tail, and secure firmly, this gives your fowl a neat, plump appearance and you then have them in proper shape for packing for the Old Country market or home market.

By R. H. Harding, Thorndale.

A word or two on the feeding and care of turkeys. While they are quite young we feed stale bread, bran, peameal, cornmeal and herbage, moistened with curd and keep them closed up in coops by night, allowing them to roam at will during the day when it is dry. After they are four or five weeks old, they need very little attention, especially if there is a good field of corn convenient, until the snow appears. Turkeys are very fond of boiled turnips. The sweepstake turkeys at the Fat Stock and Poultry Show were fatted on boiled turnips and flint corn (shelled). They were kept well filled up with the turnips during the day and then fed a liberal feed of corn before going to roost. There is not much fear of your flock going to roost in your neighbor's yard, if a good feed of shelled corn awaits their return every evening.

As to the different colors of flesh, the yellow skinned turkeys are preferred in the home market, but there does not seem to be much preference in the British market. As to which is the nicest flavor I cannot say, but would say if you want to produce the yellow appearance feed plenty of corn and milk; and if you want to raise large turkeys get a good pair of bronze.

LIST OF PRIZE WINNERS.

CATTLE.

Shorthorns.

Steers, two years and under three, two entries.

1. H. Smith, Hay, Free Trade, 25691. Sire, Abbottsford, 19446; dam, Fragrance, 22729.
2. J. Fried & Sons, Roseville, Honest Billy. Sire, Lord Abbott, 20707; dam, Blenheim Lass, 14010.

Steer, one year and under two, one entry.

1. John Fried & Sons, Roseville, Wild Bill. Sire, Lord Williamson, 24315; dam, Sunflower, 19205.

Steer, under one year, one entry.

1. T. E. Robson, Ilderton, Oswald. Sire, Guardsman, 18956; dam, Lily Strathallen,, Vol. 15.

Cow or heifer, three years and over, three entries.

1. T. E. Robson, Ilderton, Rosina 2nd, 29536. Sire, 10th Crown Jewel, 16607; dam, Rosina 29535.
2. John Fried & Sons, Roseville, Roan Lily, 29748. Sire, Lord Abbott, 20707; dam, Golden, 16265.
3. Haining Bros., Highgate, Molly, Vol. 13. Sire, Prince Consort, 19884; dam Beauty, Vol. 13.

Heifer, two years and under three, one entry.

1. F. Martindale, York, Queen Elizabeth, Vol. 14. Sire, Lord Kilpout 21449: dam, Queen Avondale, 24607.

Heifer, under two years, one entry.

1. H. Smith, Hay, Barmaid, Vol. 16. Sire, Abbottsford, 19446; dam, Bonnie Brae, 27620.

Sweepstake—Best Shorthorn Steer, two entries.

1. H. Smith, Hay.

Sweepstake—Best Shorthorn Cow or Heifer, four entries.

1. T. E. Robson, Ilderton, Rosina 2nd, 29536.

Above sweepstake prizes were offered by the Dominion Shorthorn Breeders' Association.

Sweepstake—Best Shorthorn Animal. Prize: Cement, donated by Estate of John Battle, Thorold, Ont., value, $25; three entries.

1. H. Smith, Hay.

Sweepstake—Two best Shorthorn Animals. Prize: One ton Albert's Thomas-Phosphate Powder, donated by T. C. Wallace, Board of Trade Building, Toronto, value, $25; three entries.

1. T. E. Robson, Ilderton.

Herfords and Polled Angus.

Steer or Heifer, two years and under three, two entries.

1. Walter Hall, Washington, Robin, 325. Sire, Lucretius, 17109; dam, Newtona, 12903.
2. James Bowman, Guelph, Elm Park Mayflower, 27224. Sire, Lord Aberdeen 2nd, 19810; dam, Kyma of T., 17606.

Steer or Heifer, one year and under two, three entries.

1. James Bowman, Guelph, Elm Park Belle 2nd, 30210. Sire, Lord Aberdeen 3rd, 20824; dam, Heather Belle, 22610.
2. Walter Hall, Washington, Newtona's Promise, 29662. Sire, Lucretius, 17109; dam, Newtona, 12903.
3. James Bowman, Guelph, Kyma, 8th, 31683. Sire, Prince of Thorndale, 18861; dam, Kyma 2nd, 18920.

Steer or Heifer, under one year, five entries.

1. James Bowman, Guelph, Elm Park Belle 3rd, 34620. Sire, Kyma's Heir, 24835; dam, Heather Belle, 22610.
2. Walter Hall, Washington, Maple Bank Newtona, 33690. Sire, Lucretius, 17109; dam, Newtona 2nd, 26439.
3. Walter Hall, Washington, Newtona 3rd, 33691. Sire, Lucretius 17109; dam, Newtona, 12903.

Highly Commended, Walter Hall, Washington, Black Bess. Sire, Royal Blackbird, 16556; dam, Lady Gladstone, 245.

Commended, James Bowman, Guelph. Elm Park May, 2nd, 34621. Sire, Kyma's Heir, 24835; dam, Kyma of T., 17606.

Cow or Heifer three years or over, three entries.

1. James Bowman, Guelph, Black Beauty. Sire, Prince of Tweedhill, 14409; dam, Kyma of T., 17606.
2. James Bowman, Guelph, Flirt's Own, 23322. Sire, Prince of Tweedhill, 14409; dam, Flirt, 16035.
3. James Bowman, Guelph, Kyma 4th, 24534. Sire, Lord Aberdeen 3rd, 20824; dam, Kyma 2nd, 18920.

Special.

First premiums won in the above class by Aberdeen-Angus were increased 75 per cent. by the American Aberdeen Angus Breeders' Association if recorded in the Herd Book of the above Association.

Sweepstake—Best Animal in class for Herefords or Polled Angus. Prize: A scuffler, donated by Thom's Implement Works, Watford, Ont., value, $10; one entry.

1. Walter Hall, Washington.

Sweepstake—Two best animals in class for Herefords and Polled Angus. Prize: One ton Albert's Thomas-Phosphate powder, donated by T. C. Wallace, Board of Trade Building, Toronto, value, $25; two entries.

1. James Bowman, Guelph.

GALLOWAYS AND DEVONS.

Steer or Heifer two years and under three, four entries.

1. A. M. & Robt. Shaw, Brantford, Irvena, 13219. Sire, MacCortney, 9739; dam, Gem 3rd of Drumlanrig, 9187.
2. D. McCrae, Guelph, Maid Muncie, 12959. Sire, College Boy, 10395; dam, Maid Marion B., 9750.
3. W. J. Rudd, Eden Mills, Curley Jack. Sire, Indian Chief, 1036; dam, Lady Anne, 1027.

Steer or Heifer, one year and under two, four entries.

1. A. M. & Robt. Shaw, Brantford, Minnie May of High Park, 14210. Sire, McCortney, 9739; dam Flora McErin, 5735.
2. D. McCrae, Guelph, Adella of Warkworth, 13973. Sire, C. Borderer, 5945; dam, Adella 3rd, 9576.
3. D. McCrae, Guelph, Ramee XIII., 13972. Sire, C. Borderer, 5945; dam Ramee XI., 10855.

Highly Commended, W. J. Rudd, Eden Mills, Buttercup, 1142. Sire, Indian Chief, 1036; dam, Fanney 3rd, 1035.

Steer or Heifer, under one year, four entries.

1. A. M. & Robt. Shaw, Brantford, Valentine S., 15042. Sire, College Gambler, 12808; dam, Maud of High Park, 11737.
2. D. McCrae, Guelph, Calla Lilly, 14615. Sire, Buster, 12961; dam, Calandria, 10281.
3. W. J. Rudd, Eden Mills, Velvet, 1157. Sire, Conqueror, 1053; dam, Flora R., 1087.

Highly Commended, D. McCrae, Guelph, Valetta, 14614. Sire, Czar, 12817; dam, Viscountess, 2nd, 9645.

Cow or Heifer, three years and over, five entries.

1. D. McCrae, Guelph, Adella of Flamboro, 12783. Sire, C. Borderer, 5945; dam, Adella 3rd, 9576.
2. D. McCrae, Guelph, Semiramis E., 24th, 10862. Sire, Norfolk, 6764; dam, Semiramis, 19th, 9609.
3. A. M. & Robt. Shaw, Brantford, Mary Anderson 2nd, 10383. Sire, Count Monk, 5728; dam Allie Anderson, 6668.

Highly Commended, W. J. Rudd, Eden Mills, Fanney 3rd, 1035. Sire, Billie, 998; dam, Fanney, 985.

Commended, Thos. Lloyd-Jones, Burford, Myrtle Maid, 11291. Sire, McCortney, 9739; dam, Gem of Drumlanrig, 9187.

Sweepstake—Best animal in class for Galloways and Devons. Prize: Cement, donated by Isaac Usher & Son, Queenston, Ont., value, $25; three entries.

1. A. M. & Robt. Shaw, Brantford.

Sweepstake—Two best animals in class for Galloways and Devons. Prize: One ton Albert's Thomas-Phosphate Powder, donated by T. C. Wallace, Board of Trade Building, Toronto, value, $25; three entries.

1. A. M. & Robt; Shaw, Brantford.

GRADES OR CROSSES.

Steer, two years and under three, two entries.

1. James Leask, Greenbank, Jim.
2. Thos. Lloyd-Jones & Sons, Burford, Pride of the Oaks. Sire, Marquis of High Park, 10799.

Steer, one year and under two, four entries.

1. John Fried & Sons, Roseville, Look Out. Sire, Lord Willison, 24315.
2. James Leask, Greenbank, Clinker. Sire, Moneyfuffel Lad, 20521.
3. John Fried & Sons, Roseville, Jack. Sire, Roseville Hope, 26837.

Steer, under one year, three entries.

1. James Leask, Greenbank, Rock. Sire, Moneyfuffel Lad, 20521.
2. T. E. Robson, Ilderton, Big Ben. Sire, Guardsman, 18956.
3. John Fried & Sons, Roseville, Harry. Sire, Lord Willison, 24315.

Cow or Heifer, three year. and over, two entries.

1. John Fried & Son, Roseville, Snowflake. Sire, Lord Abbott, 20707.
2. James Leask Greenbank, Watson. Sire, Monefuffel Lad, 20521.

Heifer, two years and under three, two entries.

1. John Fried & Sons, Roseville, Carry. Sire, Lord Abbott, 20707.
2. F. Martindale, York, Missie Lady. Sire, Souter Johnny, 23886; dam, Lady Clevelan'.

Heifer, under two years, two entries.

1. James Leask, Greenbank, Flo. Sire, Monefuffel Lad, 20521.
2. James Leask, Greenbank, Bess. Sire, Moneyfuffel Lad, 20521.

Sweepstake.—Two best animals in class for Grades and Crosses. Prize: One ton Albert's Thomas-Phosphate Powder, donated by T. C. Wallis, Board of Trade Building, Toronto, value, $25; two entries.

1. James Leask, Greenbank.

Special by the Dominion Shorthorn Breeders' Association. Grade steer, sired by pure-bred Shorthorn bull. Six entries.

1. John Fried & Sons, Roseville. Sire, Lord Willison, 24315.

Championship Prize.

Championship prize for best animal shown in the cattle department. Prize: A No. 50 ensilage cutter, open machine, with roller and ball bearings, and LaMarsh patent concave knives, value $45; donated by B. Bell & Son, St. George, Ont. An option of the following was given upon payment of the difference in price: A four-horse Pitts' sweep power, a No. 60 ensilage cutter, or a two or three-horse tread power.

In case a pure-bred Hereford or Hereford grade won the prize, $25 additional was offered by the Canadian Hereford Breeders' Association.

In case a Hereford grade with at least two registered crosses won the prize, $50 extra was offered by H. D. Smith, Comptom, Quebec. Four entries.

1. H. Smith, Hay.

SHEEP.

Cotswolds.

Ewe, under one year, thirteen entries.

1. John Park & Son, Burgessville, Rawling's Ewe, 18808. Sire, Lord Walton, 8771; dam, Rawling's 98, 9480.
2. T. Hardy Shore, Glanworth, Shore's 323, 19190. Sire, Goldfinder, 16183; dam, Vera 14th, 7696.
3. John Rawlings, Ravenswood, Rawling's 441, 18821. Sire, Bailey's 44, 16275; dam, Rawling's 372, 15311.

Highly commended, John Rawlings, Ravenswood, Rawlings' 440, 18820. Sire, Lord Walton, 8771; dam, Rawlings' 300, 12952.

Commended, George Allen, Oriel, Allen's 31, 18942.

Wether, one year and under two, five entries.

1. John Park & Son, Burgessville, Park 5, 16596. Sire Champion Shawanoo, 13637; dam, Park Ewe 3, 14880.
2. John Park & Son, Burgessville, Park 161, 16594. Sire, Champion Shawanoo, 13637; dam, Park Ewe, 14879.
3. Geo. Allen, Oriel, Allen's 16, 17070. Sire, Stoneside, 9537; dam, Patton's 9, 12782.

Highly commended, Geo. Allen, Oriel, Rastler, 16739. Sire, World's Homer, 13447; dam, Lisby, 16716.

Commended, John Park & Son, Burgessville, Park 15, 16612. Sire, Champion Shawanoo, 1363; dam Fairmont, 15711.

Wether, under one year, six entries.

1. John Park & Son, Burgessville. Dam, Park Ewe 46, 19976.
2. John Park & Son, Burgessville. Sire, Hopeful, 16182; dam, Park Ewe 45, 19975.
3. Geo. Allen, Oriel, Simon P. Sire, Ficht's 51, 12865; dam, Lora. 13751.

Highly commended, John Park & Son, Burgessville. Sire, Hopeful, 16182; dam, Park Ewe, 19977.

Commended, Geo. Allen, Oriel, Tom Murphy. Sire, Ficht's 51, 12865; dam, Clara B., 13752.

Three Wethers, under one year, two entries.

1. John Park & Son, Burgessville.
2. Geo. Allen, Oriel, Simon P., Tom Murphy, Jack Jeffrie.

Three Ewes, under one year, seven entries.

1. John Rawlings, Ravenswood, Rawlings' 457, 18899; Rawlings' 460, 18840; Rawlings' 469, 18877.
2. John Park & Son, Burgessville, Park Ewe 32, 19519: Rawlings' Ewe, 1808; Park Ewe 31, 19518.
3. T. Hardy Shore, Glanworth, Shore's 323, 19190; Shore's 324, 19191; Shore's 333, 19620.

Highly commended, Geo. Allen, Oriel, Allen's 33, 18944; Stoneside Lass, 19650; Stoneside Lass 2, 19651.

Dressed Carcase. 5 entries

1. John Park & Son, Burgessville.
2. John Park & Son, Burgessville.
3. Geo. Allen, Oriel.

Lincolns.

Ewe, under one year, five entries

1. Gibson & Walker, Denfield, G. & W. 562, 6490. Sire, Riby Gem, 3324; dam, Dudding, 20, 6217.
2. Gibson & Walker, Denfield, G. & W. 561, 6489. Sire, Main, 6215; dam, J. G., 146, 4249.
3. Gibson & Walker, Denfield, D.C.N., 6, 6419. Sire, Royal S., 6104; dam, Maude, 4474.

Highly commended, Gibson & Walker, Denfield, Lady D., 6187. Sire, Robbie 1st, 3508; dam, H. & Co., 37, 3460.

Commended, Gibson & Walker, Denfield, Edith 4th, 5838. Sire, Riby Gem, 3324; dam, Chester Queen, 3344.

Wether, one year and under two, two entries.

1. Gibson & Walker, Denfield, A.D., 5185. Sire, Riby Conqueror, 503; dam, Barton's 5, 966.
2. Gibson & Walker, Denfied, N.A., 5186. Sire, Riby Conqueror, 503; dam, Barton's 5, 966.

Wether, under one year, three entries.

1. Gibson & Walker, Denfield, No. 2, 6393. Sire, Sir Roger, 3318; dam, Gibson's 5, 327.
2. Gibson & Walker, Denfield, No. 3, 6394. Sire, Riby Conqueror, 503; dam, G. & W. 31, 524.
3. Gibson & Walker, Denfield, No. 1, 6392. Sire, Riby Gem, 3324; dam, No. 4, 518.

Three Wethers, under one year, one entry.

1. Gibson & Walker, Denfield, No. 2, 6393; No. 3, 6394; No. 1, 6392.

Three Ewes, under one year, two entries.

1. Gibson & Walker, Denfield.
2. Gibson & Walker, Denfield.

Dressed Carcase, two entries.

1. Gibson & Walker, Denfield, A.D. 5185.
2. Gibson & Walker, Denfield, N.A., 5186.

LEICESTERS.

Ewe under one year, thirteen entries.

1. John Kelly, Shakespeare. E. 108, 3728.
2. John Kelly, Shakespeare. E. 107, 3459.
3. J. M. Gardhouse, Highfield, Cora Girl, 3604. Sire, Long Joe, 939; dam, Cora 2nd, 1375.

Highly commended, Orr & Lillico, Galt, Pegie, 3651. Sire, Balfour, 1146; dam, Kate, 1862.
Commended, Orr & Lillico, Galt, Polly, 3650. Sire, Balfour, 1146; dam, May, 1507.

Wether, one year and under two, two entries.

1. Orr & Lillico, Galt, Bob, 3732. Sire, Balfour, 1146; dam, Jean, 1506.
2. Orr & Lillico, Galt, Jim, 2733. Sire, Balfour, 1146; dam, Jean, 1506.

Wether, under one year, 4 entries.

1. Orr & Lillico, Galt, Scott, Sire, Bunter, 3020; dam, Bess, 1516.
2. John Kelly, Shokespeare, Tom. Sire, Little Gilbert, 1359; dam, Royal Nell, 1577.
3. Orr & Lillico, Galt, Jack. Sire, Bunter, 3020; dam, Jean, 1506.

Highly commended, Orr & Lillico, Galt, Bill. Sire, Bunter, 3020; dam, Jean, 1506.

Three Weathers under one year. One entry.

1. Orr & Lillico, Galt. Scott; Jack; Bill.

Three ewes under one year. Five entries.

1. John Kelly, Shakespeare.
2. J. M. Gardhouse, Highfield. Cora Girl, 3604; Highfield Flora, 3605; Miss Playful, 3522.
3. Orr & Lillico, Galt. Daisy, 3647; Lady, 3489; Ruth, 3490.

Highly commended, John Shakespeare.
Commended, Orr & Lillico, Galt. Pegie, 3651; Polly, 3650; Pearl, 3652.

Dressed Carcase. One entry.

1. John Kelly, Shakespeare. Sire, Little Gilbert, 1359; dam, Royal Nell, 1577.

OXFORDS.

Ewe under one year. Fifteen entries.

1. Kenneth Finlayson, Campbelltown. Finlayson 61, 18721. Sire, Kempsford 8th, 16445; dam Invervells 21, 14474.
2. Kenneth Finlayson, Campbelltown. Finlayson 62, 18722. Sire, Kempsford 8th, 16445; dam Invervells 17, 14469.
3. Andrew Elliott, Pond Mills. Pond Mills 65, 19411. Sire, Pond Mills Jack 2nd, 12605; dam, Mag 2nd of Pond Mills, 10390.

Highly commended, Andrew Elliott, Pond Mills. Pond Mills, 66, 19412. Sire, Pond Mills Jack 2nd, 12605; dam, Mag of Pond Mills, 10389.
Commended, J. H. Jull, Mt. Vernon, Brant Queen, 152, 18429. Sire, Brant's King Langley, 17513; dam, Brant Queen, 76, 14690.

Wether, one year and under two, two entries.

1. Andrew Elliott, Pond Mills, Pond Mills 52. Sire, Summerhill Star. 12044; dam, Pond Mills 15, 14699.
2. Andrew Elliott, Pond Mills, Pond Mills, 51. Sire, Summerhill Star, 12044; dam, Pond Mills, 22, 14885.

Wether, under one year, three entries.

1. Andrew Elliott, Pond Mills, Pond Mills Bill. Sire, Pond Mills Jack, 12605; dam, Pond Mills Girl, 12607.
2. Andrew Elliott, Pond Mills, Pond Mills Jim. Sire, Pond Mills Jack, 12605; dam, Adams, 105, 6527.
3. Andrew Elliott, Pond Mills, Pond Mills Joe. Sire, Pond Mills Jack, 12605; dam, Pond Mills 32, 15515.

Three Wethers under one year, one entry.

1. Andrew Elliott, Pond Mills. Pond Mills Bill, Pond Mills Jim, Pond Mills Joe.

Three Ewes under one year, four entries.

1. Kenneth Finlayson, Campbellton. Finlayson 61, 18721; Finlayson 62, 18722; Finlayson 90, 19405.
2. Andrew Elliott, Pond Mills,
3. J. H. Jull, Mt. Vernon.

Highly Commended, J. H. Jull, Mt. Vernon.

Dressed Carcase, one entry.

1. Andrew Elliott, Pond Mills.

SHROPSHIRES.

Ewe under one year, thirteen entries.

1. D. G. Hanmer & Son, Mt. Vernon. Hanmer's 1203, 134610. Sire, Hanmer's 931, 118481; dam, Hanmer's 575, 102435.
2. Richard Gibson, Delaware. Gibson's 598. 128861. Sire, Prince Royal, 26146; dam, Gibson's 195, 51123.
3. John Camphell, Woodville. Campbell's 887, 129768.

Highly commended, John Campbell, Woodville. Campbell's 900, 128408.

Commended, Richard Gibson, Delaware, Gibson's 597, 128860. Sire, Martinet, 116685; dam, Gibson's 312, 59613.

Wether, one year and under two, seven entries.

1. Richard Gibson, Delaware, Invincible 2nd, 120591. Sire, Bonnie Belvoir, 20933; dam, Gibson's 419, 94170.
2. John Campbell, Woodville. Blue Bell, 112222.
3. Richard Gibson, Delaware, Ivanhoe, 113067. Sire, Bonnie Belvoir, 20933; dam, Hodgin's 61, 25020.

Highly commended, W. E. Wright, Glanworth, Wright's 272, 113290. Sire, Beattie's 487, 80007; dam, Bertha 4, 74061.

Commended, W. H. Beattie, Wilton Grove, Beattie's 700, 120965. Sire, Hindmarsh 56, 93962; dam, Hanmer's 288, 79128.

Wether under one year, eleven entries.

1. John Campbell, Woodville. The Model, 133210.
2. D. G. Hanmer & Son, Mt. Vernon, Hanmer's 1202, 134009. Sire, Hanmer's Hanmer's 881, 118481; dam, Conworth 204, 75249.
3. D. G. Hanmer & Son, Mt. Vernon, Conworth 339. Sire, Mayor, 99271; dam, Conworth 224, 86646.

Highly commended, W. E. & G. L. Telfer, Paris, Mike. Sire, Nicholl's Favorite, 124835; dam, A. E. & Son 12, 56962.

Commended, Richard Gibson, Delaware. Sire, Martinet, 116685; dam, Gibson's 417, 95977.

Three wethers under one year, four entries.

1. D. G. Hanmer & Son, Mt. Vernon. Hanmer's 1202, 134009; Conworth's 339; Conworth's 340.
2. Richard Gibson, Delaware.
3. W. H. Beattie, Wilton Grove. Beattie's 741, 134055; Beattie's 742, 134056.

Highly commended, W. E. Wright, Glanworth. Wright's 319; Wright's 320, Wright's 321.

Three Ewes under one year, six entries.

1. John Campbell, Woodville. Campbell's 887, 129768; Campbell's 900, 128408; Campbell's 884, 128406.
2. D. G. Hanmer & Son, Mt. Vernon. Phin's 710, 128332; Phin's 753, 128375; Phin's 743, 128367.
3. Richard Gibson, Delaware. Gibson's 596, 128859; Gibson's 597, 128860; Gibson's 598, 128861.

Highly commended, H. Hanmer, Burford. Hanmer's 1028, 128434; Hanmer's 1031, 128437; Hanmer's 1032, 128439.

Commended, W. H. Beattie, Wilton Grove. Beattie's 708, 134020; Beattie's 706, 134022; Beattie's 701 134017.

Dressed Carcase, five entries.

1. Richard Gibson, Delaware.
2. W. H. Beattie, Wilton Grove.
3. D. G. Hanmer & Son, Mt. Vernon, Hamner's 941, 118471.

Highly commended, W. E. Wright, Glanworth.

SOUTHDOWNS.

Ewe under one year, six entries.

1. John Jackson & Sons, Abingdon, Jackson Ewe 70B, 12201. Sire, Harbun XII., 11500; dam, Jackson Ewe 81, 7476.
2. John Jackson & Sons, Abingdon, Jackson Ewe 73B, 12204. Sire, Easter Lad, 12096; dam, Jackson Ewe 112A, 9148.
3. John Jackson & Sons, Abingdon Jackson Ewe 79B, 12209. Sire, Easter Lad, 12096; dam, Jackson Ewe 30B, 11023.

Highly commended, T. C. Douglas, Galt, Douglas 114, 12327. Sire, Chicester King 2nd, 9427; dam, E. F. B. 94, 5666.

Commended, T. C. Douglas, Galt, Douglas 113, 12326. Sire, Chicester King 2nd, 9427; dam Douglas Ewe 43, 6162.

Wether, one year and under two, eleven entries.

1. John Jackson & Sons, Abingdon, Harry 26. Sire, Strictly 2nd, 5004; dam, Jackson Ewe 104. 9140.
2. Richard Gibson, Delaware, Alfred, 11572. Sire, Stanstead 2nd. 7281; dam, Martin Ewe 32, 7378.
3. John Jackson & Sons, Abingdon, Dick 24. Sire, Strictly 2nd, 5004; dam Jackson Ewe 15, 9939.

Highly commended, D. G. Hanmer & Son: Mt. Vernon, Mutton Maker VII., 11547. Sire, Baron Beau, 8358; dam, Baker Ewe 31, 10019

Commended, W. H. Beattie, Wilton Grove, Davie, 10917. Sire, Stanstead, 7281; dam, Molly Baron, 10195.

Wether, under one year, four entries.

1. John Jackson & Sons, Abingdon, Jackson A. Sire, Martin 14, 10329; dam, Jackson Ewe 72A, 7166.
2. John Jackson & Sons, Abingdon, Jackson B. Sire, Martin 14th, 10329); dam, Simenton 72, 9396.
3. W. E. & G. L. Telfer, Paris, Pat. Sire, Telfer 2, 9798: dam, Telfer Ewe 62, 9803.

Highly commended, W. E. & G. L. Telfer, Paris, Bob. Sire, Telfer 2, 9798; dam, Telfer Ewe 62, 9803.

Three wethers, under one year, four entries.

1. John Jackson & Sons, Abingdon. Jackson A ; Jackson B ; Jackson C.
2. W. E. & G. L. Telfer, Paris. Bob ; Pat ; Jack.

Three Ewes under one year, four entries.

1. John Jackson & Sons, Abingdon. Jackson Ewe 70B, 12201 ; Jackson Ewe 73B, 12204 ; Jackson Ewe 79B, 12209.
2. John Jackson & Sons, Abingdon. Jackson Ewe 71B, 12202 ; Jackson Ewe 75B, 12205 ; Jackson Ewe 76B, 12206.
3. T. C. Douglas, Galt. Douglas 113, 12326 ; Douglas 114, 12327 ; Douglas 118, 12331.

Highly commended, T. C. Douglas, Galt. Douglas Ewe 115, 12328 ; Douglas Ewe 116, 12329 ; Douglas Ewe 117, 12330.

Dressed carcase, seven entries.

1. T. C. Douglas, Galt, C-2. Sire, Gordon 2308, 10751 ; dam, Douglas Ewe 57, 7065.
2. Richard Gibson, Delaware.
3. W. E. & G. L. Telfer, Paris. Jake, 10428.

DORSET HORNS AND MERINOS.

Ewe, under one year, three entries.

1. R. H. Harding, Thorndale, Champion, 1150. Sire, Bowman's 3, 741 ; dam, Helpful, 731.
2. R. H. Harning, Thorndale, Harding's 127, 1037. Sire, Captain Ellison, 319 ; dam, Harding's 74, 314.
3. R. H. Harding, Thorndale, Harding's 128, 1038. Sire, Captain Ellison, 319 ; dam, Harding's 92, 320.

Wether, one year and under two, three entries.

1. W. H. Beattie, Wilton Grove, Arthur. Sire, Tranquility, 370 ; dam, Tranquility, 640.
2. R. H. Harding, Thorndale, Harding's 118, 487. Sire, Middlesex Star, 427 ; dam, Harding's 77, 489.
3. R. H. Harding, Thorndale. Harding's 121, 351.

Wether, under one year, three entries.

1. R. H. Harding, Thorndale, Rodney. Sire, Captain Ellison, 319 ; dam, Harding's 92, 320.
2. R. H. Harding, Thorndale, The Twin. Sire, Captain Ellison, 319 ; dam, Harding's 42, 323.
3. W. E. Wright, Glanworth, Charlie. Sire, Harding's 96, 534 ; dam, Harding's 41, 464.

Dressed carcase, three entries.

R. H. Harding, Thorndale.

HAMPSHIRES AND SUFFOLKS.

Ewe, under one year, four entries.

1. John Kelly, Shakespeare. B-1, 5405.
2. John Kelly, Shakespeare. B-2, 5406.
3. James Bowman, Guelph. O.A.C. 601, 442.

Highly commended, James Bowman, Guelph. O.A.C. 602, 443.

Wether, one year and under two, five entries.

1. W. J. Rudd, Eden Mills. Rudd's 28, 383.
2. W. J. Rudd, Eden Mills. Rudd's 27, 382.
3. W. J. Rudd, Eden Mills. Rudd's 19, 374.

Highly commended, Jas. Bowman, Guelph. Sire, Free Wool, 161 ; dam, W.B.C., 114.

Commended, Jas. Bowman, Guelph. Sire, Free Wool, 161 ; dam, W.B.C., 114.

Wether, under one year, three years.

1. W. J. Rudd, Eden Mills, Rudd's 49. Sire, Abe, 238 ; dam, O.A.C., 246.
2. W. J. Rudd, Eden Mills, Rudd's 50. Sire, Abe, 238 ; dam, W.B.C., 223.
3. W. J. Rudd, Eden Mills, Rudd's 48. Sire, Abe, 238 ; dam, O.A.C., 213.

Dressed carcase, three entries.

1. Jas. Bowman, Guelph.
2. Jas. Bowman, Guelph.
3. W. J. Rudd, Eden Mills, Rudd's 51. Sire, Abe, 238 ; dam, Rudd's 226.

SHROPSHIRE SPECIALS.

Prizes offered by the American Shropshire Record Association.

Wether, one year and under two, two entries.

1. R. Gibson, Delaware, 120591.
2. J. Campbell, Woodville, 112222.

Wether, under one year, two entries.

1. John Campbell, Woodville. 133210.
2. D. G. Hanmer & Son, Mt. Vernon, 134009.

Three wether lambs, two entries.

1. J. D. Hanmer & Son, Mt. Vernon, 134167, 134168, 134009.
2. R. Gibson, Delaware, 135000, 135001, 235002.

Wether, sired by registered Shropshire ram out of grade ewe, one year and under two, two entries.

1. J. Campbell, Woodville. Fairview Sort, 99519.
2. W. H. Beatty, Wilton Grove. J. P. Phin's 554, 94013.

Wether, sired by registered Shropshire ram out of grade ewe, under one year, two entries.

1. J. Campbell, Woodville. Fairview Sort, 99519.
2. D. G. Hanmer & Son, Mt. Vernon. Hanmer's 929, 118453.

Sweepstake.—Best animal in class for Cotswolds. Prize: A "Maple Leaf" grain grinder donated by Goold, Shapley & Muir, Brantford, Ont. The winner had the option of applying $15 on the purchase of a power wind mill. Five entries.

1. John Park & Son, Burgessville.

Sweepstake.—Best animal in class for Lincolns. Prize: A grain grinder, donated by J. Fleury's Sons, Aurora, value, $40. One entry.

1. Gibson & Walker, Denfield.

Sweepstake.—Best animal in class for Leicesters. Prize: A combined corn and field cultivator, donated by the Massey-Harris Co., Toronto, value, $40. Three entries.

1. John Kelly, Shakespeare.

Sweepstake.—Best animal in class for Oxfords. Prize: A plow, donated by the Wilkinson Plow Co., Toronto, the winner to choose any walking plow made by this company. Three entries.

1. Andrew Elliott, Pond Mills,

Sweepstake.—Best animal in class for Shropshires. Prize: A spade harrow, donated by the Wortman & Ward Mfg. Co., London, value, $25. Six entries.

1. Richard Gibson, Delaware.

Sweepstake.—Best animal in class for Southdowns. Prize: A feed cooker, donated by the McClary Mfg. Co., London, Ont., value, $40. Five entries.

1. John Jackson & Sons, Abingdon.

Sweepstake.—Best animal in class for Dorset Horns and Merinos. Prize: 10 barrels salt (five barrels cheese salt and five barrels butter salt) donated by the Windsor Salt Co., Windsor. Two entries.

1. W. H. Beattie, Wilton Grove.

Sweepstake.—Best animal in class for Hampshires and Suffolks. Prize: Ten gallons cresote paint, donated by Sherwin-Williams Paint Co., 21 St. Antoine St., Montreal. Three entries.

1. John Kelly, Shakespeare.

GRADES AND CROSSES.

Ewe, one year and under two, four entries.

1. John Campbell, Woodville, Choice Sort. Sire, Newton Lord, 36983.
2. J. M. Gardhouse, Highfield.
3. John Campbell, Woodville, Next Best. Sire, Harrison's 235, 61709.

Highly commended, H. Hanmer, Burford, Shropshire Grade.

Wether, one year and under two, eleven entries.

1. John Campbell, Woodville, Rare Sort. Sire, Fairview Sort, 99519.
2. Orr & Lillico, Galt.
3. W. H. Beattie, Wilton Grove, Jumbo.

Highly commended, John Campbell, Woodville, Good Stamp. Sire, Harrison's 235, 61709.
Commended, D. G. Hanmer & Son, Mt. Vernon. Sire, Li Hung Chang, 94151.

Three wethers, under one year, six entries.

1. Orr & Lillico, Galt.
2. John Campbell, Woodville, Cornstock, Cameron, Commander.
3. W. E. & G. L. Telfer, Paris, John A., Laurier, Foster.

Highly commended, W. E. Wright, Glanworth.
Commended, W. H. Beattie, Wilton Grove, Duke, Ben, Bob.

Wether, under one year, ten entries.

1. Orr & Lillico, Galt.
2. John Campbell, Woodville, Commander. Sire, Fairview Sort, 99519
3. W. E. Wright, Glanworth.

Highly commended, D. G. Hanmer & Sons, Mt. Vernon.
Commended, W. E. Wright, Glanworth.

Ewe, under one year, ten entries.

1. J. M. Gardhouse, Highfield.
2. John Campbell, Woodville. Sire, Fairview Sort, 99519.
3. Gibson & Walker, Denfield, Gertie.

Highly Commended, Jas. Bowman, Guelph.
Commended, Richard Gibson, Delaware, Molly.

Best ewe or wether, under two years, six entries.

1. John Campbell, Woodville.
Highly commended, J. M. Gardhouse, Highfield.

Grand Sweepstake.—Best sheep in the Sheep Department. Prize: A silver medal, donated by the Canadian Bank of Commerce, Guelph, Ont. Ten entries.
1. John Jackson & Sons, Abingdon.

Prince of Wales' Prize.—Pen of five pure bred lambs, ewes or wethers. Twelve entries.
1. John Campbell, Woodville, Campbell's 887, 129768; Campbell's 900, 128408; The Model, 133210 Campbell's 884, 228406; Campbell's 883, 128405.
2. John Rawlings, Ravenswood.

SWINE.

Improved Berkshires.

Barrow, six months and under nine, five entries.

1. T. A. Cox, Brantford. Sire, Star, 3202; dam, Grace Darling, 4975.
2. George Green, Fairview, Black Bill. Sire, Prince Albert, 5230; dam, Highclere Maid, 6351
3. T. A. Cox, Brantford. Sire, Star, 3202; dam, Grace Darling, 4975.

Barrow, under six months, four entries.

1. George Green, Fairview, Royal Star. Sire, Prince Imperial, 4124; dam, Rosey Lee, 6151.
2. George Greene, Fairview, Ranger. Sire, Prince Imperial, 4124; dam, Rosey Lee, 6151.
3. T. A. Cox, Brantford. Sire, Cewerd, 5411; dam, June Flower, 6212.
Highly commended, T. A. Cox, Brantford. Sire, Star, 3202; dam, Bessie, 5748.

Sow, nine months and under fifteen, six entries.

1. T. A. Cox, Brantford. Brant Lass, 6714. Sire, Star, 3202; dam, Bessie, 5748.
2. George Green, Fairview. Lady Una 3rd, 6993. Sire, Royal Lad 2nd, 4412; dam, Lady Una, 4614.
3. George Green, Fairview. Lady Una 2nd, 6992. Sire Royal Lad 2nd, 4412; dam, Lady Una, 4614.
Highly commended, T. A. Cox, Brantford, Brant Maid, 6715. Sire, Star, 3202; dam, Bessie, 5748.
Commended, T. A. Cox, Brantford, Brant Queen, 6708. Sire, Star, 3202; dam, Bessie, 5748.

Sow, six months and under nine, seven entries

1. Geo. Hill, Delaware, Lady Gordon, 6933. Sire, Khedive, 3217; dam, Model Lady, 5176.
2. T. A. Cox, Brantford, Model Queen, 6906. Sire, Halle, 5089; dam, Fashion, 5218.
3. T. A. Cox, Brantford, Princess, 6721. Sire, Halle, 5089; dam, Gypsy, 4525.
Highly commended, Geo. Green, Fairview, Bonnie Lass, 6999. Sire, King Highclere; dam, Bonnie Jean 2nd, 5983.

Sow, under six months, four entries.

1. Geo. Green, Fairview, Ladysmith, 6991. Sire, Prince Imperial, 4124; dam, Rosey Lee, 6151.
2. T. A. Cox, Brantford, Sovereign Beauty, 6995. Sire, Star, 3202; dam, Bessie, 5748.
3. T. A. Cox, Brantford, Sovereign Girl, 6996. Sire, Star, 3202; dam, Bessie, 5748.
Highly commended, Geo. Green, Fairview, Lady Tombs, 6990. Sire, Prince Imperial, 4124; dam Rosey Lee, 6151.

Three pigs, the offsprings of one sow, bred by exhibitor, two entries.

1. Geo. Green, Fairview.
2. T. A. Cox, Brantford.

Improved Yorkshires.

Barrow, six months and nine, four entries.

1. J. E. Brethour, Burford, O. L. Bill. Sire, O. L. Challange, 3672; dam, O. L. Buttercup 4th, 2226.
2. Jos. Featherston & Son, Streetsville, Kruger. Sire, Britannia Wonder, 3028; dam May Beauty, 3271.
3. J. E. Brethour, Burford, O. L. Captain. Sire, O. L. Royal King, 3044; dam, O. L. Clara 10th, 3134.
Highly commended, H. J. Davis, Woodstock, Yorkshire Star, 3893. Sire, Defiance, 3196; dam, Nora J., 2607.

Barrows, under six months, four entries.

1. Jos. Featherston & Son, Streetsville, Joubert. Sire, Lancashire Prince, 3684; dam, Lendella, 2781.
2. J. E. Brethour, Burford, O. L. Royal. Sire O. L. Royal King, 3044; dam, O. L. Clarissa, 3166.
3. J. E. Brethour, Burford, O. L. Royalty. Sire, O. L. Royal King, 3044; dam, O. L. Clarissa, 3166.
Highly commended, Jos. Featherston & Son, Streetsville, Buller. Sire, Lancashire Prince, 3684; dam Lendella, 2781.

Sow, nine months and under fifteen, three entries.

1. J. E. Brethour, Burford, O. L. Buttercup 15th, 3680. Sire, O. L. Conqueror, 2475; dam, O. L. Buttercup 4th, 2226.
2. Jos. Featherston & Son, Streetsville, Stella Princess, 3577. Sire, Mollington Jones, 3013; dam, Stella Queen, 2884.
3. J. E. Brethour, Burford, O. L. Buttercup 16th, 3681. Sire, O. L. Conqueror, 2475; dam, O. L. Buttercup 4th, 2226.

Sow, six months and under nine, seven entries.

1. Jos. Featherston & Son, Streetsville, Whiston Maid, 3674. Sire, Britannia Wonder, 3028; dam, May Beauty, 3721.
2. H. J. Davis, Woodstock, Woodstock Jewess, 3837. Sire, O. L. Comet 2nd, 2880; dam, Delaware Maid, 3749.
3. J. E. Brethour, Burford, O. L. Buttercup 17th, 3838. Sire, O. L. Challenge, 3672; dam, O. L. Buttercup 4th, 2226.

Highly commended, J. E. Brethour, Burford; O. L. Butterfly 5th, 3679. Sire, O. L. Challenge, 3672; dam, O. L. Buttercup 10th, 3678.

Commended, T. Cox, Brantford. Lakeview Mattie, 3742. Sire, Prize Taker, 3226; dam, O. L. Mattie 4th, 2736.

Sow, under six months, six entries.

1. J. E. Brethour, Burford. Clarissa 3rd, 3839. Sire, O. L. Royal King, 3044; dam, O.L. Clarissa, 3134.
2. Jos. Featherston & Son, Streetsville. Lendella 5th, 3843. Sire, Lancashire Prince, 3684; dam, Lendella, 2781.
3. J. E. Brethour, Burford. C. L. Clarissa 4th, 3840. Sire, O. L. Royal King, 3044; dam, O. L. Clarissa, 3134.

Highly commended, Jos. Featherston & Son, Streetsville. Lendella 6th, 3844. Sire, Lancashire Prince, 3844; dam, Lendella, 2781.

Three pigs, the offspring of one sow, bred by exhibitor, four entries.

1. J. E. Brethour. Burford, O. L. Bill; O. L. Buttercup 15th, 3680; O.L. Buttercup 16th, 3681.
2. Jos. Featherston & Son, Streetsville, Kruger; Lendella 5th, 3843; Lendella 6th, 3844.

Highly commended, J. E. Brethour, Burford, O.L. Royal; O.L. Royalty; O.L. Clarissa 3rd, 3839.

CHESTER WHITES.

Barrow, six months and under 9, eight entries.

1. D. DeCourcy, Bornholm, Conqueror. Sire, American King, 1097; dam, Sylvester, 925.
2. W. E. Wright, Glanworth, Joe. Sire Glanworth Boy, 888; dam, Glanworth Queen, 994.
3. H. George & Sons, Crampton, Bill. Sire, Dominion King, 764; dam, Mabel, 893.

Highly commended, W. E. Wright, Glanworth, Jim. Sire, Glanworth Boy, 888; dam, Glanworth Queen, 994.

Barrow, under six months, seven entries.

1. G. Bennett & Pardo, Charing Cross, Sire, Canadian Hero, 1216; dam, Bird, 1437.
2. D. DeCourcy, Bornholm, Hero. Sire, King George, 1214; dam, Canada's Pride, 941.
3. H. George & Sons, Crampton, Bob. Sire, Crown King, 1031; dam, Snowflake, 1273.

Highly commended, W. E. Wright, Glanworth. Sire, Glanworth Boy. 888; dam, Queen Ann, 769.

Sow, nine months and under fifteen, five entries.

1. Wm. Butler & Son, Dereham Centre. May, 1434. Sire, Cuban Boy, 1046; dam, Beulah, 1050.
2. G. Bennett & Pardo, Charing Cross, Bird, 1437. Sire, Jubilee Chief, 860; dam, Found at Last, 1295.
3. H. George & Sons, Crampton, Found at last, 1443. Sire, Crown King, 2031; dam, Dora, 430.

Highly commended, Jos. Cairns, Camlachie, Ladysmith, 1417. Sire John A., 751; dam, Kate, 973.

Sow, six months and under nine, nine entries.

1. Jos. Cairns, Camlachie, Nellie A. 2nd, 1420. Sire, Nonesuch, 910; dam, Nellie A., 1009.
2. Wm. Butler & Son, Dereham Centre, Jewel, 1433. Sire, Cuban Boy, 1046; dam, Beulah, 1050.
3. H. George & Sons, Crampton, Dewdrop, 1442. Sire, Crown King, 1031; dam Dora, 430.

Highly commended, H. George & Sons, Crampton, Nora, 1446. Sire Crown King, 1031; dam Dora, 430.

Sow under six months, eleven entries.

1. G. Bennett & Pardo, Charing Cross, Eadeth, 1439. Sire, Canadian Hero, 1216; dam, Bird, 1437.
2. Wm. Butler & Son, Dereham Centre, Pet, 1435. Sire, Cuban Boy, 1046; dam, Moss Rose, 1055.
3. D. DeCourcy, Bornholm, Ladysmith, 1427. Sire, King George, 1214; dam, Canrda's Pride, 741.

Highly commended, G. Bennett & Pardo, Charing Cross, Nell, 1440. Sire, Canadian Hero, 1216; dam, Bird, 1437.

Commended, G. Bennett & Pardo, Charing Cross, Coria, 1438. Sire, Canadian Hero, 1216; dam, Bird, 1437.

Three pigs, the offspring of one sow, bred by exhibitor, six entries.

1. G. Bennett & Pardo, Charing Cross.
2. Wm. Butler & Son, Dereham Centre.

Highly commended, Jos. Cairns, Camlachie, Nell, 1419; Nellie A., second, 1420; Nellie B., 1421.

Commended, D. DeCourcy, Bornholm, Hero; Ladysmith, 1427; Miss Butler, 1428.

POLAND CHINAS.

Barrow, six months and under nine, four entries.

1. W. & H. Jones, Mt. Elgin, Oxford Lad. Sire, Klondike, 1170; dam, Black Queen, 1351.
2. W. M. Smith, Fairfield Plains, Dan. Sire, Jones' Choice, 1127; dam, Louisie, 1163.
3. W. M. Smith, Fairfield Plains, Bill. Sire, Jones' Choice, 1127; dam, Louisie, 1163.

Barrow, under six months, four entries.

1. W. & H. Jones, Mt. Elgin, Sampson. Sire Conrad Model, 990; dam, Bryant's Choice, 1153.
2. W. M. Smith, Fairfield's Plains, Fairfield Duke, 1263. Sire, Jones' Choice. 1127; dam, Carry Ida, 1162.
3. W. M. Smith, Fairfield Plains, Jim. Sire, Jones' Choice, 1127; dam, Carry Ida, 1162.

Sow, nine months and under fifteen, three entries.

1. W. & H. Jones, Mt. Elgin, Bryant's Choice 5th, 1407. Sire, Conrad Model, 990; dam, Bryant's Choice, 1153.
2. W. & H. Jones, Mt. Elgin, Bryant's Choice 6th, 1408. Sire, Conrad Model, 990; dam, Bryant's Choice, 1153.
3. W. M. Smith, Fairfield Plains, Rosa Bonheur, 1396. Sire, Jones' Choice, 1127; dam Carry Ida, 1162.

Sow, six months and under nine, three entries.

1. W. & H. Jones, Mt. Elgin, Oxford Queen, 1413. Sire, Klondike, 1170.
2. W. & H. Jones, Mt. Elgin, Oxford Lady, 1412. Sire, Klondike, 1170.
3. W. M. Smith, Fairfield Plains, Jenny, 1426. Sire, Jones' Choice, 1127; dam, Louisie, 1163.

Sow, under six wonths, four entries.

1. W. & H. Jones, Mt. Elgin, Bryant's Choice 7th, 1432. Sire, Conrad Model, 990; dam, Bryant's Choice, 1153.
2. W & H. Jones, Mt. Elgin, Bryant's Choice 8th, 1434. Sire, Conrad Model, 990; dam, Bryant's Choice, 1153.
3. W. & H. Jones, Mt. Elgin, Bryant's Choice 9th, 1435. Sire, Conrad Model, 990; dam, Bryant's Choice, 1153.

Highly commended, W. M. Smith, Fairfield Plains, Fairfield Ida, 1401. Sire, Jones' Choice, 1127; dam, Carry Ida, 1162.

Three pigs, the offsprings of one sow, bred by exhibitor, three entries.

1. W. & H. Jones, Mt. Elgin.
2. W. & H. Jones, Mt. Elgin.

Highly commended, W. M. Smith, Fairfield Plains.

SUFFOLKS AND ESSEX.

Barrow, six months and under nine, three entries.

1. Jos. Featherston & Son, Streeteville, Bacon Standard. Sire, Dark Bluff, 21; dam, Model Beauty, 30.
2. T. A. McClure, Meadowvale, Geordie. Sire, Dark Bluff, 21; dam, Model Beauty, 30.
3. Jos. Featherston & Son, Streetsville, Essex Barrow. Sire, Dark Bluff, 21; dam, Model Beauty, 30.

Barrow, under six months, three entries.

1. Jos. Featherston & Son, Streetsville, Model Pride, 30. Sire, Model B., 11; dam, Topsey, 17.
2. T A. McClure, Meadowvale, Black Diamond, 11. Sire, Model B., 11; dam, Topsy, 17.
3. Jos. Featherston & Son, Streetsville, Model Essex. Sire, Model B., 11; dam, Topsy, 17.

Sow, nine months and under fifteen, three Entries.

1. Jos. Featherston & Son, Streetsville, Topsey Maid, 37. Sire, Model B., 11; dam, Topsey, 17.
2. Jos. Featherson & Son, Streetsville, Suffolk Belle, 374. Sire, Prince K., 214; dam, Belle Queen, 266.
3. T. A. McClure, Meadowvale, Princess Lacole, 35. Sire, Model B., 11; dam, Topsey, 17.

Sow, six months and under nine, three entries.

1. T. A. McClure, Meadowvale, Daisy Maid, 40. Sire, Dark Bluff, 21; dam, Model Beauty, 30.
2. T. A. McClure, Meadowvale, Dark Tilley, 41. Sire. Dark Bluff, 21; dam, Model Beauty, 30.
3. Jos. Featherston & Son, Streetsville, Tozey Maid, 36. Sire, Dark Bluff, 21; dam, Model Beauty, 30.

Sow, under six months, three entries.

1. Jos. Featherston & Son, Streetsville, Model Topsey, 36. Sire, Model B., 11; dam. Topsey, 17.
2. Jos. Featherston & Son, Streetsville, Queen 2nd. Sire, Oh. There, 1235; dam, Miss Rose Queen, 2022.
3. T. A. McClure, Meadowvale, Black Rose, 39. Sire, Model B., 11; dam, Topsey, 17.

Three pigs, the offsprings of one sow, bred by exhibitor, three entries.

1. T. A. McClure, Meadowvale, Geordie; Daisy Maid; Dark Tilley.
2. Jos. Featherston & Son, Streetsville.

TAMWORTHS.

Barrows, six months and under nine, two entries.

1. A. Elliott & Son, Galt, Take Care. Sire, Spring Grove Duke, 669; dam, Concord Pet, 602.
2. A. Elliott & Son, Galt, Take Care 2nd. Sire, Spring Grove Duke, 6699; dam, Concord Pet, 602.

Barrow, under six months, three entries.

1. A. Elliott & Son, Galt, Mighty. Sire, Royal First, 941; dam. Royal Topsey, 1207.
2. Wm. R. McDonald, Ridgetown, John. Sire, Honest John, 554; dam, Lady Laurier, 955.
3. Wm. R. McDonald, Ridgetown, Joe. Sire, Honest John, 554; dam, Lady Laurier, 955.

Sow, nine months and under fifteen, three entries.

1. W. M. Smith, Fairfield Plains, E. Z., 1463. Sire, Advance, 610; dam, Coldspring Girl, 521.
2. A. Elliott & Son, Galt, Pearl, 1603. Sire, Spring Grove Duke, 669; dam, Concord Queen, 457.
3. H. George & Sons, Crampton, Sandy Girl, 1620. Sire, Oak Hill Hugo, 544; dam Pork Packers' Favorite, 775.

Sow, six months and under nine, seven entries.

1. J. R. Newell & Son, Crampton, Princess, 1509. Sire, Longfellow, 804; dam, Crampton Queen, 1345.
2. Wm. R. McDonald, Ridgetown, Kit, 1615. Sire, Honest John, 554; dam, May, 1218.
3. Wm. R. McDonald, Ridgetown, Briget, 1614. Sire, Honest John, 554; dam, May, 1218.

Highly commended, Wm. R. McDonald, Ridgetown, Aggie, 1613. Sire, Honest John, 554; dam, May, 1218.

Commended, J. R. Newell & Son, Crampton, Lady Longfellow, 1501. Sire, Longfellow. 804; dam, Queen, 1344.

Sow, under six months, seven entries.

1. H. George & Sons, Crampton, Last Look, 1619. Sire, Whitacre Prince, 184; dam, May, 606.
2. A. Elliott & Son, Galt, Edna, 1488. Sire, Royal First, 941; dam, Concord Topsey, 1207.
3. A. Elliott & Son, Galt, Edith, 1487. Sire, Royal First, 941; dam, Concord Topsey, 1207.

Highly commended, Wm. R. McDonald, Ridgetown, Lady A., 1616. Sire, Honest John, 554; dam Lady Laurier, 955.

Three pigs, the offspring of one sow, bred by exhibitor, three entries.

1. A. Elliott & Son, Galt.
2. Wm. R. McDonald, Ridgetown.

DUROC JERSEYS.

Barrow, six months and under nine, three entries.

1. Tape Bros., Ridgetown. Sire, Nimrod, 106; dam, Minnie, 283.
2. Tape Bros., Ridgetown. Sire, Nimrod, 106; dam, Minnie, 283.
3. Tape Bros., Ridgetown. Sire, Nimrod, 106; dam, Minnie, 283.

Barrow, under six months, four entries.

1. Tape Bros., Ridgetown. Sire, Anglo American, 343; dam, Genevieve, 359.
2. Tape Bros., Ridgetown. Sire, Anglo American, 343; dam, Genevieve, 359.
3. Tape Bros., Ridgetown. Sire, Anglo American, 343; dam, Genevieve, 359.

Highly commended, W. M. Smith, Fairfield Plains, Fred. Sire, Peter, 280; dam, Bertha, 318.

Sow, nine months and under fifteen, two entries.

1. Tape Bros., Ridgetown, Kruger's Lass, 422. Sire, Willis, 233; dam, Jersey Rose, 385.
2. Tape Bros., Ridgetown, Ladysmith, 423. Sire, Willis, 233; dam, Jersey Rose, 385.

Sow, six months and under nine, three entries.

1. Tape Bros., Ridgetown, Jean 2nd, 419. Sire, Anglo American, 343; dam, Jean, 356.
2. Tape Bros., Ridgetown, Jean 3rd, 420. Sire, Anglo American, 343; dam, Jean, 356.
3. Tape Bros., Ridgetown, Jean 4th, 421. Sire, Anglo American, 343; dam, Jean, 356.

Sow, under six months, four entries.

1. Tape Bros., Ridgetown, Genevieve 2nd, 416. Sire, Anglo American, 343; dam, Genevieve, 359.
2. Tape Bros., Ridgetown, Genevieve 3rd, 417. Sire, Anglo American, 343; dam, Genevieve, 359.
3. Tape Bros., Ridgetown, Genevieve 4th, 418. Sire, Anglo American, 343; dam, Genevieve, 359.

Highly commended, W. M. Smith, Fairfield Plains, Fairfield Princess, 389. Sire, Peter, 280; dam, Bertha, 318.

Three pigs, the offspring of one sow, bred by exhibitor, two entries.

1. Tape Bros., Ridgetown.
2. Tape Bros., Ridgetown.

Sweepstake.—Best animal in class for Berkshires. Prize: A Disc Harrow, donated by Frost & Wood Co., Ltd., Smith's Falls, Ont. The harrow is one of Frost & Wood's "Windsor" Discs, No. 4, with twelve 18 inch plates, and three horse attachment; value $26. Four entries.

1. T. A. Cox, Brantford.

Sweepstake.—Best animal in class for Yorkshires. Prize: A Feed Cooker, donated by The Rippley Hardware Co., Grafton, Ill.; value, $54. Three entries.

1. J. E. Brethour, Burford.

Sweepstake.—Best animal in class for Chester Whites. Prize: A Spramotor, donated by The Spramotor Co., London, Ontario. Four entries.

1. Wm. Butler & Son, Dereham Centre.

Sweepstake.—Best animal in class for Poland Chinas. Prize: Cement, donated by the estate of John Battle, Thorold, Ont.; value $25. Two entries.

1. W. & H. Jones, Mt. Elgin.

Sweepstake.—Best animal in class for Suffolks and Essex. Prize: Cement, donated by Isaac Usher & Son, Queenston, Ont.; value $25. Two entries.

1. Jos. Featherston & Son, Streetsville.

Sweepstake.—Best animal in class for Tamworths. Prize: A No. 15 Disc harrow, donated by the Noxon Co., Limited, Ingersoll, Ont.; value $25. Three entries.

1. W. Smith, Fairfield Plains.

Sweepstake.—Best animal in class for Duroc Jersey. Prize: 1 ton Alberts' Thomas Phosphate Powder, donated by T. C. Wallace, Board of Trade Building, Toronto; value $25. One entry.

1. Tape Bros., Ridgetown.

GRADES AND CROSSES.

Barrow, six months and under nine, two entries.

1. T. A. Cox, Brantford.
2. T. A. Cox, Brantford.

Barrow, under six months, three entries.

1. A. Elliott & Son, Galt.
2. A. Elliott & Son, Galt.
3. Wm. Butler & Son, Dereham Centre.

Sow, six months and under nine, two entries.

1. T. A. Cox, Brantford.
2. T. A. Cox, Brantford.

Sow, under six months, two entries.

1. A. Elliott & Son, Galt.
2. Wm. Butler & Son, Dereham Centre.

EXPORT BACON HOGS.

Two Improved Berkshires, five entries.

1. Geo. Green, Fairview.
2. Geo. Green, Fairview.
3. W. J. Rudd, Eden Mills. Prince; Victoria.

Two Improved Yorkshires, five entries.

1. Jos. Featherston & Son, Streetsville.
2. J. E. Brethour, Burford.
3. J. E. Brethour, Burford.

Highly commended, J. E. Brethour, Burford.
Commended, H. J. Davis, Woodstock.

Two Tamworths, four entries.

1. H. George & Sons, Crampton.
2. Jas. Smith, Harrietville, Countess 1st, 1592; Countess 2nd, 1593.
3. A. Elliott & Son, Galt.

Highly commended, Wm. R. McDonald, Ridgetown.

Two Chester Whites, eight entries.

1. D. DeCourcy, Bornholm.
2. Wm. Butler & Son, Dereham Centre.
3. H. George & Sons, Crampton.

Two Poland Chinas, four entries.

1. W. M. Smith, Fairfield Plains, Fairfield Duke, 1263; Jim.
2. W. & H. Jones, Mt. Elgin, Bacon Maid, 1431; Sampson.
3. W. & H. Jones, Mt. Elgin, Bryant's Choice 5th, 1407; Bryant's Choice 6th, 1408.

Two Duroc Jerseys, five entries.

1. W. M. Smith, Fairfield Plains, Fairfield Princess, 389; Fred.
2. Tape Bros., Ridgetown.
3. Tape Bros., Ridgetown.

Two Suffolks and Essex, three entries.

1. T. A. McClure, Meadowvale.
2. Jos. Featherston & Son, Streetsville.
3. Jos. Featherston & Son, Streetsville.

Two Grades or Crosses, one entry.

1. A. Elliott & Son, Galt.

Two Sweepstake.—Two Best Export Bacon Hogs, any breed, twelve entries.

1. J. E. Brethour, Burford.
2. Jos. Featherston & Son, Streetsville.
3. H. George & Sons, Crampton.

Highly commended, Geo. Green, Fairview.
Commended, Jas. Smith, Harrietsville.

DRESSED CARCASSES.

Two Improved Berkshires, three entries.

1. Geo. Green, Fairview.
2. W. J. Rudd, Eden Mills, Bill, Bess.
3. Geo. Green, Fairview.

Two Improved Yorkshires, four entries.

1. J. E. Brethour, Burford.
2. Jos. Featherston & Son, Streetsville.

G. B. Hood, Guelph, Guelph Bill; Guelph Billy.

Two Tamworths, five entries.

1. A. Elliott & Son, Galt.
2. A. C. Hallman, New Dundee, Clara ; Nora.
3. W. R. McDonald, Ridgetown.

Two Chester Whites, six entries.

1. R. H. Harding, Thorndale.
2. Wm. Butler & Son, Dereham Centre.
3. H. George & Sons, Crampton.

Two Poland Chinas, four entries.

1. W. M. Smith, Fairfield Plains.
2. W. & H. Jones, Mt. Elgin, Bacon Queen 1432, Bacon Lady 1430.
3. W. & H. Jones, Mt. Elgin, Sim, Simon.

Two Duroc Jerseys, five entries.

1. Tape Bros., Ridgetown.
2. W. M. Smith, Fairfield Plains.
3. W. M. Smith, Fairfield Plains.

Two Suffolks or Essex, three entries.

1. Jos. Featherston & Son, Streetsville.
2. Jos. Featherston & Son, Streetsville.
3. T. A. McClure, Meadowvale.

Two Grades or Crosses, two entries.

1. H. George & Sons, Crampton.
2. A. Elliott & Son, Galt.

Sweepstake.—Two best carcasses, any breed, thirteen entries.

1. J. E. Brethour, Burford.
2. Geo. Green, Fairview.
3. Jos. Featherston & Son, Streetsville.

THE DAIRY

The following prizes were offered as specials by the Canadian Holstein-Friesian Association : For best pure bred dairy cow, $25 ; for the next two best Holstein-Friesian dairy cows, registered in the C.H.F.H.B., $15 and $10 respectively.

1. Rettie Bros., Norwich. Aaltje Posch 4th, 65. (Woodland Iosco not registered in Canadian Herd Book, therefore not eligible for this prize.)
2. G. W. Clemens, St. George. Queen de Kol 2nd, 1819.
3. Rettie Bros., Norwich. Fanny F., 928.

The Holstein-Friesian Association of America offered as specials $25 for the first and $15 for the second, to be paid to any Holstein-Friesian cows winning premiums in competition with cattle of other breeds, provided such animals were recorded in the Herd Book of the Association.

1. Rettie Bros., Norwich. Aaltje Posch 4th, 23,176.
2. Rettie Bros., Norwich. Woodland Iosco, 36,966.

Sweepstake.

Three best cows or heifers, of one breed or all grades of one breed. Prizes : 1st, a Melotte separator, donated by R. A. Lister Co., Montreal, value $100. 2nd, a platform scale, donated by the Gurney Scale Company, Hamilton, value $30.

1. Rettie Bros., Norwich.
2. G. W. Clemons, St. George.

Sweepstake.

Two best heifers under 36 months, of one breed or both grades of one breed. Prize : A gasoline engine, donated by the Northey Mfg. Co., Toronto, value $140.

1. A. & G. Rice, Currie's Crossing.

Extra Special.

The Forest City Business and Shorthand College, of London, offered as a prize a Silver Cup, valued at $50, as a sweepstake prize for the best cow or heifer exhibited at the Ontario Provincial Fat Stock and Dairy Show. To become the final owner an exhibitor must win the cup twice in succession or on three separate occasions.

1. Rettie Bros, Norwich.

Name of cow and owner's name and address.	Total lbs. of milk in 48 hours.	Lbs. fat.	Lbs. solids not fat.	No. points for fat.	No. points for solids not fat.	Points for days in milk.	Total points.	1st test.			2nd test.			3rd test.		
								Milk.	Per cent. fat test.	Amount fat.	Milk.	Per cent. fat test.	Amount fat.	Milk.	Per cent. fat test.	Amount fat.
Shorthorns, 36 months and over.																
1. A. W. Smith, Maple Lodge.—Rene, 27386	81.5	3.08	7.72	61.52	30.88	1.2	93.6	20.2	3.6	.727	41.	3.7	1.517	20.3	4.1	.832
2. F Martindale, York—Gypsy Maid, Vol. 14	79.5	3.10	7.47	62.	29.88	.0	91.3	27.3	3.9	1.065	39.1	3.8	1.486	13.1	4.2	.550
3. H J. Davis, Woodstock—Mistletoe 5th, Vol. 16	94.5	2.72	8.85	54.40	35.40	.0	89 8	22.6	2.5	.565	49.7	2.9	1.441	22.2	3.2	.710
4. John Kelly, Shakespeare—Gracey Gwynne, Vol. 15.	76.1	2.92	7.42	58.40	29.68	.0	88.	19.8	4.1	.812	38.2	3.9	1.490	18.1	3.4	.615
5. A. W. Smith, Maple Lodge—Roan Blanche, 25854	72.4	2.79	7.02	55.8	28.08	2.5	86.3	18.3	3.8	.695	36.	3.7	1.332	18.1	4.2	760
6. H. K. Fairbairn, Thedford—Jubilee's Julia, 23523	71.7	2.61	6.58	52.2	26.32	4.3	82.7	17.1	3.4	.581	38.1	3.8	1.448	16.5	3.5	.575
7. H. K. Fairbairn, Thedford—Mary Maxwell, 26783	33.4	1.41	3.71	28.2	14.84	5.4	48.3	.. ..	....	.....	.....	....	.....	.....	....	.....
8. H. K. Fairbairn, Thedford—Frances Folsom 3rd, 23522	28.	1.00	2.55	20.	10.20	3.9	34.1	.....	....	.....	.....	....	.....	.....	....	.....
Shorthorns, under 36 months.																
1. F. Martindale, York—Bella of York, Vol. 15	51.1	1.82	4.86	36.4	19.44	1.5	57.4	16.9	3.6	.608	26.1	3.6	.940	8.1	3.4	.275
2. H. K. Fairbairn, Thedford Jenetta, 29702	40.6	1.49	3.77	29.8	15.08	3.9	48.8	10.	3.8	.380	20.9	3.6	.752	9.7	3.6	.359
3. H. K. Fairbairn, Thedford—Golden Gem, Vol. 15	40 9	1.46	3.88	29.2	15.52	3.5	48.2	10 9	3.4	.371	20.7	3.6	.745	9.3	3.7	.345
Ayrshires, over 36 months.																
1 N. Dyment, Clappison Corners—Briery Banks Cora, 2846	81.4	3.42	7.78	68.4	31.12	5.9	105.4	27.2	4.6	1.251	41.3	4.	1.652	12.9	4.	.576
2. N. Dyment, Clappison Corners—Nellie Gray, 2057	80.8	3.14	7.66	62.8	30 64	9.1	102.5	27.4	4.3	1.178	40.6	3.6	1.462	12.8	3.9	.499
3. N Dyment, Clappison Corners—Briery Banks Susie, 2847	62.1	2.15	5.68	43.0	22.72	8.8	74.6	16.2	3.	.486	31.	3.7	1.147	14.9	3.5	.521
Holsteins, over 36 months.																
1 Rettie Bros., Norwich—Aaltje Posch 4th, A.H H.B., 23176; C.H.H B., 65	146.9	6.79	13.72	135 70	54 88	.6	191.1	49.4	4.5	2.223	74.1	4.8	3.556	23.4	4.3	1.006
2 Rettie Bros., Norwich—Woodland Iosco, 36966	127.1	4.30	11.20	85.98	44.88	4.2	135.	42.5	3.1	1.317	63.8	3.5	2.233	20.8	3 6	.749
3. G. W. Clemons, St George—Queen de Kol 2nd, 1819	109.4	3.32	9.21	66.40	36.84	10.	113.2	35.8	2 8	1.002	55 3	3 2	1.769	18.3	3.	.549
4. Rettie Bros., Norwich—Fanny F., 928	134.8	3.42	10.94	68.30	43.74	.5	112.5	44.6	2 5	1.115	68.1	2.6	1.770	22.1	2.4	.530
5. W. H Simmons, New Durham—Lady Mary 4th, 19612	118.6	3.56	10 02	71.20	40.10	.0	111.2	39.6	2.8	1.109	60.7	2.8	1.699	18.3	4.1	.750
6 G. W. Clemons, St. George—Inka Josephine de Kol. 1500.	87.7	2.60	7.52	52 90	30.10	7.5	90.5	.....	....	.....	.....	....	.....	.....	....	.....
7. G. W. Clemons, St. George—Empress Josephine de Kol, 1501	74.6	2.48	6.73	49.56	26.91	6.8	83.3	.....	....	.....	.....	....	.....	.....	....	.....
Holsteins, under 36 months.																
1. Rettie Bros, Norwich—Mercena 2nd, 1941	99 6	3.53	8.77	70.54	35.09	.8	106.4	34.1	4.2	1.432	51.4	3.2	1.644	14.1	3.2	.451
2. A. & G. Rice, Currie's Crossing—Jemima M. M. Trintje, 49589	75.7	2.33	6.34	46.60	25.40	10.	82.	26.1	3.	.783	37.3	2.9	1.081	12.3	3.8	.467
3. A. & G. Rice, Currie's Crossing—Pauline Mercedes Jewel, 1741	75.1	2.30	6.35	45 82	25.38	6.9	78.1	25.8	3.1	.800	37.5	3.4	1.125	11.8	3.4	.366
4. A. & G. Rice, Currie's Crossing—Pauline Fairmont, 1853	72.2	2.40	6.49	48.12	26.60	.0	74.	24.	3 2	.768	36.4	3.4	1.237	11.8	3 4	.401
5. G. W. Clemons, St. George—Kaatji de Boer 3rd, 1822	61.6	2.30	5.75	45.90	23.00	3 8	72 7	19.7	3.4	.670	32.	3.9	1.248	9.9	3.8	.376
Jersey Cow, over 36 months.																
1. W. J. Craig, London—Primrose Park's Pride, 80475	65.9	4.16	6.80	83.2	27.2	.4	110.8	16.9	4.9	.828	32.5	6.7	2.177	16.5	7.	1.155
Grade Cow, 36 months and over.																
1. Rettie Bros, Norwich—Jess	96 3	4.03	8.84	80.8	35.36	.0	115.8	34 0	4.	1.384	45.8	4.3	1.969	15.9	4.3	.683
2. T. H. Dent, Woodstock—Dina	119.7	3 90	10 69	68 2	42.78	3 4	114.4	41.9	3.4	1.42	58.8	3.2	1.881	19.	3.2	.668
3. Jas. Leask, Greenbank—Jersey	101.1	3 79	9.50	75.8	38.	.5	114.3	25.5	4.	1.020	51.4	3.6	1.850	24.2	3.8	.919
4. A. McDougall, Guelph—Sweet Assurance	89.4	3.90	8.46	77.9	33.9	1.8	113.8	26.	4.2	1.092	42.2	4 6	1.94	21.1	4.1	.865
Grade Cow, under 36 months.																
1. T. H. Dent, Woodstock—Julia	84.6	3.11	7.89	62.36	31.54	2.6	96.1	28.2	3.2	.902	42.8	3.8	1.626	13.6	4.3	.584

COMMITTEE MEETING OF PROVINCIAL WINTER FAIR.

A meeting of the Committee of the Provincial Winter Fair was held at the Palmer House, Toronto, on Friday, March 30th, 1900. President John I. Hobson in the chair.

The minutes of the last meeting were taken as read, and on motion of Mr. John Jackson the report was adopted. The financial statement was presented and adopted.

It was moved by F. W. Hodson, seconded by Henry Wade, that the thanks of the Dominion Cattle, Sheep and Swine Breeders' Associations be tendered the deputation from Brantford, representing that city and the County of Brant, for their great kindness in offering inducements to hold the Provincial Winter Show there, and for the many great benefits conferred upon these associations by their efforts. Carried unanimously.

John Jackson moved, seconded by Jas. Tolton, that Mr. F. W. Hodson, Dominion Commissioner of Live Stock, be added to the Committee. Carried.

Moved by J. E. Brethour, seconded by G. B. Hood, that this meeting heartily concurs in the proposition to hold a Dominion Exhibition at Toronto in 1901, and that the presidents of the Dominion Cattle, Sheep and Swine Breeders' Associations be authorized to act with the Industrial Exhibition Association and the Toronto City Council in applying to the Dominion Government for a liberal grant and official recognition. Carried.

Mr. Richard Gibson stated that the American Shropshire Sheep Association had appropriated $100 this year towards the prize list of the Winter Fair. Messrs. A. W. Smith and Jas. Tolton stated that the American Leicester and Oxford Associations respectively had appropriated funds towards the prize list.

Officers and Committees.

President, John I. Hobson, Guelph; *Vice-President*, W. A. Smith, Maple Lodge; *Secretary-Treasurer*, A. P. Westervelt, Toronto.

Executive and Programme; President, Vice-President, Secretary, J. E Brethour, Burford; Jas. Tolton, Walkerton; Henry Wade, Toronto; G. W. Clemons, St. George; D. G. Hanmer; W. McNeil, London; Richard Gibson, Delaware; and F. W. Hodson.

Sub-Executive; President, Vice-President, Secretary, Prof. G. E. Day, Guelph, and F. W. Hodson, Ottawa.

Committee on Cattle: John I. Hobson, Guelph; Arthur Johnston, Greenwood; G. W. Clemons, St. George; R. G. Murphy, Elgin; and Henry Wade, Toronto.

Committee on Sheep: John Jackson, Abingdon; Jas. Tolton, Walkerton; A. W. Smith, Maple Lodge; John A. McGillivray, Uxbridge.

Committee on Swine: George Green, Fairview; Wm. Jones, Mount Elgin; Prof. G. E. Day; Thos. Teasdale, Concord; G. B. Hood, Guelph; J. E. Brethour.

Dairy Committee: G. W. Clemons, St. George; R. G. Murphy, Elgin; Henry Wade, Toronto; Prof. G. E. Day, Guelph.

Poultry Committee: W. McNeil, London; Allan Bogue, London; A. Tyson, Guelph.

Reception Committee: John I. Hobson, A. W. Smith; Dr. Mills; Mayor Nelson.

Block Test Committee: Prof. J. B. Reynolds, Guelph; D. Drummond, Myrtle.

Superintendent of Building: D. G. Hanmer, Burford.

In Charge of Poultry Exhibit: J. H. Saunders, London.

Moved by J. E. Brethour, seconded by Jas. Tolton, and carried, that the show be held the second week in December, 1900.

The classification of prizes in the poultry department was left in the hands of the poultry committee.

Moved by J. E. Brethour, seconded by W. M. Smith, that the section of the secretary's report dealing with admission fees be adopted. Carried.

General admission fee to the show was left in the hands of the executive committee to arrange.

President Mills, Guelph; Prof. Day, Guelph, and Geo. C. Creelman, Toronto, were appointed judges of prize essays.

THE PEERLESS ROUTE for TOURISTS and PLEASURE SEEKERS

to the POPULAR and CHARMING

Summer Resorts

In CANADA and the EASTERN STATES

Also The Commercial Highway between the ATLANTIC SEABOARD and CHICAGO, the WESTERN STATES and all points on the PACIFIC COAST and BRITISH COLUMBIA

ITS MAGNITUDE.

The Grand Trunk Railway System comprises a total of 4,186 miles of track, running through the most interesting and beautiful parts of Illinois, Michigan, Ontario, Quebec, New Hampshire, and Maine; tapping all the principal cities and towns, and with its branches and connections giving a direct route to all parts of the Eastern and Western States and the Atlantic and Pacific Coast.

EQUIPMENT.

Magnificent trains are run on the lines of the Grand Trunk Railway System, with handsome coaches and palace sleeping and Dining cars from Chicago to all eastern points, via Port Huron, Niagara Falls and Montreal. Solid Vestibule Train Service Chicago to New York daily. Through Sleeping Cars from the Atlantic Coast to Chicago. New Pullman Sleepers daily between Chicago and Detroit, Chicago and Saginaw Valley, Chicago and all Canadian points, Chicago and Boston.

Through Sleeping Cars between Chicago and Mackinaw City.

All modern and latest inventions for the safety and comfort of travellers are embodied in our equipment, and passengers over this system will enjoy the maximum of comfort on fast trains with luxurious accommodations.

ITS ATTRACTIONS.

The Grand Trunk has for generations been spoken of throughout the world as having some of the most wonderful engineering achievements that have ever been accomplished. The Victoria Bridge spanning the St. Lawrence River at Montreal, inaugurated in 1861 by the Prince of Wales, has been placed in the category of marvellous things, as the Eighth Wonder of the World. Through increase in traffic and with the onward march of time and improvement, this bridge became inefficient to meet the demands of the company, and a beautiful new open-work steel bridge, with double tracks, carriageways and foot walks has been built on the same piers as the old bridge, at a cost of an enormous sum, and without any interruption to traffic. Another remarkable achievement of engineering work is the new single arch, double-track steel Bridge spanning the Niagara Gorge just below and in full view of the great cataract itself. This new structure is the largest single arch bridge in the world, and its height is 252 feet above the water. The view obtained from the windows of the train while passing over the bridge is something beyond description, and probably has no equal.

Among the many attractive and charming summer pleasure grounds in Canada the Grand Trunk reaches the best, among which might be mentioned the **Muskoka Lake region, Lake of Bays district, The Magnetawan, Stony Lake District, the Thousand Islands and rapids of the River St. Lawrence, Quebec, Lake St. John, The Saguenay, the White Mountains,** and the grand seaside resorts situated on the Atlantic seaboard.

☞ **Full information, Rates and Tickets can be secured from any Agent of The Grand Trunk Railway System or**

M. C. DICKSON, District Passenger Agent, Toronto.

CHAS. M. HAYS,
General Manager,
MONTREAL.

W. E. DAVIS,
Passenger Traffic Manager,
MONTREAL.

G. T. BELL,
Genl. Pass. and Tkt. Agt.
MONTREAL.

H. G. ELLIOTT,
Asst. Genl. Pass. and Tkt. Agt.
MONTREAL.

REPORT

OF THE

SUPERINTENDENT

OF

FARMERS' INSTITUTES

OF THE

PROVINCE OF ONTARIO.

1899-1900.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:
PRINTED AND PUBLISHED BY L. K. CAMERON,
Printer to the Queen's Most Excellent Majesty.
1900.

WARWICK BRO'S & RUTTER, PRINTERS.
TORONTO.

SIXTH ANNUAL REPORT

OF THE

SUPERINTENDENT OF FARMERS' INSTITUTES

OF

ONTARIO

FOR THE YEAR 1899-1900.

To the Honorable Minister of Agriculture :

I have the honor to submit herewith the Sixth Annual Report of Superintendent of Farmers' Institutes.

Your obedient servant,

G. C. CREELMAN.
Superintendent.

CONTENTS.

FARMERS' INSTITUTES OF ONTARIO.

REPORT OF THE SUPERINTENDENT.

In presenting this my first annual report since my appointment as Superintendent, I do so with the greatest pleasure, inasmuch as I am able to record a most successful year and a very satisfactory increase in membership, in interest shown at the various meetings, and in the excellent results obtained by those who have put into practice the information gleaned, at the Institutes, on the various branches of agriculture.

History of the Farmers' Institutes System in Ontario. Farmer's Institutes, as known by that name, first came into being in Ontario during the month of January, 1885, but similar work on a smaller scale had been attempted in scattered localities for some years previous, and even as far back as 1792 we find an organized agricultural Society doing excellent work in what was then known as Upper Canada. The history of the germ of the Institute movement in Ontario in particular, and in Canada in general, has been so well collated by Mr. C. C. James, Deputy Minister of Agriculture for Ontario, that I gladly quote it here in full : "January, 1885, was the time of the revival of farmers' institute work in Ontario. It was the date of the beginning of the work under the name of farmers' institutes, and the main inspiration for the revival of the work at that time was the success attending the farmers' institute work in some of the United States. This, however, was not the first time that instruction of farmers had been attempted. The original agricultural societies of this Province, as well as some of the other Provinces, had made instruction through papers and discussions an important feature of their work. Of late years agricultural societies have confined themselves to the holding of fairs, and I presume that is one reason why farmers' institute work has been so successful. In the earlier days our agricultural societies were accustomed to offer prizes for essays on various subjects, such as the growing of wheat, the growth and manufacture of hemp and flax, etc. These papers were read at the annual meeting and discussed.

"The first agricultural Society in Upper Canada was organized in 1792 or 1793, and we have reason to believe that the instruction of the members was of greater moment than the holding of fairs. This society formed an extensive agricultural library which was carried on for the benefit of its members for a number of years, until it was finally incorporated with the public library of the old town of Niagara. In 1830 agricultural societies were especially encouraged by an act passed in that year, and the first provincial fair was held in 1846. From that time forward these societies were under the control of a Board of Agriculture, which was composed of a large number of representative farmers of the Province. Prof. George Buckland was for many years secretary. He conducted a course in Agriculture in connection with Toronto University, and had a small experimental farm within the present limits of the city of Toronto. He was accustomed to make a tour of the agricultural societies, and address them upon various agricultural topics. In many cases these agricultural societies devoted their energies and funds to the introduction of pure-bred stock and seed grain, and in a few sections the desire for instruction not being fully met by the agricultural societies, others known as farmers' clubs were organized. The records of these were very meagre. However, I have before me reference to one which may be of interest. It is contained in an article written by Mr. Walter Riddell, sr., of Cobourg, and

refers to the County of Northumberland, about 70 miles east of Toronto. He says : 'There had been an agricultural society in this county before we knew it. The first society was formed in 1824. It held shows and plowing matches, and gave prizes for best managed farms, and for essays on wheat culture and other varying subjects. The farmers' club was begun in 1846, and though often dormant, it took occasionally lively starts and held sometimes ten or twelve meetings in a year. The subject for discussion at the next meeting was selected and someone appointed to undertake it, which he might do either verbally or by written paper. The subject was then discussed by the members. This has been superseded by farmers' institutes.'

"At the time of the organzation of the farmers' institutes there were active farmers' clubs in Puslinch Township, Wellington County, and at St. George in Brant County, and the members of these clubs at once threw their energies into the farmers' institutes. There were probably many others, but their record has disappeared. My conclusion, therefore, is that, while the year 1885 may be given as the year of the revival of farmers' institute work, and placing it upon an organized and permanent footing, the germs of the work must be looked for in the farmers' clubs and the agricultural societies, the earliest of which dates back for over 100 years.

"The first agricultural society organized at Quebec, 1789, published a small volume containing special information and suggesting various lines of experiments. The report was very much of the nature of the first report of the New York society 1792."

A Comparative Statement. A comparison between the amounts appropriated by the Legislatures in Ontario and certain States of the Union and of the results obtained therefrom, is strikingly in favor of Ontario. Taking the year 1899, the last year for which figures are available, we find that the Government appropriation for Farmers' Institute work in Ontario is only $9,900. This includes the salary of the Superintendent and expenses of his office, with the exception of the cost of printing his annual report. During the year ending June 30th, 1899, 677 institute meetings were held at which there was a total attendance (actual not estimated) of 119,402. All parts of the Province are reached as meetings are arranged for in every district at central points.

In New York State, which as regards climate and latitude nearly resembles Ontario, the annual appropriation is $20,000. About 300 meetings are held while the attendance does not exceed 75,000 annually. In Ohio $8,173.36 is available for expenses, and a similar sum for payment of lecturers, or $16,346.72 in all. 274 meetings were held in 1899-1900 with a total attendance of 98,210. The State of Minnesota appropriates $13,500 each year, with only 59 meetings, and a total attendance of 22,600. In Pennsylvania the figures are : appropriation, $12,500 ; meetings, 308 ; attendance 50,000. In Wisconsin, appropriation $12,000 ; meetings, 127 ; attendance 55,000 The list could be further extended, but enough has been said to show that with a smaller expenditure than in the principal States of the Union, Ontario is securing much better results, both as regards the work done and the number of farmers reached by means of lectures, reports and other suitable literature.

A New Feature. At a number of the meetings held last winter we arranged to have the practical discussions reported, and we trust the "Question and Answer" feature will enhance the value of the report.

I wish to thank the press throughout the Province for the able assistance they have rendered us in disseminating the work of the local Institutes. To Mr. W. L. Smith, editor of the *Weekly Sun*, I am especially indebted for excellent reports of meetings which he attended.

THE INSTITUTES HOLDING THE LARGEST NUMBER OF MEETINGS ARE:

Hastings, North	22	Durham, West	11
Haldimand	15	Parry Sound, West	11
Waterloo, South	15	Grey, North	10
York, East	15	Lennox	10
Simcoe, East	14	Ontario, North	10
Huron, West	12	Ontario, South	10
Middlesex, North	12	Prince Edward	10
Peel	12		

THE INSTITUTE MEETINGS WHICH WERE THE MOST LARGELY ATTENDED WERE:

	Number of Meetings.	Total Attendance.
Waterloo, South	15	3,875
Bruce, South	7	3,7 0
Middlesex, North	12	3,635
Lanark, North	9	3,630
Halton	7	3 545
Huron West	12	3,090
Northumberland, East	6	3,005
Norfolk, North	8	2,678
Haldimand	15	2,623
Perth, North	8	2,470
Huron, South	6	2 270
Lanark, South	6	2 250
Hastings, North	22	2,198
Wentworth, South	9	2,184
Leeds, South	7	2,175
Peel	12	2,120
Glengarry	9	2,085
Perth, South	8	2,025

THE INSTITUTES HAVING THE LARGEST MEMBERSHIP TO JULY, 1900, ARE:

Peel	545
Hastings, North	533
Halton	494
Waterloo, South	460
Lanark, North	370
Middlesex, North	340
Haldimand	338
Huron, West	323
Norfolk, North	322
Lambton, West	315
Wentworth, South	306

THE INSTITUTES HAVING THE SMALLEST MEMBERSHIP ARE:

Port Carling and Bala	21
Muskoka, Centre	51
Amherst Island	56
Addington	71
Cornwall	79
Algoma, Centre	80
Essex, North	80

OFFICERS OF WOMEN'S INSTITUTES.

GREY, NORTH.—Hon. President, Mrs. J. L. Smith, Whitby; President, Mrs. J. Gardner, Kemble; Vice-President, Mrs. D. Davidson, Kemble; Treasurer, Mrs. G. Beckett, Kemble; Secretary, Mrs. F. J. Willcox, Kemble.

ONTARIO, S.—Hon. President, Mrs. J. L. Smith, Whitby; President, Mrs. S. L. Brown, Whitby; Vice-President, Mrs. Wm. Purves, Columbus; Treasurer, Mrs. J. B. Mitchell, Whitby; Secretary, Mrs. Wm. Anderson, Whitby.

WENTWORTH, S. (Saltfleet Institute).—Hon. President, Mrs. J. Hoodless, Hamilton; President, Mrs. S. H. Melson, Stoney Creek; 1st Vice-President, Mrs. F. M. Carpenter, Fruitland; 2nd Vice-President, J. Mrs. J. H. McNeilly, Stoney Creek; Treasurer, Miss L. King, Stoney Creek; Secretary, Miss M. E. Nash, Stoney Creek.

REPORTS OF LOCAL FARMERS' INSTITUTES

Institute district.	Membership, December, 1899.	Membership to June, 1900.	No. of Meetings held.	Total attendance.	No. of papers read or addresses delivered.	Receipts.					
						Cash on hand per last report.	Members' fees.	Donations.	Grants.	Receipts from conventions.	Receipts from excursions.
						$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Addington	67	71	5	589	26	11 94	17 75	.....	50 00	.....	.....
Algoma, Centre	141	80	5	254	15	1 32	20 00	.....	50 00	.....	.....
Algoma, East	145	136	8	600	31	43 23	31 00	.....	25 00	.....	.....
Amherst Island	55	56	5	1,155	11	40 19	14 25	.....	50 00	.....	.....
Brant, North	168	129	6	911	28	2 92	33 00	.....	50 00	.....	.....
Brant, South	90	84	6	1,110	29	51 64	18 50	.....	50 00	.....	.....
Brockville	164	227	7	1,560	29	18 54	50 75	12 75	50 00	.....	.....
Bruce Centre	94	159	7	1,825	28	134 40	39 75	.....	50 00	.....	101 78
Bruce, North	115	103	6	259	10	104 63	18 50	.....	50 00	.....	35 45
Bruce, South	180	197	7	3,730	40	189 13	40 75	.....	50 00	.....	144 83
Bruce, West	183	211	7	1,700	44	97 97	52 75	.....	50 00	.....	89 25
Carleton	175	150	5	1,290	17	15 83	43 75	.....	50 00	.....	.....
Cornwall	105	79	6	860	19	.....	18 75	12 50	37 50	.....	.....
Dufferin	195	277	9	936	53	184 10	64 50	.....	50 00	.....	114 55
Dundas	252	201	5	1,677	39	165 86	50 25	.....	49 75	.....	.....
Durham, East	141	172	7	1,056	13	36 20	42 75	.....	50 00	.....	28 00
Durham, West	154	178	11	618	25	80 76	45 25	.....	50 00	.....	.....
Elgin, East	175	219	7	570	22	71 92	47 50	.....	50 00	.....	.....
Elgin, West	147	179	7	815	37	12 88	43 25	.....	50 00	.....	.....
Essex North	84	80	5	670	28	.....	17 50	19 95	.....	.....	.....
Essex, South	212	199	9	1,280	42	110 84	52 25	.....	50 00	.....	22 20
Frontenac	106	140	6	805	24	4 30	32 00	.....	50 00	.....	72 75
Glengarry	224	216	9	2,085	21	.....	53 75	.....	50 00	.....	.....
Grenville, South	105	100	5	815	18	64 47	25 25	.....	50 00	.....	.....
Grey, Centre	193	159	7	1,201	48	38 97	40 60	.....	50 00	.....	.....
Grey, North	261	232	10	923	30	12 68	59 00	.....	50 00	.....	126 80
Grey, South	176	227	5	1,730	30	151 10	56 00	.....	50 00	7 65	174 05
Haldimand	282	338	15	2,623	82	492 50	85 50	.....	50 00	.....	61 15
Halton	419	494	7	3,545	32	196 09	123 00	.....	25 00	.....	142 00
Hastings, East	157	127	7	1,285	47	12 43	31 75	.....	50 00	.....	.....
Hastings, North	438	533	22	2,198	69	.....	131 25	.....	50 00	25 65	.....
Hastings, West	118	128	6	1,030	31	47 06	29 75	.....	50 00	.....	.....
Huron, East	281	229	7	1,449	28	40 77	56 25	.....	50 00	.....	.....
Huron, South	164	132	6	2,270	33	95 13	32 25	.....	50 00	13 89	217 30
Huron, West	205	323	12	3,090	78	117 24	78 25	.....	50 00	.....	.....
Kent East	258	209	7	835	21	5 72	49 50	.....	50 00	.....	.....
Kent, West	122	137	7	490	33	109 05	36 75	.....	50 00	.....	.....
Lambton, East	189	185	9	802	31	42 98	44 50	.....	50 00	.....	62 00
Lambton, West	295	315	9	1,040	64	6 14	71 50	.....	50 00	.....	31 00
Lanark, North	366	370	9	3,630	27	19 30	93 25	.....	65 00	41 30	.....
Lanark, South	126	115	6	2,250	45	.....	29 75	.....	40 00	.....	.....
Leeds, North & Grenville N.	94	151	8	1,900	35	16 92	37 75	.....	50 00	.....	.....
Leeds, South	227	271	7	2,175	49	.....	66 75	.....	50 00	.....	.....
Lennox	88	110	10	794	41	77 22	28 25	.....	25 00	.....	.....
Lincoln	173	217	6	1,510	30	30 00	43 25	.....	55 00	.....	14 65
Manitoulin, East	91	150	7	1,040	16	66 30	39 50	.....	25 00	.....	.....
Middlesex, East	195	281	9	1,660	43	167 77	50 75	.....	50 00	.....	17 85
Middlesex, North	359	340	12	3,635	79	332 16	85 00	.....	50 00	.....	183 05
Middlesex, West	141	167	6	701	29	21 73	41 75	.....	50 00	.....	31 45
Monck	151	149	6	901	20	51 13	35 25	.....	55 00	.....	.....
Muskoka, Centre	66	51	4	267	11	32 94	12 75	.....	25 00	.....	.....
Port Carling & Bala	66	21	.....	.....	.....	.....	.....	.....	.....	.....	.....
Muskoka, North	203	194	7	680	54	.....	50 75	.....	25 00	.....	34 25
Muskoka, South	78	101	4	170	17	41 01	24 50	.....	37 00	.....	.....

FOR YEAR ENDING 30TH JUNE, 1900.

Receipts.—*Con.*			Expenditure.											
Miscellaneous.	Balance due Treasurer.	Total receipts.	Due treasurer per	Expense for Meetings.	Secretary's salary etc.	Postage and stationery.	Printing.	Advertising.	Lecturer's expenses.	Lecturers' allowance.	Periodicals for members.	Miscellaneous.	Balance on hand.	Total.
$ c.	$ c	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c	$ c	$ c	$ c.
.....	.....	79 69	.. ..	10 50	20 00	6 88	6 00	1 50	11 20	.. ..	.....	6 50	17 11	79 69
.....	.....	71 32	.....	16 50	24 50	50	.....	..	..	.....	.....	7 15	22 67	71 32
.....	.....	99 23	.....	23 25	33 50	2 57	.....	8 25	.....	.....	....	1 20	30 46	99 23
.....	.....	104 44	.....	26 43	7 00	1 88	4 75	.....	16 15	..	....	.....	48 23	104 44
.....	.....	85 92	.....	54 35	10 00	1 20	5 75	.....	12 79	.. .	.....	50	33	85 92
.....	....	120 14	.....	26 40	25 00	2 67	10 50	.. ..	15 99	.....	.....	.....	39 58	120 14
.... .	..	132 04	....	12 60	15 00	3 33	9 25	2 25	13 30	.	. . .	61 20	15 11	132 04
.....	....	325 93	....	40 75	31 25	5 96	40 00	5 93	23 30	2 00	20	9 35	167 19	325 94
. ....	.....	208 58	.....	18 98	13 75	4 21	9 55	3 30	4 40	6 00	.....	46 82	101 57	208 58
8 00	.....	432 71	....	21 27	60 26	17 40	38 75	85	12 20	.....	.....	32 00	250 04	432 71
1 00	.....	290 97	.....	42 00	38 60	6 54	16 63	3 75	9 45	.....	39 00	21 55	113 43	290 97
... ..	....	109 58	.....	14 12	25 00	7 73	13 25	.....	1 05	....	....	85	47 50	109 58
.....	.....	68 75	3 88	8 50	27 75	2 50	17 25	.....	8 16	.....	....	....	71	68 75
.....	.....	413 15	.....	68 24	34 77	7 90	30 87	6 00	....	.....	.....	40 90	224 47	413 15
6 16	.....	272 02	.	15 50	30 00	6 31	12 00	16 00	10 57	.....	.. ..	60	181 04	272 02
.....	.....	156 95	.....	40 80	26 50	10 03	13 25	....	1 00	.. ..	.....	....	65 37	156 95
2 45	.....	178 46	.. ..	7 25	20 00	....	27 25	.....	10 00	.....	.....	50	113 46	178 46
.....	.....	169 42	.....	39 23	35 00	2 71	14 50	13 25	17 70	....	..	.	47 03	169 42
.....	....	106 13	.....	4 00	31 65	13 03	16 50	....	18 00	.	. ....	55	22 40	106 13
.....	32 13	69 58	38	9 15	10 00	2 80	5 50	.....	24 75	17 00	.....		..	69 58
....	.....	235 29	.....	11 50	36 30	5 80	29 10	.....	35 25	10 00	.. ..	15 20	92 14	235 29
4 25	.....	163 30	.....	4 00	20 00	4 23	21 50	33 35	9 00	...	.....	.....	71 22	163 30
.....	82 35	186 10	47 25	55 20	25 00	2 00	.	14 75	36 90	5 00	.....	.....	.	186 10
.....	.....	139 72	.....	11 25	20 00	2 78	10 50	...	19 64		1 60	13 85	60 10	139 72
.....	.....	129 57	....	54 05	10 00	2 96	8 00	50	9 45	..		1 46	43 15	129 57
1 00	....	249 48	...	58 15	42 50	14 22	11 75	19 04	.....	.....	32 25	3 57	88 00	249 48
30 45	..	469 25	.....	41 85	62 30	8 46	34 55	18 60	8 65	.....	48 70	49 30	196 84	469 25
68 00	....	757 15	....	42 25	95 60	59 27	88 95	....	34 42	.....	.	18 85	417 81	757 15
.....	....	486 09	.....	83 11	38 00	14 86	48 31	.....	9 75	....	48 55	46 47	196 84	486 09
.....	...	94 18	.....	8 75	25 00	13 56	20 50	. ..	19 69	.....	..	4 05	2 63	94 18
.....	35 46	242 36	34 10	18 45	60 00	5 21	29 25	4 75	63 10	....	.....	27 50	.....	242 36
.....	.....	126 81	....	32 25	30 00	4 00	13 40	25	12 00	.....	.....	5 00	29 91	126 81
.....	.....	147 02	.....	27 90	20 00	8 34	13 75	4 00	8 95	6 70	. ..	7 79	51 59	147 02
3 00	..	411 57	.....	27 95	27 95	5 56	6 50	19 92	33 90	. ..	.....	3 41	286 38	411 57
.....	.....	245 49	.....	22 10	62 95	27 70	10 00	12 5.	74 40	.....	.....	11 25	24 59	245 49
... ..	.....	105 22	.....	17 50	20 00	16 74	2 00	12 55	14 00	....	...	2 10	20 33	105 22
.....	....	195 80	....	33 10	32 00	9 25	7 50	7 00	18 00	...	.. ..	.....	88 95	195 80
.....	....	199 48	.....	27 00	29 20	10 25	15 60	6 00	21 95	.	.....	41 75	48 33	199 48
25 00	...	183 64	.....	46 59	28 75	7 71	23 50	2 00	25 60	.....	.....	6 90	41 59	183 64
.....	...	208 85	....	43 85	56 00	3 00	41 31		13 12	.. ..	....	5 00	46 54	208 85
.....	15 49	85 24	8 99	10 50	19 00	4 30	12 50	17 75	12 20	.....	.....	.....		85 24
104 00	.....	208 67	.....	11 0.	10 00	3 50	15 25	10 00	15 50	15 00	.....	74 20	54 22	208 67
.....	4 75	121 50	8 05	60 08	15 00	1 52	21 00	.....	15 00	.....	.....	85		121 50
.....	.....	130 47	.....	38 70	15 00		10 80		.....	.....	.....	..	65 97	130 47
.....	.....	142 90	.....	4 00	30 00	9 18	11 55	5 50	17 70	.....	...	5 50	59 47	142 90
.. ..	.....	130 80	.....	6 25	12 00	1 25	9 50		23 25	.....	.....	50	78 05	130 80
5 15	.....	291 52	.....	42 25	35 4.	11 05	24 50	19 33	38 17	.....	.	7 30	113 47	291 52
... ..	.....	650 21	.....	31 20	52 30	28 19	60 75	22 25	95 13	.....	.	2 75	357 64	650 21
.....	.....	144 93	.....	14 45	32 00	3 67	7 10		18 30	.. ..	.....	4 05	65 36	144 93
.....	...	141 38	.....	34 75	29 05	6 19	9 42	7 65	12 54	.....	.	3 50	38 28	141 38
.....	.....	70 69	.....	5 50	11 00	1 99	5 25	.. ..	.....	.....	....	3 15	45 80	70 69
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1 25	.....	111 25	3 49	37 10	25 00	7 07	18 40	7 00	...	..	..	5 75	7 44	111 25
.....	.....	102 51	.. ...	14 15	15 00	4 87	7 00	....	4 10	.....	15 00	6 45	35 94	102 51

REPORTS OF LOCAL FARMERS' INSTITUTES

Institute district.	Membership, December, 1899.	Membership to June, 1900.	No. of Meetings held.	Total attendance.	No. of papers read or addresses delivered.	Receipts. Cash on hand per last report.	Members' Fees.	Donations.	Grant	Receipts from conventions.	Receipts from excursions.
						$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Norfolk, North	266	322	8	2,678	50	62 80	79 00	.....	50 00	.....	22 05
Norfolk, South	254	283	9	1,345	42	27 16	69 00	.....	50 00	.....	25 25
Northumberland, East	130	137	6	3,005	42	43 01	34 00	.....	50 00	124 40	.....
Northumberland, West	84	95	5	1,445	20	47 83	23 75	....	50 00	.....	.....
Ontario, North	406	209	10	1,115	33	184 51	46 70	.....	25 00	.....	193 30
Ontario, South	248	253	10	1,007	56	24 11	64 25	.....	50 00	.....	.....
Oxford, North	134	213	8	1,537	44	12 79	42 71	.....	50 00	.....	.....
Oxford, South	215	269	7	1,965	47	56 23	66 75	.....	50 00	.....	.....
Parry Sound, East	102	182	8	642	38	32 78	50 50	....	37 00	.....	.....
Parry Sound West	94	125	11	399	56	16 96	31 25	10 00	25 00	.....	.....
Peel	416	545	12	2,120	65	231 61	135 50	.....	50 00	.....	1 9 30
Perth, North	243	296	8	2,470	61	156 40	72 75	.....	50 00	.....	130 20
Perth, South	212	231	8	2,025	46	26 15	52 50	.....	50 00	.....	62 40
Peterboro' East	162	168	6	1,410	28	33 59	37 50	.....	50 00	19 46	.....
Peterboro' West	140	174	6	1,032	33	43 95	43 75	.....	50 00	10 90	31 00
Prescott	89	82	5	1,185	20	16 27	21 00	.....	50 00	.....	.....
Prince Edward	316	240	10	1,040	28	41 32	79 00	.....	50 00	.....	15 70
Renfrew, North	66	85	5	950	14	12 00	18 25	.....	50 00	.....	.....
Renfew, South	110	115	5	1,186	25	102 57	29 00	.....	50 00	.....	.....
Russell	90	103	5	725	26	43 51	15 00	.....	50 00	.....	.....
Simcoe, Centre	130	218	7	1,515	39	133 86	47 50	.....	50 00	.....	40 00
Simcoe, East	229	191	14	1,040	54	13 31	62 25	.....	50 00	.....	59 45
Simcoe, South	140	118	5	619	23	9 51	27 00	.....	50 00	.....	.....
Simcoe, West	153	155	6	1,825	29	93 40	38 00	.....	50 00	.....	306 94
Stormont	209	215	7	1,340	29	.....	53 75	.....	50 00	.....	.....
St. Joseph Island	94	92	8	750	27	82 21	25 50	.....	33 35	.....	.....
Victoria, East	148	135	9	1,662	44	12 63	37 00	.....	50 00	.....	.....
Victoria, West	124	94	4	724	21	14 13	41 35	.....	50 00	.....	.....
Waterloo, North	160	240	8	1,660	41	66 49	60 25	....	50 00	.....	.....
Waterloo, South	510	460	15	3,875	102	210 59	110 50	.....	50 00	.....	108 70
Welland	235	206	7	1,035	41	108 41	52 75	.....	50 00	.....	.....
Wellington, Centre	111	200	6	1,870	35	46 18	47 25	.....	25 00	.....	62 92
Wellington, East	190	195	7	1,830	51	27 83	49 00	.....	50 00	.....	27 00
Wellington, South	171	152	7	1,265	8	15 74	32 00	5 00	50 00	.....	.....
Wellington, West	112	99	6	1,680	27	54 86	28 75	.....	50 00	.....	57 75
Wellington, W (Union Br.)	55	86	5	670	19	15 45	21 50	.....	25 00	.....	57 75
Wentworth, North	176	195	6	1,625	31	41 27	49 25	.....	50 00	.....	.....
Wentworth, South	271	306	9	2,184	62	154 48	73 50	.....	50 00	.....	64 85
York, East	134	147	15	1,045	28	169 55	45 00	....	50 00	.....	9 80
York, North	107	140	8	635	26	57 01	34 50	.....	50 00	.....	.....
York, West	230	188	7	958	15	16 13	49 25	.....	50 00	.....	58 00
Total	16,925	18,058	715	138,982	3,328	.....	.....	..	...	....	.....

FOR YEAR ENDING 30TH JUNE, 1900

Receipts—*Con.*			Expenditure.											
Miscellaneous.	Balance due treasurer.	Total receipts.	Due treasurer per last report.	Expense for meetings.	Secretary's salary, etc.	Postage and stationery.	Printing.	Advertising.	Lecturers' expenses.	Lecturers' allowance.	Periodicals for members.	Miscellaneous.	Balance on hand.	Total.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
.....	.....	213 85	.....	72 60	35 00	12 60	15 25		22 12	....	.....	8 76	47 52	213 85
.....	20 51	191 92	.....	35 85	35 00	6 42	29 00	20 50	26 95	....	.....	38 20	.....	191 92
2 00	.....	253 41	.....	30 75	27 00	9 64	21 00	5 00	17 59	.....	.....	87 80	55 23	253 41
.....	.....	121 58	.....	36 25	18 00	4 25	6 00	.....	9 58	.....	.....	.....	47 50	121 58
.....	.....	449 51	.....	28 90	90 60	11 12	33 80	17 60	45 37	33 00	.....	2 75	186 37	449 51
.....	7 22	145 58	.....	11 10	31 85	23 73	12 75	17 50	48 65	.....	.....	.....	.....	145 58
.....	.....	105 50	....	44 13	20 00	4 75	28 23	.....	.....	.....	.....	.....	8 39	105 50
3 20	.....	176 18	.....	38 25	36 95	8 32	.....	15 30	15 47	....	.....	8 31	53 58	176 18
.....	.....	120 28	.....	48 95	15 00	4 50	3 00	9 00	.....	.....	.....	2 68	37 15	120 28
.....	.....	83 21	.....	31 75	17 59	4 00	8 25	.....	.....	.....	.....	5 00	16 71	83 21
6 90	.....	553 31	.....	48 50	35 00	9 21	73 00	.....	56 09	34 50	71 80	14 15	211 06	553 31
.....	.....	409 35	.....	44 20	32 90	10 47	29 00	32 25	30 00	.....	.....	26 40	204 13	409 35
.....	.....	191 05	.....	83 78	20 00	10 60	15 00	21 00	.....	.....	.....	5 00	35 67	191 05
.....	.....	140 55	.....	26 62	21 50	5 25	25 50	.....	15 41	.....	.....	60	45 67	140 55
75	.....	180 35	.....	22 00	20 00	7 91	32 00	26 75	8 57	.....	.....	12 00	50 12	180 35
.....	.....	87 27	.....	12 20	20 00	.....	15 75	16 15	9 46	.....	.....	5 00	8 71	87 27
95	.....	186 94	.....	35 65	10 00	7 33	29 25	.....	35 60	10 00	31 60	1 25	26 26	186 94
.....	1 35	81 60	.....	17 50	25 00	5 75	3 75	14 75	14 21	.....	.....	64	.....	81 60
.....	.....	181 57	...	13 00	25 00	1 66	8 25	10 65	9 60	.....	.....	9 20	104 21	181 57
.....	....	108 51	.....	7 50	31 50	2 50	.....	....	10 80	.....	....	.....	56 21	108 51
102 35	.....	373 71	.....	71 36	33 35	7 00	65 00	43 35	12 35	....	.....	1 00	140 30	373 71
.....	....	185 01	.....	63 42	30 00	10 05		61 59	.....	.....	.....	.....	19 95	185 01
.....	17 64	104 15	.....	24 25	18 25	4 70	21 00	.....	29 90	.....	.....	6 05	.....	104 15
.....	.....	488 34	.....	70 50	69 15	14 17	92 60	78 05	.....	.....	9 20	25 00	129 67	488 34
.....	4 53	108 28	13 67	20 00	35 40	2 50	17 25	.....	19 46	.....	.....	.....	.....	108 28
.....	.....	141 06	.....	9 25	18 35	6 40	11 60	4 39	.....	.....	.....	37 65	54 02	141 06
.....	25 29	124 92	.....	36 45	21 25	6 29	26 75	.....	28 00	....	.....	6 18	.....	124 92
.....	.....	105 48	.....	9 50	25 00	7 00	15 55	.....	7 80	.....	21 98	.....	18 65	105 48
.....	.....	176 74	.....	13 15	43 80	10 70	18 10	4 00	11 75	.....	.....	2 00	73 24	176 74
7 00	....	486 79	.....	84 30	139 00	9 24	18 25	7 00	10 59	.....	....	21 70	196 71	486 79
.....	.....	211 16	.....	42 15	20 00	4 57	11 50	5 00	.....	.....	.....	.....	127 94	211 16
.....	.....	181 35	.....	23 99	42 15	4 45	26 00	2 00	14 30	.....	.....	16 65	51 81	181 35
.....	.....	153 83	.....	18 10	25 70	4 25	25 75	25	14 58	.....	18 50	14 50	32 20	153 83
6 75	.....	100 49	.....	3 95	20 00	8 23	12 00	12 90	5 00	.....	...	14 50	2 91	109 49
.....	.....	191 18	.....	32 25	10 00	2 70	18 00	25 24	.....	.....	.....	40 00	62 99	191 18
.....	.....	119 70	.....	12 90	25 60	4 46	7 45	50	8 75	.....	.....	80	59 24	119 70
.....	.....	140 52	.....	15 50	26 60	9 43	10 00	9 92	19 26	.....	.....	15 15	34 66	140 52
.....	.....	342 83	.....	42 00	17 00	13 24	32 80	15 00	34 08	.....	.....	15 00	173 71	342 83
.....	.....	274 35	.....	43 82	87 65	16 44	16 00	.....	.....	.....	.....	.....	110 44	274 35
.....	.....	141 51	.....	20 75	25 00	4 34	..	34 88	27 50	.....	.....	35	28 69	141 51
.....	.....	173 38	.....	12 75	40 95	6 68	43 00	1 00	18 76	6 75	.....	17 90	26 59	173 38
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

INSTITUTE OFFICERS FOR 1900-1901.

ADDINGTON.—President, A. V. Price, Newburgh ; Vice-President, Chas. Whelan, Centreville ; Secretary-Treasurer, J. B. Aylesworth, Newburgh.

ALGOMA, C.—President, Henry Knight, Sr., Sault Ste. Marie ; Vice-President, Harry F. Hill, Roundwood ; Secretary-Treasurer, Geo. H. Farmer, Sault Ste. Marie.

ALGOMA, E.—President, Jas. Smail, Dayton ; Vice-President, D. H. Egan, Day Mills ; Secretary-Treasurer, J. H. Elliott, Thessalon.

AMHERST ISLAND.—President, Henry Filson, Stella ; Vice-President, Wm. Allen, Stella ; Secretary, T. J. Polley, Stella ; Treasurer, Samuel Fleming, Emerald.

BRANT, N.—President, H. R. Nixon, St. George ; Vice-President, A. W. Vansickle, Onondaga ; Secretary-Treasurer, E. F. Osborne, St. George.

BRANT, S.—President, D. G. Hanmer, Burford ; Vice-President, F. M. Lewis, Burford ; Secretary-Treasurer, W. H. Metcalf, Burford.

BROCKVILLE.—President, Wm. Neilson, Lyn ; Vice-President, Elgin Row, Brockville ; Secretary-Treasurer, R. H. Field, Addison.

BRUCE, C.—President, D. N. McIntyre, Paisley ; Vice-President, R. H. Rowan, Glammis ; Secretary-Treasurer, O. H. Nelson, Paisley.

BRUCE, N.—President, Cecil Swale, Wiarton ; Vice-President, John Heath, Hope Bay ; Secretary-Treasurer, Peter Anderson, Hepworth.

BRUCE, S.—President, P. H. McKenzie, Lucknow ; Vice-President, R. E. Little, Teeswater ; Secretary-Treasurer, James A. Lamb, Walkerton.

BRUCE, W.—President, Alfred Brunton, Tara ; Vice-President, John George, Port Elgin ; Secretary-Treasurer, John Douglass, Tara.

CARLETON.—President, J. G. Clark, Ottawa ; Vice-President, John Craig, North Gower ; Secretary-Treasurer, R. H. Grant, Hazeldean.

CORNWALL.—President, J. L. Groves, Cornwall Centre ; Vice-President, D. Leitch, Cornwall ; Secretary-Treasurer, C. W. Young, Cornwall.

DUFFERIN.—President, W. J. Craven, Shelburne ; Vice-President, Geo. Walker, Bowling Green ; Secretary-Treasurer, Wm. Hudd, Horning's Mills.

DUNDAS.—President, W. H. Casselman, Chesterville ; Vice-President, Geo. Smyth, Rowena ; Secretary-Treasurer, J. P. Fox, Winchester.

DURHAM, E.—President, T. A. Kelly, Millbrook ; Vice-President, Isaac Larner, Millbrook ; Secretary-Treasurer, W. Vance, Millbrook.

DURHAM, W.—President, J. M. Joness, Bowmanville ; Vice-President, Frank Allin, Newcastle ; Treasurer, W. E. Pollard, Bowmanville ; Secretary. H. C. Hoar, Bowmanville.

ELGIN, E.—President, Walter E. Lewis, Orwell ; Vice-President, Ben. Marlatt, Yarmouth Centre ; Secretary-Treasurer, F. Leeson, Aylmer.

ELGIN, W.—President, James Jameson, Rodney ; Vice-President, J. R. Gow, Wallacetown ; Secretary-Treasurer, Arch. McColl, Aldboro'.

ESSEX, N.—President, Alex. St. Louis, Walkerville ; Vice-President, John Holden, Windsor ; Secretary-Treasurer, David Ure, Windsor.

ESSEX, S.—President, J. C. Shepley, Kingsville ; Vice-President, A. H. Woodbridge, Kingsville ; Secretary-Treasurer, G. W. Coatsworth, Kingsville.

FRONTENAC.—President, John Clow, Harrowsmith ; Vice-President, Geo. V. Stuart, Eric ; Secretary-Treasurer, Alex. Ritchie, Inverary.

GLENGARRY.—President, J. P. McNaughton, Dominionville ; Vice-President, Col. D. B. McLennan, Lancaster ; Secretary-Treasurer, W. J. McNaughton, Lancaster.

GRENVILLE, S.—President, Robt. Alder, Prescott ; Vice-President, Thos. J. Miller, Spencerville ; Secretary-Treasurer, G. W. Carson, Charleville.

GREY C.—President, John Boland, Vandeleur ; Vice-President, J. M. Davis, Vandeleur ; Secretary-Treasurer, J. I. Graham, Vandeleur.

GREY N.—President, W. J. Saunders, Owen Sound, Box 814 ; Vice-President, T. J. Harkness, Annan ; Secretary-Treasurer, James Smith, Inglis Falls.

GREY, S.—President, Robt. Morice, Orchard ; Vice-President, James Allan, Varney ; Secretary-Treasurer, Geo. Binnie, Bunessan.

HALDIMAND.—President, Robt. Buckley, Cheapside ; Vice-President, J. Kohler, Kohler ; Secretary-Treasurer, R. E. King, DeCewsville.

HALTON.—President, Dr. D. Robertson, Milton ; Vice-President, Geo. Gastle, Milton ; Secretary-Treasurer, J. L. Warren, Acton.

HASTINGS, E.—President, Thos. Way, Chapman ; Vice-President, Henry Denyes, Foxboro' ; Secretary-Treasurer, John L. Clapp, Corbyville.

HASTINGS, N.—President, Robt. S. Allen, Cooper ; Vice-President, Henry S. O'Hara, Madoc ; Secretary-Treasurer, J. G. Foster, Moira.

HASTINGS, W.—President, John A. Holgate, Foxboro' ; Vice-President, J. U. Simmons, Frankford ; Secretary-Treasurer, B. Mallory, Frankford.

HURON, E.—President, Thos. McMillan, M.P., Seaforth ; Vice-President, James Elliott, Bluevale ; Secretary-Treasurer, G. Hood, Sunshine.

HURON, S.—President, S. A. Moffat, Varna ; Vice-President, J. A. Wilson, Seaforth ; Secretary-Treasurer, Robert Gardiner, Farquhar.

HURON, W.—President, Jas. Snell, Clinton ; Vice-President, Roderick Young, Carlow ; Secretary-Treasurer, Fred. C. Elford, Holmesville.

KENT, E.—President, Wm. Henderson, Thamesville ; Vice President, Jas. Leslie, Blenheim ; Secretary-Treasurer, A. J. C. Shaw, Thamesville.

KENT, W.—President, W. C. McGregor, Tilbury ; Vice-President, Henry Sales, Merlin ; Secretary-Treasurer, J. R. Longmoore, Chatham.

LAMBTON, E.—President, Wm. Wight, Widder ; Vice-President, Robt. McCormick, Warwick ; Secretary-Treasurer, W. J. McAlpine, Warwick.

LAMBTON, W.—President, T. C. Wheatley, Blackwell ; Vice-President, Robert S. Watson, Bunyan ; Secretary-Treasurer, D. McKellar, Colinville.

LANARK, N.—President, John Steele, Almonte ; Vice-President, W. F. Lowe, Almonte, Secretary-Treasurer, W. A. Snedden, Blakeney.

LANARK, S.—President, W. J. Anderson, Smith's Falls ; Vice-President, A. F. Wilson, McGarry ; Secretary-Treasurer, Geo. Oliver, Perth.

N. LEEDS & N. GRENVILLE.—President, Wm. Nicholson, Merrickville ; Vice-President, Malcolm McCrae, Merrickville ; Secretary-Treasurer, J. B. Arnold, Easton's Corners.

LEEDS, S.—President, W. N. Bass, Newboro' ; Vice-President, John Cook, Warburton ; Secretary-Treasurer, Freeman Britton, Gananoque.

LENNOX.—President, Manley Jones, Napanee ; Vice-President, M. O. Fraser, Fellows ; Treasurer, W. N. Dollar, Napanee ; Secretary, David Aylesworth, Bath.

LINCOLN.—President, Jas. L. Craise, Niagara ; Vice-President, Jas. Bennett, Beamsville ; Secretary-Treasurer, J. Pawling, Pt. Dalhousie.

MANITOULIN, E.—President, W. R. Smith, Manitowaning ; Vice-President, James Stringer, Little Current ; Secretary-Treasurer, W. J. Tucker, Manitowaning.

MIDDLESEX, E.—President, R. Venning, Mossley ; Vice-President. E. Nicholson, Thorndale ; Secretary-Treasurer, A. M. Munro, Glanworth.

MIDDLESEX, N.—President, C. M. Simmons, Ivan ; Vice-President, Hugh McDonald, Fernhill ; Secretary-Treasurer, Peter Stewart, Parkhill.

MIDDLESEX, W.—President, Isaac Walker, Woodgreen ; Vice-President, R. S. Munson, Glencoe ; Secretary-Treasurer, Chas. M. Macfie, Appin.

MONCK.—President, Allan Robbins, Boyle ; Vice-President, Eldon C. Perry, Smithville ; Secretary-Treasurer, J. E. Cohoe, Wellandport.

MUSKOKA, C.—President, Alfred Kay, Port Sydney ; Vice-President, Richard Lance, Beatrice ; Secretary-Treasurer, John Wilson, Utterson.

MUSKOKA, N.—President, Jos. Kitchen, Huntsville ; Vice-President, John Bilsdon, Huntsville ; Secretary-Treasurer, Wm. Goldthorp, Ravensclift.

MUSKOKA, S.—President, W. H. Taylor, Alport ; Vice-President, Edward Lee, Bracebridge ; Secretary-Treasurer, Alex. Barron, Bracebridge.

NIPISSING, W.—President, R. McLeod, North Bay ; Vice-President, Ferdinand Gratton, North Bay ; Secretary-Treasurer, R. Rankin, North Bay.

NORFOLK, N.—President, L. L. Soverign, Waterford , Vice-President, Thomas Herron, Windham Centre ; Secretary-Treasurer, F. L. Culver, Waterford.

NORFOLK, S.—President, Wm. Dawson, Sr., Vittoria ; Vice-President, John Murphy, Silverhill ; Secretary Treasurer, N. S. Palmerton, Walsh.

NORTHUMBERLAND, E.—President, Alex. Hume, Menie ; Vice-President, R. J Cochran, Edville , Secretary-Treasurer, Geo. Carlaw, Warkworth.

NORHHUMBERLAND, W.—President, C. E. Godard, Cobourg ; Vice-President, E. B. Hinman, Grafton ; Secretary-Treasurer, R. Cullis, Camborne.

ONTARIO, N.—President, Thos. Feasby, Uxbridge ; Vice-President, Henry Harrison, Cannington ; Secretary-Treasurer, Jos. E. Gould, Uxbridge.

ONTARIO, S.—President, Wm. Ormiston, jr., Columbus ; Vice-President, John Bright, Myrtle ; Secretary-Treasurer, Elmer Lick, Oshawa.

OXFORD, N.—President, E. J. Pearson, Kintore ; Vice-President, Angus Ron, Woodstock ; Secretary-Treasurer, Jas. G. Munro, Embro.

OXFORD, S.—President, John Topham, Burgessville ; Vice-President, W. J. Whaley, Dereham Centre ; Secretary-Treasurer, John McKee, Norwich.

PARRY SOUND, E.—President, J. Duke, Hartfell ; Vice-President, W. H. Sylvester, Burk's Falls ; Secretary-Treasurer, Jas. Dunn, Sundridge.

PARRY SOUND, W.—President, S. Armstrong, Parry Sound ; Vice-President, W. H. Burnes, Orrville ; Secretary-Treasurer, J. S. Miller, Parry Harbour.

PEEL.—President, R. J. McGregor, Inglewood ; 1st Vice-President, D. J. McClure, Churchville ; 2nd Vice-President, Jas. Davidson, Cheltenham ; Secretary-Treasurer, R. McCulloch, Snelgrove.

PERTH, N.—President, D. A Dempsey, Stratford ; Vice-President, Jacob Bray, Listowel; Secretary-Treasurer, S. H. Pugh, Milverton.

PERTH, S.—President, W. W. Ballantyne, Stratford : Vice-President, James Donald, St. Marys ; Secretary Treasurer, P. S. Armstrong, St. Marys.

PETERBORO', E.—President, F. Birdsall, Birdsall ; Vice-President, E. Hawthorne, Warsaw ; Secretary-Treasurer, Chas. O'Reilly, Norwood.

PETERBORO', W.—President. E. M. Elliott, Peterboro' ; Vice-President, R. Q. Dench, Lakefield ; Secretary-Treasurer, Wm. Collins, Peterboro'.

PRESCOTT.—President, J. Cross, Caledonia Springs : Vice-President, A. S. Leavitt, Vankleek Hill ; Secretary-Treasurer, Wm. Macadam, Vankleek Hill.

PRINCE EDWARD.—President, G. N. Rose, Waupoos ; Vice-President, J. V. Cooper, Picton ; Secretary-Treasurer, A. S. Yarwood, Picton.

RENFREW, N.—President, Geo. McCaskill, Forester's Falls ; Vice-President, O. Wright, Beachburg ; Secretary Treasurer, John Brown, Beachburg.

RENFREW, S,—President, Jas. O'Connor, Renfrew : Vice-President, David Barr, sr., Renfrew ; Secretary-Treasurer, G. MacIntyre, Renfrew.

RUSSELL.—President, W. C. Edwards, Rockland ; 1st Vice-President, D. McDonald, Russell ; 2nd Vice-President, R. McTavish, Vernon ; Secretary-Treasurer, W. R. Craig, Russell.

SIMCOE, C.—President, Wm. Pratt, Penetang : Vice-President, Wm. Taylor, Barrie : Secretary-Treasurer, G. C. Caston, Craighurst.

SIMCOE, E.—President, Col. W. E. O'Brien, Shanty Bay ; Vice-President, D. M. Harvie, Orillia ; Secretary-Treasurer, R. A. Lehmann, Orillia.

SIMCOE, S.—President, James Allen, Churchill ; 1st Vice-President, W. C. Henry, Thornton ; 2nd Vice-President, Jas. S. Duff, M. P. P., Cookstown ; Secretary-Treasurer, E. Jeffs, Bond Head.

SIMCOE, W.—President, Jas. Carlton, Avening ; Vice-President, F. E. Webster, Creemore; Secretary-Treasurer, Chas. Lawrence, Collingwood.

STORMONT.—President, A. W. McIntyre, Newington ; Vice-President, Jas. Begg, Gravel Hill ; Secretary-Treasurer, C. W. Young, Cornwall.

ST. JOSEPH ISLAND.—President, Chas. Young, Richard's Landing ; Vice-President, A. Kitchen, Carterton ; Secretary-Treasurer, J. K. Young, Jocelyn.

VICTORIA, E.—President, W. H. Cullis, Powle's Corners ; Vice-President, Thos. Robertson, Dunsford : Secretary Treasurer, Wm. Thurston, Bobcaygeon.

VICTORIA, W.—President, Wm. Channon, Oakwood ; Vice-President, Donald Jackson, Woodville ; Secretary-Treasurer, James Keith, Lindsay.

WATERLOO, N.—President, J. L. Umbach, Elmira ; Vice-President, J. G. Hurst, Conestogo ; Secretary-Treasurer, Allen Shantz, Waterloo.

WATERLOO, S.—President, Menno Shantz, Breslau ; 1st Vice-President, R. H. Knowles, Hespeler ; 2nd Vice-President, T. C. Douglas, Galt ; 3rd Vice-President, J. Hallman, Washington ; Secretary-Treasurer, Andrew Chisholm, Galt ; Assistant Secretary, C. D. Brown, Haysville.

WELLAND.—President, J. McLeod, Ridgeway ; Vice-President, F. A. Hutt, Southend ; Secretary-Treasurer, W. H. Gainer, Welland.

WELLINGTON, C.—President, Alex. Spence, Metz : Vice-President, R. D. Nodwell, Hillsburg ; Secretary-Treasurer, Jas. Kirkwood, Ospringe.

WELLINGTON, E.—President, W. H. Mallett, Teviotdale : Vice-President, Samuel Waters, Petherton ; Secretary-Treasurer, Albert Hellyer, Kenilworth.

WELLINGTON, S.—President, Wm. Rae, Arkell : 1st Vice-President, Wm. McCrae, Guelph; 2nd Vice-President, W. W. Kenny, Guelph; Secretary-Treasurer, W. W. Buchanan, Gourock.

WELLINGTON, W.—President, E. L. Robinson, Wallace ; Vice-President, Frederick Wetzel, Moorefield ; Secretary-Treasurer, Jas. McEwing, Drayton.

UNION (Branch of Wellington West).—President, Alex. Drummond, Clifford ; Vice-President, Robt. Wallace, Lakelet ; Secretary-Treasurer, John Munro, Clifford.

WENTWORTH, N.—President, Richard Attridge, Flamboro' Centre ; 1st Vice-President, James Nicholson, Kirkwall ; 2nd Vice-President, Ernest Tufgar, Millgrove ; Secretary-Treasurer, Joseph Stephenson, Freelton.

WENTWORTH, S.—President, Thos. Yeo, Ryckman's Corners , Vice-President, Adam Inch, Hamilton ; Secretary-Treasurer. Erland Lee, Stoney Creek.

YORK, E.—President, L. E. Annis, Scarboro' ; 1st Vice-President, Thos. Pilkey, Wexford; 2nd Vice President, Jas. Young, Mongolia ; Secretary-Treasurer, A. J. Reynolds, Scarboro' Junction.

YORK, N —President, J. A. Hopkins, Holt ; Vice-President, F. W. Heacock, Kettleby ; Secretary-Treasurer, R. W. Phillips, Aurora.

YORK, W.—President, Wm. Scott, Weston ; Vice-President, A. T. Orth, Kleinberg ; Secretary-Treasurer, R. L. Crawford, Emery.

AGRICULTURE.

SOIL FERTILITY—METHODS OF IMPROVING AN IMPOVERISHED FARM.

By T. G. Raynor, Rosehall, Ont.

In discussing a question like this, I do not propose to advise the purchasing of an impoverished farm in order to see how soon it can be brought back to productiveness. We become possessed of such property through inheritance or a desire to extend our lands for pasture or some other purpose when better land near at hand is not available.

Lack of Plant Food—Why Land is Impoverished. When we do own land we should study how to overcome the natural disadvantages. First, we aim to find the cause or causes of unproductiveness. It may be the result of a lack of one or more kinds of plant food. There are about ten essential elements in soils necessary for plant growth. Seven of these are usually present in sufficient quantities, but three of them may be lacking or some one of the three may not be available in sufficient quantities to produce the results we hope for. The three elements referred to are nitrogen, phosphoric acid and potash. Of these three nitrogen is the most important, hardest to get, and hardest to hold in the soil after it is obtained. Fortunately for us, there is a large supply in the air, and the fact that there are some plants which can get their nitrogen from the air is of great practical value to the farmer, and is the key with which to solve the problem of an impoverished farm. Some such plants are clover, peas, beans, lentils, vetches, etc.

Drainage. Another course of sterility is insufficient drainage, either surface or underdrainage. The latter method is preferable where practicable.

Weeds. A third cause may be the prevalence of various forms of weed life. To overcome this, persistent war should be made against them. We must understand the nature of the growth and development of such plants if we would know how best to destroy them. For example, couch grass is a very common weed in many parts of the province. It everywhere propagates itself by underground stems and seed, chiefly by the former. It is a surface feeder, and therefore to destroy it we must give surface treatment in a dry part of the year.

Sour Land. A fourth cause may be found in low-lying lands from the presence of acid solutions which are harmful to vegetation, and cause the land to become sour.

Extremely Poor Land. Having discussed thus briefly the probable causes of infertility, let us now take an extreme view of our subject ; that is to say an extremely poor piece of land. How should I treat it to reinstate it ? Briefly stated, my course would be something like the following :—I would prepare a portion every year with thorough cultivation ; tillage operations help to make plant food available. The first crop I should try would be buckwheat, which feeds largely on elements obtained from the air. When about a foot high I should plow it down in order to gather humus, an essential for clover growing, to improve the mechanical texture of the soil, and to increase its waterholding power. If there was any available manure I should apply it as a top dressing to the part to be seeded down. In the spring I would prepare the seed bed as early as possible, but not too deeply. I aim at firmness rather than depth If I sow a nurse crop I sow it rather sparingly, and seed down with a mixture of twelve pounds of red clover, four pounds of timothy, and two pounds of alsike. This makes a good mixture where it is desired to leave the field seeded more than one year. If clover grows I have got the key to its improvement.

I would now seek to establish some system of rotation in cropping, possibly a four or five year shift, in which clover and corn would figure prominently. Instead of hauling grain to market, I would seek to keep stock to consume the coarse grains, and drive it to market on legs in the shape of live stock. The stock I should begin with would be sheep, dairy cows, and enough pigs to consume the by-products of the dairy. I should try to get the manure on the land with the least waste, and thus from year to year increase a little the productiveness of my farm.

Q. When would you apply the manure ?

A. If at all possible, in the winter time.

Q. Have you any guide for adopting a rotation in cropping ?

A. There can be no cast-iron system followed. In the main the principles I observe are to follow a nitrogen-consuming plant with a nitrogen-gathering one. I follow a shallow-growing crop with a deep-rooted one, and a crop that is hard on the land with one that is comparatively easy. These are the main principles to follow, but there are, of course, some minor considerations.

Q. Could you give a good rotation ?

A. The location and the kind of crops we can grow to advantage must be our guide. I favour a four or five-year system, where about one-quarter of the farm could be kept seeded

every year. Starting with (1) corn, (2) barley or wheat, and seeded with grass and clover; (3) clover for hay and pasture, (4) may be left a second year to meadow, (5) peas or oats.

Q. Why do you recommend sheep in land improvements?

A. There is no animal so destructive of weed life as sheep. They are said to have a golden hoof, and for manuring the higher portions of the field sheep are excellent. Their droppings have good fertilizing properties.

Q. Would you treat such a farm with shallow or deep cultivation?

A. I would say cultivate under any consideration, and as a rule I would cultivate shallow. There are soil conditions, however, where I would cultivate more deeply, as in the case of a clay soil not properly drained, then deep plowing would help the drainage.

Q. What is the object of shallow cultivation?

A. To preserve moisture by preventing excessive evaporation, and to keep the soil loose for root development, etc.

Q. Can fertility be brought to the soil by under-draining?

A. A. W. Peart.—Under-draining low, wet soils makes them more productive. When drained, such lands are generally the richest on the farm. They usually contain quantities of vegetable matter, which is sour and inactive while the land is wet. When drained this humus begins to decompose and plant foods are liberated. My experience is that low lands surcharged with water are practically useless for grains and fruits, so that under-draining makes the natural fertility of the soil available for the use of plants.

Q. Will not drained lands suffer in dry weather?

A. Not in my experience with drains in clay and gravelly loams. Drainage simply removes surplus water. Other forces are at work retaining enough water for the use of plants, such as that of capillary attraction. This force or law draws the water from the sub-soil towards the surface and acts to a depth greater than that of the till in most soils."

Q. Do you recommend the use of glazed tiles for draining?

A. I do not use glazed tiles and have had no experience with them. I use the ordinary clay tile and find it durable and satisfactory. On general principles I would think that a glazed tile might tend to prevent water soaking into the tile by lateral capillary action. However, I cannot speak with any positive knowledge on this point.

Q. Does underdraining pay?

A. Most emphatically yes, when properly and judiciously done. If done carelessly or without due information, it may be a great waste of time and money. I do not think it pays to underdrain lands which have reasonably good natural drainage, but low, wet lands are very little use without it. We find that such drainage pays for itself in about five years. After that it is clear profit. In the Burlington district it costs from 45 to 60c per rod to underdrain, that is provided you let the job to a skilled man. This cost included the price of tile, etc —the whole outlay. If you do the work yourself, of course the cost would be less.

Q. What is the cheapest material for underdraining?

A. I believe that when you go to the expense of draining that it pays to use the best material and that tile is the best, because more durable and efficient than stone or wooden drains, and they have paid well. In some parts of the Province the wooden drains are doing a good useful work. Stone drains tend to fill up with earth, while wood decays. We have tile drains laid 30 years ago, doing as good work as they ever did, so that if tile are reasonably accessible I would prefer to use them, although the first cost would probably be more than stone wood.

Q. What is the fertilizing value of a crop of clover?

A. The farmer can increase the amount of humus and nitrogen by growing leguminous plants in soils of good average fertility. There are from 2,500 to 5,000 pounds of nitrogen, 5,500 to 11,000 pounds of potash, and 3,500 to 6,000 pounds of phosphoric acid per acre on the surface soil. These proportions vary of course, according to the character of the soils. When a clover crop is grown and harvested the soil is left in better condition than before, especially in nitrogen, while considerable amounts of potash, phosphoric acid, and lime are, during the growth of the clover absorbed and built up into its tissues, which are obtained by the roots of the clover at depth not reached by the roots of some other farm crops; hence the clover crop, when plowed under, also adds mineral substances to the soil. Experiments at the Dominion Farm, Ottawa, show that the estimates for a crop of clover, one year's growth, produced 20,770 pounds of green leaves and stems, 11,476 pounds roots (depth of four feet), and 3,073 pounds of semi-decayed material on the surface of the ground, per acre, which contained about 101 pounds of nitrogen in the stems and leaves 48 pounds in the roots and 22 pounds in the decaying material, making a total of 171 pounds of nitrogen added to the soil by a clover crop. If the clover is mowed and fed to stock a portion is returned as manure, but in the roots that are turned under remains 48 pounds, as well as 22 pounds in the decaying material When the entire crop is plowed under the value of the nitrogen per acre, at 15 cents per pound, is $25.65, according to the above yield. Clover can therefore be profitably grown as a green manurial crop outside of its value as hay.

THE RELATIVE VALUE OF ROLLING, NOT ROLLING, AND HARROWING AFTER ROLLING.

By H. R. Ross, Gilead, Ont.

During recent years and more especially since the necessity for taking measures to improve the fertility of cultivated soils became evident, a great deal has been heard of the importance of plant food. Our weakness in this respect is known to be due to the fact that long continued cropping has reduced the percentage of humus or vegetable mold—the source of the value of virgin areas. Into this discussion, however, there has still more recently entered the question of the value and importance of moisture in soils. Each succeeding year finds us suffering more or less from drouth. Scientists and farmers have studied to overcome this difficulty. As a result we are reminded that rotation of crops, constant employment of clover in the same, and good drainage all assist towards the desired end. These things, however, are only partial aids and might possibly be termed as indirect assistants, since they primarily aim to increase the store of humus, and as a consequence the water-capacity of the soil.

What we have we should hold. It is well known that the kernel of the plant food question lies in judiciously making available what we have by intelligent tillage. The same principle applies in another way to the water question. We cannot have a shower of rain on every occasion when such would be desirable, but we may husband the water left by the melting snows of winter and given by the showers of the growing season. The power to do this depends on two principles, which form the A B C of the student in soil physics. First, the water of the soil consists of three kinds—that which soaks through it, that which is held in the space between the grains as a film surrounding each, and that within the grain itself. In a normal soil the second kind stated should be by far in excess of the others since the first is unnecessary, even injurious, and the third is bound to be small in quantity under the most favorable conditions. The virtue of the second class lies in its being held between the soil grains, the same as water may be retained in a sponge or oil in a lamp wick. It has the power of motion under suitable conditions. To regulate these conditions is the great secret of conserving soil moisture. It has been demonstrated that in obedience to a natural law the tendency of soil grains of any kind—clay sand or what you will—is to have in each a like amount of water. Under field conditions this is manifestly a difficult matter. We have the heat of the sun, the roots of the crop and the drying influence of the wind affecting the surface. At lower levels none of these influences are felt and a consequently lower temperature and moister soil will be found. The result is that in the endeavor to maintain an equilibrium the water is being continually passed upwards to the surface, the movement being, by scientists, termed capillary attraction.

Capillarity. This leads up to the second principle. It must be evident that to permit this upward passage to go unregulated, is to incur a loss. The nearer the surface we come, the greater the demand for capillary movement. It has further been proven that the rapidity of the rise is governed by the compactness or looseness of the soil, because on this depends the size and continuity of the passages formed by the soil grains through which the water must pass. The more tightly we pack the soil the finer the spaces and the quicker the rise. Inversely, the looser the formation the slower the rise.

The Roller. The knowledge of these facts combined with the principles of tiliage as affecting crop growth, set advanced scientific thinkers to asking themselves if the practice of farmers throughout our province, on some important points, was not at variance with the teachings of science. In the effort to harmonize these things, the question of the use and misuse of the land roller came prominently to the front. Figures were not to hand for confirming the agreement, but the question of having the moisture conditions of land surface devoted to grain crops properly adjusted was selected for the work of 1899 in the Soil Physics Branch of the Ontario Experimental Union in order to secure evidence which it was hoped might be conclusive.

Experimental Result. The writer undertook the work under Prof. J. B. Reynolds, of Guelph, and a scheme somewhat as follows was adopted. A clay field having a level surface and uniform soil was prepared as in ordinary intensive tillage by securing a finely worked seed bed of uniform depth. In this were sown three strips of oats, two rods wide and the length of the field, having a foot space between each, secured by running the wheel of the drill on the wheel mark previously made instead of putting the outside tooth in the same. The same was done with barley. The seed in all cases was alike and the seeding was also uniform being done on the same day with a press drill. Up to the completion of the seeding, then, we have the conditions equal; now for the treatment. One plot each of oats and barley were left exactly as the drill left them; two more were rolled with the ordinary farm roller; and the remaining two were likewise rolled and then given a stroke with the harrow immediately.

Keeping in mind the principles previously stated, the aim was first to see if this treatment would in any way influence the germination of the seeds, and, what more nearly affected our pockets, to see if it influenced the yield per acre.

Immediatedly on seeing the first sprout appear above the surface on any of the plots, a length of two feet was measured off in a drill in each and the grains were dug up and counted. Two days later this was repeated. Then as each plot ripened it was cut and threshed with a flail. The grain was cleaned and weighed and as we knew exactly the area of each plot the yield per acre could easily be calculated. The results are set down in the following table. The date of seeding was May 6th.

	Oats.			Barley.		
	Drilled	D. & Rolled	D. R. & H.	Drilled	D. & R	D. R. & H.
Yield per acre.....	51 bu. 16 lbs	49 bu. 9 lbs.	55 bu. 5 lbs.	24 bu. 10 lbs	23 bu. 8 lbs.	26 bu. 2 lbs.
No. seed sprouted on May 12th.....	21	17	26	25	19	27
No. seed sprouted on May 19th	27	25	27	41	38	36

Harrowing after Rolling best. It will thus be seen that the results are favorable in both cases from both standpoints to the practice of harrowing after the roller in preference to either of the other methods. In the light of what has been said we certainly had a right to expect this. It will be observed that the plots thus treated showed as many germinated seeds (practically speaking) on the sixth day as on the eighth. Further it may be noticed that the drilled plot gave better returns than that which was rolled. This is not surprising when we remember that the firmness of packing governs the moisture supply. The superiority of the harrowing after the roller as compared with the simple drilling lies in the fact that in its case the soil was firmed around the seed and the loose earth above saved its supply from waste, while the other had its seed sown in a loose soil from which, while there could be no waste worth mentioning, there was difficulty in passing the water up to the right point owing to the looseness of the soil surrounding the seed. The results were secured by a proper distribution and regulation of the moisture supply.

Effect of Rain. It may be argued that rain soon after seeding would render this work useless. However, the seeding was done on May 6th and on May 8th .1 of an inch of rain fell. This was amply sufficient for the purpose of throughly soaking the surface soil, and yet we have the figures given. Futhermore it may be said that on other than clay land the work would not have been so favorable in results. This, however, is a greater mistake than the other, for the question of moisture is of more vital importance to the tiller of a sandy farm than the man who works heavy clay. The hard sand does not take moisture within its particles, hence is cut off in that particular. It is coarser and the grains are larger ; thus we have fewer and larger capillary spaces whose irregularity reduce its water-holding power. Having less power to take up moisture and less power to retain it when taken up, it must be evident that sand certainly is at a great disadvantage when compared with clay from the physicist's standpoint. Those who have observed the comparative drouth-resisting power of the two soils will see the force of this reasoning.

MANURE AND HOW TO APPLY IT.

By D. C. Anderson, Rugby

There was a time in the history of farming in this country when manure had but little value ; that was when our land was new. The rich virgin soil upon which a heavy crop of leaves and decaying timber had rotted for centuries, responded liberally to the most primitive methods of cultivation. Manure then was a nuisance, to be got rid of speedily, generally by fire. In fact in early times it was considered a great advantage if a river or a large creek was near, down which the straw was floated. But with continual cropping the plant food has been taken from the land, and we must return it or suffer. The highest type of good farming is when the land is kept clean of weeds, and the fertility of the farm is not only maintained but increased. No farmer can be a success, no matter what line of production he follows unless he manures his land.

Three methods of keeping up and enriching soil. (1) Stable manure ; (2) green crops, clover and peas, plowed into the soil ; (3) a proper rotation of crops.

Three points in applying manure. (1) Never plow it deeply into the land ; (2) keep it near the surface ; (3) work it with the top soil into a fine seed bed.

Q. Is it wise to draw the manure direct from the stable and put it on the land ?

A. I follow the practice of hauling the manure twice a week in winter to the field spreading it on the snow ready for the next year's crop. The greatest benefit from hauling in winter is that the labor is done when we are not pushed with other work.

Q. Would you put it on a hill side in winter ?

A. No. Such a rain as we had last week would wash some of the best fertilizing elements out of the manure on to the richer level land below where it was not so much needed. I aim to draw the manure made in March and April on to the rolling hilly places in the field after grain seeding is done, manuring only the level parts of the field on snow.

Q. Does it pay to put manure on a bare summer fallow ?

A. I think not, for several reasons. There is not much profit in bare fallowing, but a bare fallow is preferable to a dirty field ; but a miss in grass catch may force us into a summer fallow. In applying manure to a fallow field we are too long in getting our returns (the nimble sixpence is far better than the slow shilling). If fall wheat is sown on the fallow it sometimes is a poor crop, and if the soil is of a sandy nature with a porous open subsoil we lose nearly all the manure by leaching before the third year.

Q. On what crops would you apply the manure ?

A. The bulk of it should be applied to the hoed crops such as corn, potatoes, mangels or turnips. These crops would get the full benefit of it the summer after it was made. A light top dressing on a clover field, or from eight to ten loads per acre, gives very beneficial results.

Q. Have you had any experience in top dressing fall wheat ?

A. Yes. Coarse, strawy manure is what is required for this purpose. It affords the best protection to the young plants from hard frosts that often throw them out by the roots, and this benefit exists all through the various freezings and thawings of the winter. As the rough manure lies close to the ground it shelters the young plants from the cold early spring winds. In winter on wind swept hill sides, the manure helps to hold the snow, keeping the wheat covered. Top dressing wheat is best done after the first hard frost so that the ground will bear up horses and waggon. Remember it is not the freezing that hurts the wheat plant as much as the thawing, and once the ground is frozen it is well to keep it so by a covering of some kind, so that the alternate freezing and thawing by which the plants are drawn out of the ground may be avoided. In top dressing, eight or ten loads to the acre will be quite sufficient. The main point is to spread it evenly over the land.

Q. Did you ever use commercial fertilizers and on what crops ?

A. No. I am of the opinion that commercial fertilizers are too expensive for the average Ontario farmer, but market gardeners near some large manufacturing or commercial centre wanting to make the most out of a small piece of land, may profitably use them. Superphosphate and artificial manure are of benefit, but the farmer who has to make a living from the soil will find that the cheapest and best manures are those that he manufactures on his own farm.

Q. What is the best way of making and keeping manure ?

A. The best manure is made where dehorned cattle are being fattened in large sheds and given plenty of bedding, but where dairy cattle are kept if it is not drawn direct to the field the horse, hog and cattle manure should be wheeled to an open shed and the young cattle allowed to tramp it solid. It will not heat. Leave it there until it is going to be applied to the land. A series of carefully conducted experiments at Ottawa have proven that a ton of raw, fresh, green manure gives as good results as a ton of rotted manure. Manure loses one-half in weight during the process of rotting. There is too much loss in allowing manure to heat, for then some of its best elements pass into the air in the form of ammonia and are lost. This is why there is a loss from drawing it into large heaps in the field in winter—it heats too much.

Q. How would you apply manure to a potato crop ?

A. I live in a section where potatoes are extensively grown. On some of the best crops I have seen the manure used was coarse and strawy. It was drawn from the barn just before planting, and placed in small heaps in straight rows across the field, planting every third furrow. A couple of stout boys with six-tined manure forks, after the seed has been dropped are able to fork the manure into the furrow on top of the potatoes when the next furrow covers both manure and seed.

Q. Have you ever tried spreading manure on the land after plowing but before sowing ?

A. Yes. The manure made in the summer months is applied as a top dressing on fall wheat land previous to sowing, the preceding crop being peas. When the land is plowed about four inches deep manure is worked into the soil with cultivator and harrow. On thus preparing and manuring the land, I seldom miss harvesting a fine crop of wheat, and always secure a good catch of grass both timothy and clover. If the bedding of our animals were run through the straw cutter so that we could apply a top dressing of six or eight loads per acre of short manure on land that was to be sown with barley or oats and seeded with clover, there would not be as many failures to get the grass to catch. Applying manure on the surface is best for all kinds of grain crops. The plant food is then given where it is the most available to young plants, the roots being near the surface, but if the manure is plowed in much of it is buried beyond their reach. Plant or animal life requires a good start in the earliest stage of their existence. This can best be given to plants by applying manure near the surface.

Q. How would you enrich a field without stable manure ?

A. If the soil were light I would plow in the early fall and sow rye. Next spring about the second week in May I would turn all my growing and dry cattle on it ; not the cows, as rye pas-

ture taints the milk. Keep it closely cropped till after haying, plow shallow once, keep it cultivated until time to sow fall wheat, seed to grass with the wheat, as cropped-out light land gets too porous open and loose. The summer pasturing will help to bind it and make it solid. If the soil is cropped-out clay it will have gone to the other extreme, and have become stiff, solid and hard. On this kind of soil I would sow peas and plow them in for manure. This green crop would have a two-fold beneficial effect on hard clay. The decayed vegetable matter would not only enrich the soil but keep it open and loose.

Q. Is it not best to draw manure out in winter and leave it in small heaps in the field about eight or ten heaps to the load?

A. This method of winter manuring is open to some objections. If it comes in a warm spring, the manure gets dry and is hard to spread. The crops will be spotty and very uneven wherever a heap has been. The plants will be healthy and vigorous if the field has been in good condition and the season is a growing one. The crop on the manured spots will lodge and often fall, the heads will not fill up well and the grain will be shrunken.

Q. Does it pay to grow rye to turn under green?

A. Upon a light worn out soil there is a loss in turning in a crop of rye, because when light land is over-cropped it becomes too loose and open, and rye would tend to keep it more so. But upon a heavy tenacious clay good results would be obtained by plowing in a crop of rye. The greatest trouble would be to get it turned under on this kind of soil especially in a dry summer. After chaining in the rye the land should be presistently worked with cultivator, disc roller and harrows to retain moisture and cause the rye to decay.

Q. How does land plaster act as a fertilizer?

A. Land plaster is an indirect fertilizer. It adds but very little fertility to the soil, and acts more like a stimulant helping to change unavailable forms of plant food and makes them more available to the growing crops, especially clover and peas. I have seen fine crops of peas ruined by applying plaster. The leaves became blighted with mildew, and the pods never filled. On gravelly soil, plaster does not seem to have the same stimulating effect as upon a clay or sandy loam.

Q. What amount of lime should be applied at one time?

A. A dressing of lime on stiff clay soil would do some good, but too much should not be put on at one time. About 45 or 50 bushels per acre worked into the soil by itself would be sufficient. Barn-yard manure should be applied after. Lime does very little good on gravelly or sandy soil.

Q. What are wood ashes worth per ton as a fertilizer?

A. Hardwood ashes are rich in potash. A bushel of ashes unleached, weighs about 50 pounds, and contains three pounds of potash and one pound of phosphoric acid. The value of potash at the chemists is 4c. a pound and phosphoric acid 3c. a pound. The chemical value of ashes is about 15c. per bushel, or about $6.00 a ton. No better fertilizer can be applied to an orchard than unleached hardwood ashes.

Q. What is the best manner of applying farm yard manure to get the best results?

A. Draw straight from the yard, or, better, from the covered shed, spread from the waggon and plow in lightly the same day.

FARMYARD MANURE.

By John I. Hobson, Guelph, Ont.

I may say that a life time's experience as a farmer and the knowledge acquired during the many years that I was engaged in judging the prize farms of Ontario and in other ways, have led me to know that there is no other department of farm management which required as much thoughtful care as how best to manage and apply farm yard manure. And certainly speaking in a general way there is not along any other lines of farm management to be seen such wasteful extravagance and bad practice, and, we may add, gross carelessness, as is too often shown in dealing with this matter, and this is very often to be seen on otherwise well managed farms. It is not putting it at all too strongly to say that of the many different problems which have to be solved bearing upon the agriculture of this country, there is none more so than the all important one of how best to keep up the fertility of the soil.

Considering how important it is for the individual farmer to have an intelligent and thorough knowledge of this subject, and the bearing it has on successful agriculture causes it to be one of the most suitable subjects which can be dealt with at a Farmers' Institute meeting. It has always been very noticeable as far as my observation has gone that in all Institute gatherings of intelligent farmers that there is a freshness in the discussions, and an interest taken which is not surpassed when dealing with any other subject. This is easily accounted for, for the reason that it is vastly important in itself. It is equally so whatever may be the character of the farming carried on, the nature of the soil or the physical features of the section of the country where the meeting is being held. It is of alike importance to the gardener, the fruit grower, the stockman or to the farmer who makes grain growing a specialty.

The discussion following an address on this subject has almost invariably been very interesting. It generally takes the lines of showing the enormous loss sustained in the wasting of the liquid portions of the manure, its relative value as compared with solids, the best and most satisfactory way of constructing stable floors with the view of saving it, the most suitable material to be used in making these floors, the relative cost of cement floors as compared with those constructed of vitrified brick. It may be here said that the consensus of opinion as shown at the meetings which I have attended during the past two seasons is almost entirely in favor of using either one or the other of the materials above mentioned, with a marked growing tendency in those sections where they have been properly tested, of vitrified brick.

Then again very valuable discussion has been brought out when dealing with the question of the comparative value of the manure made from the different classes of animals, and the important bearings, which the different stock foods have upon that value, this again leading up to the important matter of showing how necessary it is when dealing with food values to consider it also from the standpoint of manurial value ; absorbents and their values as used under different conditions ; the use of straw passed through the chaff cutter as compared with uncut ; the importance of mixing the manure made from the different classes of animals with the view of securing uniformity of fertilizing value and for other reasons. These have always been dealt with at the meetings I have attended when the manure question has been on the programme, as well as the best way of trying to secure conditions which would tend to reduce to a minimum the precentage of waste in the management.

The importance or otherwise of having a large part of the manure kept under what may be termed manure sheds, usually brings about considerable discussion, and demonstrates the fact that a yes or no answer cannot be given, as it depends so much upon the conditions under which the farming is being carried on. There are many homesteads in this country to which manure houses are very valuable adjuncts, and a good purpose is served by their use ; but it can also be said with equal truth that there are many farms in this country on which the system of management is almost perfect, and the results highly satisfactory, on which the manure is kept uncovered in open yards. However, although these are facts, the discussions are none the less valuable—perhaps all the more so.

Applying manure. The best way of applying the manure brings up the question of surface manuring. This opens a wide field. The popular opinion, judging from what is said at these meetings, is ever growing more strong in the direction of applying well made stable manure directly to the land. That again incidentally leads up to the labor question, which has a very important bearing upon the work, showing how important it is in these days, when there is an ever increasing difficulty in getting satisfactory help on the farm at a reasonable cost. To utilize as far as possible the work of men and teams at a season of the year when the time is least valuable, is one of the many strong arguments which is used by many of the best farmers who attend these meetings in favor of drawing out and applying manure directly to the land in the late fall and winter months.

At the meetings which I have attended of late years there has been very little time taken up in considering artifical manures. There appears to be a growing tendency to leave them alone, and to take the stand that on the farm is where the fertilizers can be most cheaply and satisfactorily made. Gypsum and salt are not included when referring to artificial manures.

The question is often asked : What have you got to say about growing green crops for plowing under ? It is needless to say that a good deal can be, and often is, said about them.

I would just like to say in conclusion that one amongst the many satisfactory features noticable at these Institute meetings is the ever growing tendency of our best and most successful farmers to take an active interest in them ; and further, that our most successful Institute speakers are not those who feel it necessary that they should do all the talking, but rather those who have the faculty of crystallizing what they have got to say, and then draw out others of the strong men to take part in the discussions.

THE PRESERVATION OF BARNYARD MANURE.

At the Dominion Experimental Farm, Ottawa, some experiments in reference to the care of barnyard manure were conducted last year. In the investigations two points in particular were given special attention. (1) A comparison of the changes occurring during the decomposition of protected and exposed manures, and (2) the effectiveness of gypsum as a preservative. In the first case of two lots (four tons each) of fresh mixed horse and cow manure with litter, alike in composition, one was placed in a closed shed, the other in an open wooden bin with a practically water-tight floor, and both lots were weighed and analyzed month by month for the period of a year. From the data obtained the following conclusions are drawn :

Heavy loss of important constituents in exposed manure 1. There is a greater loss of nitrogen and organic matter from the exposed manure than from the protected. The former lost one-third of its nitrogen, the latter about one-fifth. Ten per cent. more organic matter was destroyed in the exposed than in the protected manure.

2. There is practically no loss of potash and phosphoric acid from the protected manure.

3. The exposed rotting manure lost about one-sixth of its phosphoric acid and somewhat more than one third of its potash.

4. The chief changes, due to fermentation, take place within the first months of rotting, and as far as this experiment goes there is no apparent benefit in rotting for a longer period than three months.

In the experiments with gypsum three tons of horse and cow manure, mixed in equal proportions, were allowed to ferment without the addition of any preservative and an equal weight of the same manure was mixed intimately with ground gypsum or land plaster at the rate of fifty pounds per ton of manure. These lots were fermented at the same time in separate bins inside the small building used in the previous experiment. The manures were placed in the building on July 15th, being then fresh, made as compact as possible and not stirred or otherwise disturbed till the close of the experiment, November 15th, when they were again weighed and samples taken for analysis. From time to time both lots of manures were moistened. Both manures, therefore, were, with the exception of the presence of gypsum in the one, rotted under the same conditions.

The results show that the use of gypsum retarded to a certain extent the destruction of organic matter.

"With respect to the nitrogen, however, no useful result was observed under the conditions of this experiment from the use of gypsum. The amounts in the manure rotted with and without plaster were practically the same.

The practical conclusions from this part of this investigation are (1) that the proper place to use gypsum is in the stable, where undoubtedly the greater waste of nitrogen, as ammonia, frequently occurs, and (2) that when the manure heap is kept compact and moist there is not any considerable escape of ammonia."

It was found in these experiments that if the manure is kept moist loss of potash can not be completely prevented without a water-tight, non-absorbent floor.

SILOS—ARE THEY BENEFICIAL?

By John McMillan, M.P., Seaforth, Ont.

The silo may be built in different forms and of any material that will combine strength with durability, and as nearly air tight as it is possible to make it. Some are built round, some square, and some octagonal or eight-sided. We have built two square silos, twenty feet square inside and thirty feet high. They are built of gravel and cement, and give us good satisfaction. They are built outside of the barn, but are convenient to get the silage into a feed room, where it is mixed with cut straw, cut hay and grain, once each day, enough to last twenty-four hours.

When to cut the corn. In order to have good silage, it is important that the corn be cut at the proper stage of ripeness, because if cut too green, the silage will be very sour, and not as good food as when properly ripened. Corn in the tasseling stage is said to contain 91 per cent. water; silking stage, 83 per cent.; milk stage, 85 per cent.; glazing stage, 77 per cent.; ripe, 72 per cent. *I have come to the conclusion that the best time to cut is between the glazing and the ripe stage.* Between the time when the kernels begin to glaze and full ripeness, there is said to be a gain of over 1/8 of dry matter, 1/6 of starch and sugar, and 1/5 of fat. For a number of years we have allowed our corn to be well on towards the ripening stage, and our silage has been excellent.

Corn the best Cattle food. Experience proves unmistakable that where corn is grown properly and brought to a proper stage of maturity, there is no plant so valuable for the bulky portion of a food ration for cattle as silage. We find so far the best mode of cutting the corn is with a hoe made for the purpose. We can cut so much lower, that we believe the extra amount of feed from an acre will pay for the cutting, as I believe the bottom of the stalk is the most valuable part. Then we cut with a large Smolley silage self-feeding cutter, and cut in lengths about three-fourths of an inch, as the shorter the stalks are cut the closer they pack in the silo.

In filling the silo, the corn needs to be well tramped, and the butts of the stalks, the ears and the leaves and top of the stalks must all be well mixed in the silo. If not well mixed wherever there is a quantity of leaves and tops of the stalks without any of the ears and stalks there will in all likelihood be mouldy spots, whereas if it is all well mixed and solidly tramped this will not occur. The only covering we put on is to tramp thoroughly and put 25 to 30 pails o water on the top of the silage the second day after we finish filling; but we continue to tramp a

least every second day for say ten days, when we put on a second time 25 or 30 pails of water all over the silage. When we open to begin to feed, we find three or four inches on the top spoiled.

Now as to the benefits of silage over fodder corn :

1. The silo renders the corn more easily digested.

2. I can have succulent food both summer and winter.

3. I can keep a greater quantity of cattle on the same number of acres, as there is no waste, the silage being eaten up clean.

4. Animals are more healthy on silage than on dry food.

5. If land is well drained and well manured, the corn crop seldom fails.

6. Experiments made at Wisconsin Experiment Station with ensilage and fodder corn upon milk cows : On one acre of each the silage gave 243 pounds more milk, and 12 pounds more butter, or 3 per cent. in favor of silage.

7. At New York Experiment Station, an experiment was made with silage and corn cut and shocked. Two animals were fed and their voidings kept and analyzed to see what amount of every hundred pounds of solids the food contained would be kept by the animals. It was found that from silage they kept 69 pounds out of every 100 pounds ; from the shocks they kept only 62 pounds out of every 100 pounds of solids.

8. At New Jersey Experiment Station, an experiment was conducted during the year 1897 to study the cost and feeding value of the dry matter of corn fodder and of silage, and the results showed that while the cost of harvesting, storing and preparing for food the dry matter contained in corn was greater per unit of dry matter in the form of silage, than in the form of dried fodder, the feeding value of the former was much greater than that of the latter. The yield of milk was 12.8 per cent. greater, and the yield of butter fat 10.4 per cent. greater, from a given amount of dry matter fed in the form of ensilage than when fed in the form of dried fodder. It was also found that at one per cent. per pound for the milk produced by the animals, the value of the corn crop was $10 greater per acre when fed in the form of silage rather than in the form of dried fodder.

9. At an experiment made in Wisconsin as to the quality and flavor of butter made from cows fed silage and cows fed on other foods, the butter from the milk of cows fed silage took the largest score in point of flavor.

The time has come when the farmers of the Province of Ontario must solve the question of cheap feeding both in summer and winter. Corn and the silo is in my opinion the solution of our food problem. There is a great amount of prejudice against silos, but that prejudice is now confined to those who have had no experience, and it is doomed to dissappear as the number of silos increase. Since we have had them ourselves and fed ensilage, we have gotten better results from our straw by putting it through the straw cutter and mixing it with the silage and a little meal, when the cattle eat both silage and straw clean, leaving nothing, and are doing well this winter.

We have 120 steers this winter. They are feed each day about 30 pounds of silage, 10 pounds of cut straw, and about two and one half pounds of meal. They average between 1,200 and 1 300 pounds in weight, and the cost of the food daily for each steer is about five and one-half cents. There is no other class that the same value of food would give the same results. I feel confident that in ten years from now it will be the exception on farms in Ontario not to find a silo.

Q. What is the cause of sour silage ?

A. Either the corn is cut too green or the silo is not perfectly air tight.

Q. Is dried fodder corn not as valuable a food as silage ?

A. No, cattle will not eat up clean the butts of the strong stalks even when put through the cutting box.

Q. Would it not pay to take the ears off and have the corn ground and feed along with the stalks after putting the stalks through the cutting box ?

A. No. Experiments have been made, and it has been found that silage with all the ears on gave better results than any other known system of feeding corn.

Q. What about raising corn on heavy clay land ?

A. Corn on heavy clay land does best on sod.

Q. Is it better to plow in the fall or in the spring

A. It is better to plow in the fall and give the frost a chance to assist to pulverize the soil.

Q. Is it better to grow corn in drills or hills ?

A. We have tried both, and we think the best results are got from planting in hills.

SILOS AND SILAGE.

By Barlow Cumberland, "Dunain," Port Hope.

When living in the city of Toronto we kept cows, so, when in 1896, we moved into the country, to the old homestead near Port Hope, in which the wife had been brought up, she made up her mind to extend her interest by farming on a moderate scale. We thought, too, that by carefully considering what we did and how we did it, we might be of some advantage in our neighborhood. In order to get the latest information I obtained all the Farmers' Institute reports, and kept up a lively correspondence with both the Experimental Farm at Ottawa and the Agricultural College at Guelph ; and here let me say that no inquiry ever failed to obtain from the officers of each an immediate and pratical reply.

When one farmer meets another, and questions are exchanged respecting their farming methods, information is gained by the ear, but failing such opportunities they learn from one another by reading the results of other persons' experiences, as set down in the farming pamphlets and Agricultural Reports which are so freely to be obtained from our Canadian Governments. But often we put more confidence in what we hear, and learn more completely by talking than by what we read, and, therefore, we must greatly rejoice that we have the splendid opportunity given us of a Farmers' Institute meeting such as this one to-day. We ought to endeavour to the best of our ability to increase these meetings in number, and so spread the practical knowledge of the profession of farming, which requires and is capable of employing our highest methods of education, and is the backbone of our country's advancement.

We soon found before us the problem of how to raise the largest amount of fodder at the smallest expense, and off the smallest amount of ground. The answer to the problem was silage which has been proved, when properly made, properly kept and properly fed to answer all these requirements. I sought then, not for the most expensive kind of silo, but for one which would be the most practical and effective, and yet at the same time be cheap enough to be within the range of almost any farmer, and I think I have found it.

Having gathered a great deal of information, and visited silos in other places, I set to work, and while not indulging in any comparisons will state my experience for the information of others.

How to build the Silo. The silo is placed close alongside the cow-shed, at a position which will enable the cutting machine and elevator to be conveniently placed for filling, and so that the teams can bring the loads of corn alongside the cutter without detention. Let the teams drive past the machine and unload and get away without any backing up, and you will get more trips from the field in the day.

Ours is a round wooden silo, 12 feet in diameter, 20 ft. high, and holds 45 tons. The height of a silo must be regulated by the lay of the ground, for there is a limit to the height to which the elevators can conveniently work ; but the higher the silo is in proportion to its width (diameter) the better the silage is pressed down by its own weight in settling, and the less surface is exposed to the air. The item of expense, too, has to be considered, for the longer the lumber the higher the price.

Experience has proved that no silo should be less than 20 ft. high. The planks must be as long as possible, for the fewer the splices the better, all the same width, sound and free as possible from knots, two inches thick, and the edges square, not bevelled.

The hoops are $\frac{3}{4}$ inch iron, screw tapped at both ends with nuts and washers. Two pieces of 4x4 oak are put on opposite sides of the silo, and hoops put through these and drawn up tight.

The bottom of the silo is sunk three feet in the ground, no foundation is needed other than one of cedar plank, such as is used for the botton curbing of a well. Short four foot hemlock boards are put around outside to keep the earth from touching the plank. The floor is clay beaten solid, banked up a little against the sides to keep out the air, and a little hollowing in the centre.

Put up the two oak pieces. Put on the bottom hoop and the fifth. Put the first plank on the foundation, raise it up and hold it in place by wire nails bent round the hoops. Do not drive the nails through the plank ; they are only to hold it in place while building. See that it is plumb ; if you do not the silo will be crooked. Put up all the other planks in succession, carefully adjusting the edges. Tighten up the hoops. The square edges will bind into one another. Put on the other hoops. Watch the planks when tightening up, and make them keep their places with a wooden mallet ; put the hemlock plank around outside ; pack the earth down tight all around, and the silo is complete.

The following is the account for our silo :

To 57 pieces 2x8, 20 ft. pine	$27 36
6 iron hoops ¾ inch round, 1 in at end, tapped for 1 foot	13 00
2 pieces 4x4, 20 ft. oak	1 10
4 pieces 2x8, 12 ft. cedar for foundation	1 20
125 ft. hemlock	1 00
2 men 1 day working	3 00
1 man 1½ day working	2 25
Nails	25
	$49 16

To this must be added the labour of our own man and a boy who also dug out the hole for the foundation. After the silo is up cut three openings 1, 4x2 ft. for taking out the silage, bevelling the edges to the inside ; this is to take the pressure of the Silage when swelling. The pieces cut out will make the doors. The two lower openings have two chutes direct into the cow shed. A top to keep out the rain and snow it necessary ; ours has a conical six sided, shingled top, which cost $19.00, and has a door opening upwards to take in the top of the elevator when filling, but a much simpler top would do as well.

Growing the Silage. 3¼ acres, 1896—poor, exhausted, sandy loam, full of twitch ; sowed peas and oats and fed to cattle.

1897.—Sowed part barley, part buckwheat, plowed in fall, manured in fall and during winter, spreading the manure on the snow.

1898 —Plowed in spring and harrowed. 25 and 26 May, planted Mammoth Southern corn, 5 to 6 seeds in holes, with hoe, in squares 3 feet apart. As soon as blades came above ground cultivated with single horse cultivator four times at intervals of ten days apart, and hoed up hills around the stalks. There were four or five stalks to each hill. You can pull out stalks when there are to many, but you cannot grow another. Corn grew 8 to 12 feet high, cobs 1 foot to 15 inches long, many weighing 2½ lbs.

Sept. 15 and 16.—Filled Silo. The cobs were glazed just changing color to brownish yellow. The corn was cut on Sept. 14, the day before filling. The force employed was horse power and 3 teams, 2 teams to haul, 5 men to load and handle, 2 men to tramp in silo.

Cost horse power and three teams	$13 00
" 7 men at $1.25	8 75
" 2 teams hauling	6 60
	$27 75

In addition to the 3¼ acres had 1¾ acres cob corn, poor sand, poor crop, cultivated twice. The cobs were taken off and the stalks cut and filled into top of silo.

One foot of pea straw was tramped into bottom of Silo. Before filling all knots and any openings in joints were tacked over with paper, and also the edges of each door as it was put in. Corn was cut to ¾ inch, and steadily tramped down as it fell from the elevator ; silo filled to within 2 feet of top with product of 4½ acres, making 40 tons silage.

Oct. 26.—Started feeding. The silage had sunk about three feet and about two feet on top was spoiled. Fed steadily to four cows and two yearlings to 6th May, when covered the silage with 2 feet of straw stamped firmly down.

July and August —Opened silo again, took off straw, was perfectly good and fed for two months and carried the stock over the dry summer. Silage was good to the very bottom.

Silage 1899.—2½ acres had been in sod for four years. Plowed in early spring when the spring rains have more chance to get at the sod than when the furrows are hard frozen ; crossed both ways with cultivator just before planting.

1¾ acres sandy loam not in good condition. A crop of cob corn had been taken off in 1898. Plowed in fall and manured 15 loads to acre. Spring of 1899 crossed twice with cultivator just before planting.

May 28.—Planted Mammoth Southern Corn as it seems to suit our neighborhood, same as before. This year only cultivated three times and did not hill up but chopped off weeds around the foot of stalks, averaged 5 to 6 stalks to hill, 10 to 12 feet high, cobs same size as 1898, but foliage broader and greener, and did not dry off on stalk.

Sept. 20 and 21.—Filled silo, the corn being cut same day in the field and taken direct to machine.

Cost engine and 2 teams hauling	$17 00
" 7 men at $1.25	8 75
" Wood for engine	1 00
	$26 75

The corn was cut to ½ inch. Silo was filled chuck up to the top. Five loads in addition cut and filled into the conical roof and had about one acre of corn left standing uncut out of the 4½ acres, making 45 tons silage from 3½ acres corn.

Oct. 29th.—Opened silo and started feeding. Silage had sunk about 5 feet. Do not think it was as well trampled down as before, but being cut smaller it settled down and packed harder and better, only about 8 inches on top was spoiled and have been feeding steadily ever since.

Feeding notes.—In 1898 when silage was cut ¾ inch, cattle would leave the thick bits of cobs, amounting to about 1 bushel each cow per week. This year, cut to ½ inch, they eat it up clean.

Another thing, last year the corn was cut the day before and withered somewhat in the field, this year it went direct, juicy and green from the field to the machine.

In taking out the silage we at first took it out with a three-pronged fork, and the silage, which was disturbed, went musty and spoiled. Now we scrape off the top evenly with a shovel, not disturbing anything beneath and only moving the silage which is to be used, so nothing is spoiled.

Shovel direct to the mixing floor, taking off in the morning enough for that evening and the next morning.

Our mixture for milk cattle is :

Bran	10 lbs.
Ground Oats	10 lbs.
Pulped Carrots	60 lbs.
Silage	152 lbs.
	232 lbs.

All thoroughly mixed together and left to stand until the time for the evening feed. This quantity is fed in 8 rations (or baskets full) of 23 to 28 lbs. each. One in evening and one in morning to each of four cows. What is kept over night is covered with an old blanket and is perfectly good in the morning. The cows are given a feed of hay at mid-day in addition to the morning and evening rations of silage.

The silage is mellow and sweet smelling, and the cattle eat it with avidity and thrive and do well. As to the utility of the feed the detailed experiments, which have been made and reported by the Agricultural Departments prove that silage is the cheapest method of curing corn and is a most efficient form of winter fodder.

In a round wooden silo a little (not more than one to three inches) may sometimes freeze on the sides, but these can be broken up, thawed and fed at once without damage.

Watch your cows and arrange the quantity of feed accordingly, as the same amount of silage may scour some while agreeing with others.

The size of the silos must depend upon the number of cattle to be fed, and as these wooden silos are easy and economical to build it would be better to have two moderate sized round silos than one big one. One can be kept undisturbed for summer use, and as each in turn will be fed out of the bottom there will be no old silage accumulated.

After filling the silo watch the hoops and loosen them off if there are any signs of strain by the swelling of the silage. One of the advantages of the oak pieces is that they will take care of some of this strain. During summer and when the silo is empty tighten up the hoops. A silo is like a tub, the staves won't keep in their places if the hoops are loose ; watch your silo. If any silo has ever burst or fallen down it was not the fault of the silo, but the man who didn't take care of it.

These are my experiences and I give them to you in the hope that by drawing attention to the subject they may prove of use in our neighborhood.

The following table of sizes and capacity of silos has been given by Mr. Gould.

DIAMETER.	HEIGHTS.			
	20 ft.	22 ft.	25 ft.	30 ft.
10 ft.	31 tons	34 tons	40 tons	47 tons
12	45	49	56	65
14	63	68	77	90
16	80	90	105	130
19	100	110	125	150

THE SILO, ENSILAGE AND CORN.

By Andrew Elliott, Galt.

Q. What do you consider a well balanced ration for milch cows with ensilage as part of it?

A. Mr. Andrew Elliott : (1) 35 pounds of silage ; 5 pounds of bran ; 4 pounds chopped oats, barley and peas, mixed in the proportion of 3, 2 and 1. Mixed with all they will eat up clean of chaff and cut straw fed in two feeds with a feed of clover hay at night.

(2) 35 pounds silage ; 6 pounds bran ; 3 pounds pea chop. Mixed with all they will eat of equal parts of cut clover hay and straw or chaff. Give a feed of straw for them to pick over at night. Silage is under no condition a perfect ration, containing an excess of carbohydrates and consequently ought to be combined with foods containing an excess of protein such as wheat bran, oats peas, cotton seed meal, oil cake and clover hay.

Q. Does ensilage injure the flavor of butter ?

A. No. If good and fed with other feeds.

Q. How large would you build a silo for one dozen cows ?

A. A silo 11 or 12 feet in diameter and 25 feet deep would be amply sufficient.

Q. Describe how you would build a silo.

A. For a tub silo have planks 2x8 or 2x10 planed on both sides, and if possible of the length required. Have hoops of $\frac{3}{4}$ of an inch round rim properly bent to circle, with a fairly long thread run on all the ends. Either elevate and compact the bottom, or cement. Take two 6 inch timbers, and after boring holes for hoops, (holes two inches from face slanting outward,) stay lath posts opposite each other, and put centre and bottom hoop in place. Begin at post and set plank on end, driving a wire nail in and clinching it around hoop to hold stave in place. Continue until staves are all up, then tighten hoops and put on remainder. Cover with a cheap roof paint. (I use iron oxide and raw oil). Have the doors bevelled from the inside. If the silo is built of cement use Queenston or some other good cement, and clean gravel in the proportion of 1 to 6. I prefer an octogon shape. It is stronger, has not the objectional corners and is much easier built than a round one and can be cheaply roofed. By bedding old waggon tires or such like into the walls they can be very much strengthened and a lighter wall used.

Q. Are shallow silos satisfactory ?

A. No. Depth is very desirable, giving greater solidity to the mass and being more satisfactory for feeding.

Q. What is the size of your feeding door ?

A. Feeding doors need not be more than $2\frac{1}{2}$ by 3 feet, and say 4 feet between.

Q. Should the silo be bedded in cement ?

A. Not necessarily. We must have good drainage, however. Cement floors prevent rats from working into the silage, which are most destructive.

Q. What kind of roof do you advise ?

A. An ordinary shingle roof. I think all silos ought to have a tight roof.

Q. What should a silo such as you have described cost ?

A. A tub silo say 16 feet in diameter and 24 feet deep will require about 2600 feet of plank (inch measure) and less than $15 worth of iron. With the material on hand, three men would build it in a day, roof extra. An 8 sided cement silo, inside planks 6 feet long, walls 12 inches thick, 24 feet deep, would require between 50 and 60 barrels of cement, and three men would build it in 12 or 14 days. Cost considered I much prefer the cement to the wooden silo.

Q. In your travelling about the Province you no doubt meet some who have tried the silo and been disappointed in it. What were the causes of their failure ?

A. 1st. Imperfectly constructed silos ; and 2nd, from faulty filling, either too green and immature corn causing sour ensilage, or putting into the silo too dry, causing mould, or third, by feeding silage exclusively.

Q. Do you prefer the round to the square silo ?

A. If a wooden silo I prefer the round tub, and if cement, round or eight sided.

Q. What variety of corn do you prefer for the silo ?

A. I sow the Leaming or Cloud's Early Yellow. Sow the largest growing variety that will fairly well mature.

Q. How do you prepare your soil ?

A. If clover sod, which I prefer, I cover with manure during fall and winter spreading as drawn ; plow rather shallow about the middle of May ; harrow and pulverize thoroughly and sow from May 20th to June 1st. If stubble, gang plow and harrow after harvest to start weeds. Plow quite deeply just before winter. Manure as above, and cultivate or disc manure into the soil previous to sowing.

Q. How do you cultivate ?

A. Keep harrow or weeder going until corn begins to point through the ground, then start scuffler until second leaf comes. After that keep weeder and scuffler going alternately until corn is too high for weeder. Scuffle quite shallow as long as horse can pass between rows.

Q. What do you consider a good yeild per acre ?

A. Sown thin in order to get all the grain possible. I find 20 tons to the acre a good crop.

Q. When do you cut your corn ?

A. Just about the time I would cut if grain was wanted.

Q. How do you fill your silo ?

A. I try to get enough men to keep everything going at once and have the best outfit available. With 4 teams drawing, 3 men besides teamsters loading, 4 men at engine and cutter and two in silo, from 80 to 100 tons can be handled in a day.

Q. How much do you estimate your silage costs you per ton ?

A. I can grow corn at a profit of $1.50 per ton in silo.

Q. How much do you estimate your silage costs you per ton ?

A. I can grow corn at a profit of $1.50 per ton in silo.

Q. What varieties of corn do you prefer ?

A. Mr. Thos. McMillan : The Baillie, a yellow dent variety, from Essex County, grows very large giving a very large yield of grain to the acre, and matures perfectly in this locality in an average year. Mr. J. Hinchley, also of Huron County, prefers Crompton's Early, although not giving as heavy a crop as the Baillie. Still he considers it will give a greater feeding value to the acre, as it matures earlier and is a safe crop every year. For Southern Ontario—T. H. Mason prefers Wisconsin Earliest White, Mastodon Dent, Leaming and Butter Co. Dent. For feeding green early in the season, White Flint, Compton's Early or any other early variety. For later feeding before silos are opened, some of the large canning varieties such as Stowell's Evergreen. For Centre Ontario—Salzer's North Dakota, White Wisconson Dent, Longfellow or Compton's Early. For North Ontario—Blue Blade, White Flint, King Philip, Eight-rowed Yellow Canada. The principal thing to remember is, that the best variety is the one that will give the largest yield of stalk and grain per acre, and that will mature perfectly every year in the locality in which we live.

Selection of Seed Corn. When the corn is ripening in the fall, go through the field and select the earliest ripening, largest and best formed ears. Hang in a dry place where they will get artificial heat, so as to be thoroughly dried before severe weather comes. Seed saved in this way will have stronger vitality and will generally be superior to that purchased from seedsmen.

Q. How much seed do you sow to the acre ?

A. Mr. A. McNeill : Five or six quarts per acre when planted in hills, three feet eight inches to four feet apart each way preferred, leaving three plants to a hill certainly not more than four to get the best results. Mr. T. McMillan, Constance, planted a little thicker, eight to ten quarts per acre. Mr. W. Ballantyne, Stratford, about ten quarts to the acre. The general opinion is, that corn is generally planted too thick to obtain the best results, especially in the amount of grain per acre.

Q. What is the best time to plant ?

A. Mr. A. McNeill : With regard to this point there is quite a difference of opinion. Messrs. McMillan of South Huron, advocate early planting, early in May, saying they would rather risk the frost in spring than in the fall, as even if frosted in the spring, it would come on again. T. H. Mason, of Elgin, prefers planting from the 15th to the 30th of May, according to the season and condition of the soil. The great majority favor planting before the 24th of May, where the land is properly drained.

Q. What is the best preparation for corn ?

A. Mr. Mason : Mr. A. McNeill favors spring plowing on clover sod ; Mr. Hinchlet fall plowing on sod manured during the winter and spring, then worked up with discs or gang plows in the spring; Mr. Baty, Middlesex, fall plowing and winter manuring, with thorough cultivation in the spring.

Q. Does corn require shallow or deep cultivation ?

A. Mr. Mason : Shallow cultivation is preferable, although where plants are small, deep cultivation does no harm. Harrow as soon as planted if land is dry, and every few days after until corn is up, then use weeder until the plants are about one foot in height, then cultivate as often as possible through the growing season, using short whippletrees and running the cultivator as shallow as possible after the corn is say 4 feet high.

A. Mr. McNeill : Thorough cultivation is necessary if corn is to be made a cleaning crop. If cultivation is kept up through the growing season, the land is left in much the same condition as a summer fallow, and is in first class condition for succeeding crops.

Q. What is the best form of silo ?

A. Mr. Mason : Round silos seem to be giving best satisfaction. They are cheap, easily put up, and can be taken down if any change in farm building are desired. Where permanent silos are required where farm buildings are finished, the Messrs. McMillan, of Huron County advocate cement or concrete silos. They are practilally indestructible, lasting a lifetime, cure ensilage perfectly, and can be built for about twice the first cost of a wooden silo under average conditions.

Q. What condition should corn be in when cut for the silo ?

A. Mr. Mason : When about two-thirds of the corn is ripe and the balance soft corn. Cut before frost if possible. Do not let it get over ripe and dry, as there is danger of mold and it is not as digestible.

A. Mr. Hinchley, Constance : Nearly ripe.

A. Messrs McMillan : Past the glazing stage.

A. Mr. W. Ballantyne, Stratford : Well matured, nearly ripe.

A. Mr. R. H. Harding : Well matured, cut before frost.

CLOVER.

By A. McNeill, Walkerville, Ont.

If the farmer were to choose an emblematic flower nothing could be more suitable than clover. It is suggestive of pure air and sunshine and all the pleasures of out door life, delighting the eye with its beauty, exhaling fragrance at every stage of its existence, as well as contributing most liberally to the material necessities of mankind. To paraphrase Sir John Falstaff, "It is not only profitable in itself but is the cause of there being profit in other crops."

As a fodder clover is yet much under-valued. A ton of clover hay contains 140 pounds of ash and 300 pounds of protein matter, while the same amount of timothy hay has only 90 pounds of ash and 180 pounds of protein matter. From this it will be seen that it is much richer in the expensive nutritive elements, has a larger percentage of bone making material, and is more nearly a balanced ration than timothy. It is also much more palatable, and when properly cured and fed, quite as healthful. For milk cows, fattening animals, sheep and working horses, it is indeed preferable to any other fodder, and even the swine breeder and poultryman can use large quantities of it most profitably.

Clover as a fertilizer. Its value as a fertilizer is more generally recognized. It is a common saying among farmers that anything can be grown upon a good clover sod. It has the power in common with other leguminous plants of appropriating the free nitrogen of the air, and thus adding absolutely to the plant food of the soil. This is a most important function indeed as nitrogen is the most expensive element of plant food. Nevertheless the work which clover in appropriating plant food at depths not attainable by common plants, and in solutions too weak for their sustenance is even more important. Its very large expansion of leaf surface enables it to evaporate an immense quantity of water, so that it will live and thrive when the proportion of mineral matter is very small compared with the water which holds it in solution. These elements are stored up in a condensed form in the large tap-roots as well as in leaf and stem, so that when plowed under they can be used by surface feeding plants.

Another consideration not to be lost sight of is that a large part of this plant food is taken from depths never reached by ordinary plants, thus tapping a source of wealth that would not be available without its aid. It is often remarked by those interested in the sale of commercial fertilizers that clover adds no mineral constituents to the soil. Practically it does. The only part of the soil of use with ordinary crops is the upper foot. Anything added to this is a direct addition to the fertility of the workable soil. The farmer has his choice of paying good money for fertilizers or drawing them from the subsoil by means of clover which will yield a profit i the form of fodder while doing this grand work. But clover adds another and most essentia element to the soil in the form of humus, and here again we must note how admirably clover is adapted to the work in hand. The same amount of humus could be put upon the soil in a few loads of stable manure, but the results would be very different. The clover roots permeate the soil in all directions, and in decaying leave the humus most thoroughly mixed with the soil. To have as much humus from any other source as advantageously placed, would require a large expenditure of labor, if it was possible to do the work at all, so that clover may rank as a labor-saving device. Again, the roots permeating the subsoil not only assist drainage very materially but renders any other form of subsoiling almost unnecessary.

Make the seed bed fine. So numerous and valuable are the virtues of clover that every effort should be made to meet the requirements of its growth. The seed is small and requires a corresponding fineness in the soil of the sub-bed. It will not grow readily in a soil deficient in humus, and a good dressing of land plaster or air slacked lime will always pay. Sometimes even after the seed has germinated well the plants will die during the summer. This is often the result of an improper preparation of the soil, or want of underdraining, usually both causes combined. Not only should the seed bed be very fine, but the connection between the surface soil and the subsoil should be very intimate, so that after the spring rains, which usually afford sufficient moisture to start the clover into vigorous growth and mature the crop with which it was sown, have ceased, subsoil moisture may readily rise to the roots of the young plants and carry it through the comparatively rainless months of summer and early autumn. It is difficult to get these conditions with spring plowing. Corn or root ground that has been well worked for these crops, stirred to a depth of three or four inches the following spring with the disc or other cultivator, but not plowed, and seeded to clover with oats or barley, give the best results. Sow ten or twelve pounds to the acre. There is no advantage in sowing grass seeds with the clover except in special cases.

Of the various methods of curing the crop none is more satisfactory than cutting after the dew is off and following immediately with the tedder. If the weather will permit, leave in cocks over night and take it in next day. If no tedder is used it should be left in cocks for several days to cure, but is often seriously injured by rain. A set of cotton caps treated with linseed oil will pay many times over by keeping the rain off and allowing the clover to cure thoroughly in the cock.

Q. Will clover hay give horses the heaves?

A. If the hay has been poorly cured it will be musty and therefore dusty, and the dust appears to be very irritating to the mucous membranes of the windpipe and lungs inducing cough.

ing and disease. Again, horses are very fond of it and will fill the digestive organs so full that they press upon the space usually occupied by the lungs and causes distress in breathing. But good, bright clover feed in moderation is perfectly safe.

Q. How can "heaving" of clover plants in the spring, be prevented?

A. Underdraining is almost a necessity. Even on underdrained land, however, clover will heave if the plants are not vigorous and are thin on the ground with no covering of foliage. Underdrain the land, secure as good a growth as possible the first year and do not pasture close during the fall.

Q. Do you believe in taking off a crop of clover seed?

A. Certainly. Cut the first crop early and if the second crop sets well, only a small amount of fertilizing matter is removed and the straw is still eaten by sheep, though there is so much woody fibre developed, that it is not very digestible even for them.

Q. How would you use clover to "bring up" a "run down" farm?

A. Adopt a short rotation, say corn followed by oats (or other spring crop), seeding down to clover. Cut for hay once or twice, next season plowing down the spring of the third year, and planting again to corn after applying all the manure that can be spared. In this way a profitable crop can be grown every year, and the fertility of the soil will be at the same time very much increased. Should there be a difficulty in securing a "catch" of clover at first, a little barnyard manure will work wonders. Do not plow the corn stubble.

Q. How do you cure clover?

A. Mr. T. N. Rolston: The main thing is to work it in the shade as much as possible. Cut it when in full bloom just as a few heads show brown, rake it up in an hour or two and put in coils right away. These coils should be broad and loose. These coils should not be built to keep out the rain, but to prevent the penetration of the sun's rays, and to allow for the circulation of air freely throughout. It should stand this way for from four to six days, before hauling in. Just before taking to the barn have a boy go ahead and turn the coils over on their sides. They will then come apart in flakes. Set these back leaning against one another, and by the time the teams get around, all the surplus moisture will have evaporated and there will be no heating or moulding in the mow. Clover cured in this way looks almost as green in the mow as in the field, and is eagerly devoured by all animals from a cow to a chicken. It is not rain but sun that destroys clover in the field.

GRASSES AND CLOVERS FOR PASTURE.

By Henry Glendinning, Manilla, Ont.

"No grass—no cattle: no cattle—no manure; no manure—no crops."—*Belgian Proverb.*

A remarkable combination of circumstances has brought about a change of conditions in agriculture in this country within the last few years. Wheat and barley sold in the raw state, no longer take the lead as the money-making crops of this Province, but cattle, sheep, hogs, poultry and the products of these animals are now the sources of income upon which the farmer depends. We may ask ourselves the question, have we with these newly developed sources of wealth, placed ourselves and farms in the best condition to produce these articles at the minium cost?

Grass the most wholesome and nutritious food.—The first requisite for the production of cattle, sheep and hogs after the mother's milk, is grass, it being the most wholesome and nutritious of foods. The grasses possess and combine in a remarkable degree, all the nutriments required to build up the body, in the shape of blood, bone, flesh and fat, and at the same time so far as food goes, to keep the animal in a perfect healthy condition. Therefore, pasture or grass is the first essential to the successful growth of these animals and the economic production of beef, mutton, pork and dairy products. While the farmers have been making great efforts to increase their output of these commodities, by improving their breeds of stock, better buildings, growing more roots, and the introduction within the last few years of ensilage, all of which have done much to advance the farmer in the art, and reduce the cost of winter feeding,—what has been done by the average farmer in regard to his pasture fields? I venture to state, little or nothing except to seed down in the usual way a few more acres to grass; and what is the usual seed sown? Timothy and red clover, and perhaps a little alsike added, making in all about 10 or 12 pounds of seed per acre. Now, let us follow up and see the result.

First year, seed sown with grain, no pasture, or at least the young plants should not be eaten off. Second year, a good crop of timothy and clover for hay with pasture in the fall, obtained principally from the red clover. Third year, pasture mostly timothy, as the clovers being biennial plants are nearly all dead. This leaves the ground covered with plants to the extent of one-fifth with timothy, which yields fair pasture up to the last of June. After that time the plants become dry and woody and they make but an indifferent growth in the fall of the year. Fourth year, pasture, timothy and some alsike clover, the result of self-seeding by the shelling of the clover at the time of cutting the hay two years previous and some of the natural grasses. Fifth and following years, same grasses with a greater proportion of natural grasses and white

clover covering the ground. In this way during the latter years the pasture fields have improved by the filling in of the natural grasses, but in the great majority of cases the fields have been plowed up and sown to grain at the end of the third year, just when the pasture was poorest.

Permanent Pasture. Many of our best farmers will say that to continue a field in grass for more than two or three years, shows a want of proper rotation, but I consider that it is advisable that each farm should have a portion of the land in permanent pasture. Some may contend that they cannot afford to lay their high priced land down to grass. But when we consider that in Britain where an acre of land sells for several times the price for an acre in Ontario, and see the large acreage of land that is in permanent pasture, will it not pay to keep a portion of our comparatively low priced land seeded in the same manner? It is estimated that England has about fourteen million acres in permanent pasture, Scotland about eight millions and Ireland about nine millions. Most of this land has lain in pasture from time immemorial and will rent for several times as much per acre as arable fields of a similar character lying alongside.

Good pasture after bush. The old settlers tell us, and it has been generally conceded, that the pasture grown on the land just after the bush was cleared off was the best we ever had in this country. Let us consider the reason for this. In the first place the humus in the virgin soil, on the surface, had not been lost by being turned down with the plow and the more barren subsoil brought to the surface. Secondly, the fields had to lie sufficiently long in grass for the stumps to rot. This gave the natural grasses and clovers a chance to get well established, and cover the whole of the surface with a close sward which gave the stock a large amount of rich herbage. But as the country becomes more and more cleared up there are less and less of these old natural pastures, and consequently more of the temporary and less desirable pastures taking their place. It is a well recognized fact that old permanent pastures will fatten stock much faster than new or temporary pastures.

What constitutes a good pasture? Let us consider the requisites for a good pasture. The land should be closely covered with plants from the time of seeding and there should be a succession of fresh grass throughout the whole season from early spring until the frost comes in the fall. Some varieties of grass have their roots spreading along the surface of the ground, and usually start to grow early in the spring and give fine pasture early in the season but fail during the dry months of the summer. Other varieties have deep roots which go down into the subsoil and stand the dry season well. Some of them will give a green bite to stock during the dryest time.

Preparation for Seeding to Grass. Land that is seeded to pasture should be clean of weeds and full of plant food if possible. It is a good plan to seed down after a hoe crop with the best and cleanest seed that can be obtained. The land should not be plowed, but worked up with a spring tooth cultivator and well harrowed to make a fine mellow seed bed. The best catch will be obtained by seeding without any grain or nurse crop, but the usual custom is to sow the seed with some kind of grain crop. It may be sown with fall wheat or rye in in the early spring, just after the snow has gone off while the ground is frozen, so that when it thaws the small seeds will sink into the soil and bury themselves, or a light harrow may be run over the land as soon as it is dry enough for the horses to work upon without puddling the soil. Barley or spring wheat do very well for spring crops, but the amount of seed grain sown should be at least a peck per acre less than if no grass seed was sown. The small heavy seeds, such as clovers and timothy seed, should be sown from the grass seed box, so that the seeds will fall in front of the drill. Light seeds such as Blue grass should be mixed with the grain upon a floor before taken to the field and the whole sown together. Then give one stroke of the harrows crossways. After harvest the young grass should not be pastured, but allowed to grow a good top. This will give you good, strong plants to go into the winter with, and serve as a mulch to protect the roots by holding the snow, and keep the ground from alternate freezing and thawing that we are troubled with in Canada.

How to treat a pasture. It will be found an advantage to cut a crop of hay the following year so as to give the plants a good root before the stock is turned on it. After fields have been in pasture for a number of years they are apt to become what is generally termed hide-bound or runout. This is owing to the soil becoming so full of interlaced roots that the air and rain do not readily penetrate it. The result is a short stinted growth of grass. But it is a mistake to plow up a field of this kind if it is needed for pasture, as it can be easily renewed by putting on a sharp set of harrows and going over it several times, crossing it every alternate time. If it is desirable to introduce some other kinds of grasses into the field this will be found a very good if the seed is sown before the last stroke of the harrow. This renewing should be done in November after the growth is over for the season. It will greatly improve the pasture if a top dressing of manure is given the field at this time. Fields that are troubled with moss will be greatly benefited by the harrowing. In Britain, where moss is much more troublesome than in this country, they apply one part of lime mixed with four parts of soil at the rate of about four waggon loads of the mixture per acre.

A good permanent pasture mixture. The following mixture of seed will be found suitable to most places in the Province subject to the exceptions hereinafter mentioned :—Timothy 3 pounds ; Orchard grass 5 pounds ; Kentucky Blue grass 4 pounds ; Red Top 4 pounds ; Alfalfa 5 pounds ; Alsike 2 pounds ; White Clover 2 pounds. A word as to the merits of each of the mentioned varieties.

Phleum pratense (Timothy).

Dactylis glomerata (Orchard Grass).

Poa pratensis (Kentucky Blue grass).

Agrostis vulgaris (Red Top).

Phleum Pratense, Timothy also known in Britain as Herd's grass and Meadow Catstail. This is a hardy but short lived perennial, grows well on nearly all kinds of soil, but gives best results on land containing considerable humus. The plant is a surface feeder, hence the soil should have an abundance of plant food near the surface. Timothy has an advantage over many surface-feeding plants owing to its bulbous thickening at the base of the stalks, which become filled with water and enable the plant to survive drouthy periods. While timothy is a hardy plant, standing the winters well, it is not to be considered a good pasture grass, owing to the hard and woody stems it produces, if not kept eaten down closely, and the scant amount of aftermath it produces after the latter part of June.

Dactylis glomerata, Orhard grass, Crested dogstail, Rough cocksfoot. This is a hardy perennial, grows well on almost any kind of soil. It prefers a rich loam, and thrives well in the shade. It starts to grow early in the spring and continues to grow well throughout the season until late in the fall. If allowed to grow up so that the stalks become woody, it is a good plan to mow those parts, the plants will immediately send out new shoots, and it will remain green throughout the dryest season.

Poa pratensis, Kentucky Blue Grass, June Grass, Spear grass, Blue grass and in England known as Smooth Stalked Meadow grass. This is often confounded with our common Canadian Blue grass *Poa Compressa*, as many of the same names are applied to both. These grasses resemble each other considerably in their appearance and habit of growth. The main difference being that in Kentucky Blue grass, the stems or culms are smooth and round and the leaves longer and broader than the Canadian Blue grass. The stems or culms of the latter are hard and much flatter. Kentucky Blue grass is one of our earliest grasses, but does not stand the drouth well during the hot dry months of the summer owing to the roots being close to the surface of the ground, but it produces a fine lot of herbage in the fall of the year. It is a very nutritious grass, and grows well on nearly all kinds of soil, it being very hardy.

Agrostis vulgaris, Red Top, Bent grass, Fine Bent, Fine Top, Herd's grass (of the South), Burden's grass, Summer Dew grass and Withgrass. This grass is one of the exceptions made mention of in the earlier pages of this article. It may take the place of some of the more tender kinds. It is a native of this country, and will grow on very wet land. It does not start early in the spring, but makes a good growth during the summer. It stands tramping by the feet of the cattle well on account of its many interlacing roots. It is a valuable grass for low land, but is not equal to Kentucky Blue grass where the latter will succeed. It is an inferior grass on high, dry land.

Medicago Sativa, Alfalfa, Lucerne. It is a native of the south of Europe, and has been cultivated there from unknown antiquity. It is a very deep rooted perennial plant, yielding an abundance of herbage during the whole season. It belongs to the leguminous family of plants, and, like all the clovers, stores up great quantities of nitrogen in its roots which is taken from the atmosphere and in this way greatly enriches the land upon which it grows. It succeeds best on a deep, dry limestone soil. If the land is inclined to be wet, it would be a mistake to sow it. It should not be pastured off too close in the fall of the year. If horses are allowed to run on the fields late in the autumn or early spring where lucerne grows, they will bite the green crowns out of the plants and kill them. If farmers are not willing to take good care of their pasture fields in early spring or late fall, it will be better for them to leave this seed out of their mixture. If the land is wet do not sow it on any account.

Trifolium hybridum, Alsike Clover. It was introduced into Britain from the south of Sweden a little over fifty years ago and into this Province about twenty years later. Linnaeus, the great Swedish botanist suppossed this plant to be a hybrid between the Red and White Clovers as in appearance it is nearly intermediate between the two, but Prof. Beal of Michigan Agricultural College, one of the best living authorities, says it is not a hybrid. In this country the plants are usually biennial, but it is a useful plant in a permanent pasture, for it has the power of re-seeding itself if the plants are not eaten off too bare during the month of June.. If it is once sown in a field you will usually find plants of it ever afterwards. It gives a fine herbage during the early part of the season, but it is of little value after the month of June as it produces scarcely any aftermath.

Trifolium repens, White or Dutch Clover. This plant was first introduced from the Netherlands, hence the familiar name Dutch Clover. It is said not to have been sown in England until the beginning of the eighteenth century, but it now appears to be common to the pastures and roadsides of Europe and America. It is perennial. The seed will lie dormant for a long time, and at a great depth, and be ready to spring into life when brought to the surface. The habit of the plant is creeping, and when once established it soon covers the ground. In warm rainy seasons it spreads rapidly but makes little progress during cold, dry weather. Besides the mass of fibrous surface roots, there is a long tap root which goes deep into the sub-soil sustaining the plant during drouth. When only the parent stem grows the lateral and creeping shoots remain dormant. White clover forms an essential constituent of every good pasture. All stock eat it with relish, and it contains a large percentage of flesh forming nutriments.

For light Sandy or Gravelly Soil. While the foregoing grasses and clovers will be found to give general satisfaction in the pastures of Ontario there are soils and conditions of

Alfalfa : *a*, *b*, seed pod ; *c*, seed.

Alsike (*Trifolium hybridum*).

White Clover (*Trifolium repens*).

Black medick (*Medicago lapulina*).

land that will warrant the sowing of some kinds where it would not be advisable to sow on ordinary good clean farms. For instance, on poor gravelly soil or the bottom of an old gravel pit or light sandy soil such as a large section of the Muskoka and Parry Sound districts consist of, it will be found satisfactory to sow four pounds of *Trefoil.*

Medicago Lupulina, Trefoil, Yellow Clover, Hop Clover, Black Medick, Shamrock, Nonsuch, Black Nonsuch, Black Grass, Lupine. This clover will give a good account of itself on land of a kind where no other grasses will grow. It it quite nutritious, and like all the clover family it draws its nourishment in the shape of nitrogen from the atmosphere through the medium of minute organisms in the little tubercles or swellings on the roots, so that by the continuous growing of clover in our pasture fields we make the land richer from year to year. The decay of the clover roots, leaves large quantities of nitrogen in the soil, which is the most valuable element of manure and this is left in an available condition for the other grasses to feed upon.

If a farmer intended to break up the land and grow Alsike seed for sale, it would not be advisable to sow Trefoil, as more or less of the seed would remain in the soil and spring up with the Alsike and spoil the sample of seed when threshed.

COMMON RED CLOVER.

By W. S. Fraser, Bradford, Ont.

Clover is said to be the poor farmer's best friend. There is no clover so profitable to the farmer as the small red. It leaves the land better than it found it, and at the same time produces a profitable fodder crop. Its ability to take of the free nitrogen of the air and store it in its roots is not equalled by any other plant. Clay land is made more friable by growing clover. The roots or residue of this crop in the form of stubble, fallen leaves and roots is said to be equal to about fifteen loads of farm yard manure per acre. It is also a cleaning crop. Its luxuriant growth prevents many weeds from growing, and those that do grow are cut before they are sufficiently developed to reproduce themselves.

When properly cured it is much relished by all kinds of stock, hogs not excepted. It furnishes the best hay we have for milch cows and sheep, and if fed in limited quantities for horses as well. It is as near a balanced ration as any food we have. Clover should be cut when about one third of the heads have commenced to turn brown. If a tedder is used it should follow the mower in a couple of hours. The hay should be put in well made coils that night where it may be left for two or three days, when, if the weather is fine, if shaken out for a couple of hours, it will be ready for the barn where it should be tramped. We should not be satisfied with our success in curing clover if in winter the leaves and most of the blossoms are not always the same color as when cut.

Q. Mr. Silvester, Burk's Falls : Does Alsike improve the land as much as red clover ?

A. No it is more of a surface feeder and it has not the same ability to store up nitrogen in its roots.

Q. What about the pea vine clover ?

A. The mammoth grows to a greater length. It is coarser, more waste in feeding, a slower grower and does not furnish as good after grass.

Q. Mr. Duke, Sundridge —Why is it that clover is so easily killed after it has given one crop ?

A. Mr. Fraser.—Because it is a biennial and has lived its term of existence. To get best results plow up after having grown one season.

Q. Would you plow immediatedly after cutting the crop of hay ?

A. Mr. Fraser.—If I did not want a crop of seed or the after grass for hay or pasture. In such a case it would be best to plow after taking the crop of hay and cultivate the land freely during the fall, using a cultivator or disc harrow.

Q. Mr. Duke.—Why speak of growing clover seed as we have no machines for threshing clover in this section ?

A. Mr. Fraser.—In that case you may use your ordinary grain threshers by closing the cylinder below and putting in a piece of plank in place of grate, then closing the back of cylinder by using a hard wood plank or iron plate leaving an opening of 8 or 10 inches at one end. Then close the front of the cylinder leaving an opening for feeding at opposite end from the opening at the back; thus the clover is fed at one end of the cylinder and has to work its way to the other for egress ; by which time it is hulled. It is also necessary to use a fine screen in, the shoe, underneath a coarser one. With these changes clover may be as well threshed as with a regular clover huller.

Q. What amount of seed would you sow per acre ?

A. Mr. Fraser.—On old land about 20 pounds per acre. I prefer sowing with spring wheat or barley to oats.

Q. Mr. McPhail, Parry Sound.—Does timothy improve the land ?

A. Mr. Fraser.—No. Growing timothy hay and selling it is a sure and speedy way of exhausting the land.

Q. Do you think that leaving hay to lie a couple of days before raking up injures its feeding value?

A. Mr. Fraser.—I believe one acre of well cured hay is equal in feeding value to the product of two acres that is burnt up with the sun.

Q. Mr. Wilson, Utterson.—Do you know anything about scarlet clover?

A. Mr. Fraser.—My experience has been limited. It is an annual and useful as a catch crop. It will never take the place of small red in this country.

THE CULTIVATION NECESSARY FOR GOOD CROPS OF TURNIPS AND MANGELS.

By Simpson Rennie, Milliken, Ont.

The necessity of following some system of rotation is generally recognized by all persons engaged in farming, and in the best rotation it is admitted there should be one year in green or hoed crops. In my system peas, wheat and oats follow after sod, so that corn and roots will come after a crop of oats when the land is in the poorest condition. My reasons for this are two-fold. First, because after sod the land is in good condition to grow at least two crops of grain, and again because it is best to apply the manure to the land intended for hoed crops, so that if any foul seeds are in the manure the cultivation required for the corn and roots would destroy them.

Preparation for Corn and Roots. After harvest any manure on hand is applied to the oat land at the rate of about fifteen or sixteen good loads to the acre, and plowed in lightly. The remainder of the land for hoed crop is plowed fairly deep. Of late years we have hauled out some manure during the winter and spread it on the land broadcast, and find the result very satisfactory. The land intended for corn, carrots, or mangels, (including beets of all kinds) should be manured during the fall or winter, and if the manure is not too long I find the best results are obtained by working the land in the spring without plowing, especially on clay soil. This can be done with the disc or spring-tooth cultivator, as soon as the ground is dry enough in the spring to work finely.

Carrot and Mangel Cultivation. As already stated, I prefer the manure applied in the fall and winter, and in the spring to work the land so that the manure will be well mixed with the soil. Then make the drills thirty inches wide, but not high, and sow on top at the rate of about one and a half pounds of carrot and four pounds of mangel seed to the acre. After sowing, if the land is dry, roll with the common land roller, and the seed will germinate much more evenly. I may say that I grew some mangels and sugar beets of the different varieties on the checkered row system, and found it very satisfactory. To do this mark the land off 28 inches each way and plant with a corn planter, and single out to one plant in each place. The advantage of being able to scuffle both ways is certainly very great, especially on weedy land. Carrots are as well singled out to eight or ten inches in the rows. The yield will be about the same as though they were closer, but the labour of thinning and handling is very much lessened where they are left a good distance apart. In singling where the rows are 30 inches apart, mangels, especially the long varieties, should be singled out to at least 24 inches, and the globe varieties 18 to 20 inches.

Potatoes and Turnips. As soon as the carrots, mangels, and corn are planted, we turn our attention to the manuring of the potato and turnip land. The manure is plowed in with not too deep a furrow as soon as it is hauled out, after which the land is harrowed and rolled, and allowed to remain at least two weeks. It is then cultivated, and worked until the manure is thoroughly mixed with the soil. For potatoes I mark out four or five rows with a narrow-bottomed plow. I do not like to mark out with the drill plow, as the long sole has the tendency to pack the soil, which should not be. When a few rows are planted I cover, going the one way with a good deep furrow and open out coming back; this should not be over five inches deep. This will always leave a few rows ready for the planters.

In my experience of potato culture the best results are obtained from planting potatoes of good size, uniform shape, and cutting to one or two eyes in a set, and if the land is well manured planting 18 or 20 inches apart in the rows. A few days after the potatoes are planted, and before they show through the ground, the drills should be harrowed lengthwise until they are nearly level, and as soon as the potatoes are through the ground start the scuffler and keep the soil loose. There may be a little earth put up to the plants with the scuffler while loosening the soil, but they should never be banked up with a plow, for where this is done it tends to shed off the water between the rows, just where it is least required.

Turnips, require a nice, rich, loamy soil, so it is very important to have the land well worked and made fine so that the manure will be thoroughly incorporated with the soil, after which roll the ground all smooth. At this time, if there should come a nice shower, start and drill up about 30 inches wide, but do not have the drills high. Some are sown on the level, but I prefer the drills slightly raised so that the water will not settle around the plants in case of a heavy rain. The seed may be sown with the turnip drill at the rate of two pounds to the acre,

although less would do if there were no flies to trouble the young plants. It the land is dry when sown, it is well to roll w th the common land roller, and as soon as the plants commence to show along the rows start the scuffler and keep the land loose between the rows until the tops meet in the drills. Turnips should be thinned out to 18 or 20 inches. The cost of thinning and harvesting will be very much less, and the yield will be nearly the same as if left closer.

Q. I would like to know how Mr. Simpson Rennie grows his prize roots ?

A. At one time I was not so successful. but in the last two or three years I have taken more first prizes in roots at the Industrial than all other exhibitors put together. Last year I got fifteen, including the sweepstakes, out of twenty-three. The record for mangels up to last year was 73 pounds. I raised it to 78 pounds, and I produced a sugar-beet weighing 59 pounds. I have attained these results largely by observation. One of the first requisites in root production is liberal manuring, another is thorough cultivation. The manure made in summer and early fall should be applied in the fall and plowed in lightly. In spring the land should be well stirred up with a spring-tooth cultivator or disc harrow.

Q. What about winter manuring ?

A. When you cannot get manure in the fall put it on in the winter and then, as soon as the land is firm enough in spring. put the disc harrow over it twice. This leaves the manure near the surface. Afterwards work the land with a spring tooth cultivator, and you will get it in a fine state of tilth.

Q. Mr. PATERSON.—Does not manure placed on the ground in the winter tend to keep the land wet ?

A. Yes, it has that tendency, but on the other hand, it keeps the land mellower han it otherwise would. Turnips should be drilled up 30 inches apart. Once when pressed for time I partially thinned out by cross-cultivation, leaving clumps about the breadth of my hand 28 inches apart. I believe, however, that 18 inches is a better width. When I thinned to 28 inches I scuffled both ways all summer.

Q. Have you fed any sugar beets ?

A. I have not had much experience in feeding for milk, but for fattening stock, sugar beets are incomparably better than mangels, providing you get the genuine Danish Improved. The Danish Improved is n t hard to harvest either. If pure seed could always be got, I believe this variety would drive all other roots out of the market.

Q. I should like to ask Mr. Simpson Rennie if he practices flat cultivation for roots ?

A. I do not like flat cultivation for roots, as it is difficult to avoid covering the young roots in the first cultivation. Moreover, if the land is dirty the slightly raised ground where the mangels are serves to guide the scuffler in killing the weeds. Furthermore, if there is a crust, the crust will fall over on the young plants in scuffling. It is harder to thin in level planting, and a heavy rain is apt to make a puddle in the seed-bed.

Q. I should like to hear from Secretary Clark on the subject of roots.

A. Secretary J. C. CLARK, Agincourt.— I plow my mangel ground in spring. I grow 10 to 12 acres, and have never yet failed to get a good crop with spring plowing. I believe the yellow intermediate is the best quality, but with the large mangel you get a bigger return. and this more than offsets the inferior quality. If you are feeding mangels for fattening hogs you will meet with disappointment, but for growing hogs, mangels and grain are much better than grain alone. No crop will give such results in growing hogs as mangels.

Q. What about sugar beets ?

A. Chairman PATERSON, Agincourt.—I have formed a good opinion of sugar beets. They are good keepers and good feeders, but the report from the Experimental Farm at Guelph on the feeding tests for milk in sugar beets and mangels has almost knocked me out. I feed beets at noon and turnips at night and morning to my dairy stock, and by this means avoid bad flavour in the milk.

Q. Would you plow root land in the spring

A. WM. MILLER, Milliken.—My practice is to plow the land directly after harvest, manure, and the plow in. In the spring I do not plow but cultivate. I plant with a seed drill, and put rows of mangels three feet apart. By way of experiment I adopted a different plan with a small plot. On this small plot I treated the land in the fall in the same way as I did the rest of the field intended for roots, but in the spring I plowed instead of cultivating. On six rows treated in this way last year I had a fourth less roots than I had on the same extent of ground that was cultivated in the spring. I hoe twice—once with thinning and once after. I thin out to an average of 18 inches. I calculate on having the land clean the year before the roots go in. If the land is in proper tilth, the shallower the working during the season the root crop is being produced the better.

A. Mr. JOHN L. PATERSON.—Land intended for growing mangels should be manured in the fall, and that the seed should be put in as early as possible in the spring. To gang plow or cultivate is decidedly better than plowing in spring. If you plow in spring the soil is apt to turn up sad. If you cultivate shallow, the land will remain fine and germination will be much more rapid. I would have rows 30 inches apart, with 24-inch intervals.

Q. Mr. Miller.—Can you cultivate as late in the season as I can between rows 36 inches apart?

A. Mr. Paterson.—Oh, yes; I have never grown mangels big enough to fill all the intervening space, even when the rows were only 30 inches apart.

A. Wm. Mason, Ellesmere.—If the land was dry and in nice condition one might venture on plowing in spring before planting roots, if not, it is better to cultivate only. Still, I have occasionally produced my best crops where I manured in spring. If the land is heavy it is kept more open by spring manuring. Different results in different years may have been due to difference in seed; the seedsmen should be hauled over the coals. One thing should always be avoided: never plant more than you can till. If you have help sufficient to till but five acres, you will get more by planting five acres than you will by planting ten.

Q. Do you ever plant cabbage with mangels?

Mr. Mason.—In the last four drills of mangels I add a little cabbage seed with the mangels. If the cabbage do well I have plenty for the house, the poultry-yard, and a little left for the stock. If they do not, I have a crop of mangels anyway, but I generally have a first-class crop of cabbage. I Paris green the cabbage, putting the poison on in the morning in the dry form.

Q. What is the chief difficulty in turnip growing?

A. Mr. Paterson.—There is no danger of a failure if you only get a good start. The thing is to get them up directly after sowing. Sometimes the land is too dry. Run over the land frequently in spring with the gang plow or cultivator. This will keep the soil stirred and prevent the evaporation of the moisture. The land should be all ready by the 10th of June, and then plant after the first shower. If the land is drilled directly after a shower the seed bed will retain the moisture until the plant comes up. If you cannot avoid sowing in a dry time sow after five in the evening, and never put the seed more than half an inch in the ground. Turnips should show in four day after seeding, and they will do so if the ground is damp when they go in. Sometimes a heavy rain will come after sowing, and this will cause a thin crust to form. In that case it is well to roll and break the crust, or else plant over again. Once you get the turnips through the ground you are almost certain of a crop, because even if they are checked by drouth in summer the damp fall will bring them on.

Q. How do you prepare your land for roots?

A. Mr. Paterson.—In preparing for mangels and carrots I begin in the fall before. I plow the land, then manure, and plow the manure in. For these roots I consider fall manuring almost essential. Mangels should be in as soon as the land is fit, and if the land has been manured in the fall you can get on it early in the spring.

Q. What variety of mangels do you grow, and how much seed do you plant per acre?

A. Mr. Paterson.—I generally plant the Yellow Intermediate, four or five pounds of seed to the acre. I thin out to a foot and a half or even wider. I begin to scuffle as soon as the roots show above the ground and keep right on scuffling through the season.

Q. How do you manage your turnip crop?

A. Mr. Paterson.—Turnips make perhaps the best root crop of the lot for cleaning the soil. You have, in fact, almost time enough to summer fallow the ground before the seed goes in. The ground should always be plowed twice in the spring before planting turnips. My usual practice is to sow turnips about the 20th of June, and to thin out to 15 inches apart. In harvesting mangels I pull by hand, twist the top off and throw four rows into one. In harvesting turnips I follow the same plan, except I cut the tops off. Last year I had Kangaroo turnips, and was well pleased with them, except one thing—they grew too much top, almost two or three tops, in fact. I think this was due to the vigorous growth following a period of drouth.

SUITABLE SOILS, SELECTION OF SEED AND BEST METHODS OF CULTIVATING POTATOES.

By Peter Anderson, Hepworth, Ont.

The title of this paper is comprehensive enough to allow great latitude in treating of the subject. I shall, however, confine myself principally to "soil," "manuring," "seed collection," and "cultivation."

Although potatoes may be grown successfully on a variety of soils, a sandy loam sufficiently drained to be fairly dry at planting time, making it reasonably sure that the crop will not be drowned out by June rains, and having a subsoil of such a nature that with proper cultivation a sufficient amount of moisture may be retained in it to tide the crop over the usual summer drouth is the ideal soil. A pliable clay loam well supplied with humus is also a desirable soil. Heavy clays and light, loose sands are the most unsuitable.

Where the soil is not well adapted it is useless to attempt to grow potatoes for profit. Neither is it wise to grow them extensively where a long haul is necessary to get them to a place of sale or shipment.

I shall give my own methods on a soil which would be generally classed as a sandy loam, although I have had large yields of fine potatoes from fields where the sand is in evidence much more prominently than the loam.

As a rule I use a field upon which oats have been grown the previous year. Plow the field lightly—not over five inches deep—as soon as possible after harvest, harrow as soon as plowed, and again once or twice before winter to kill any weeds that may have started. If there is much wild (June) grass starting in the spring gang-plow or use the cultivator or the spring-tooth harrow thoroughly about May 16th. Then apply a moderately heavy coat of farm-yard manure made during the preceding winter, spreading it evenly and plowing in as the potatoes are being planted. In planting plow the entire field, dropping the sets in every third furrow, and be careful never to let the plow run deeper than four inches.

There is a theory held by some growers that the use of fresh manure applied directly causes "scabby" potatoes. On this point I can only say that I have been using manure in this way for thirty-eight successive years, and have never yet had scabby potatoes where it was applied. In two of these years, however, there was about half an acre in the field used upon which I put no manure, for the reason that the cattle had made a habit of lying upon that particular portion overnight when the field was used as a pasture and had left on it a large quantity of excrement both solid and liquid. Both peas and oats had preceded the potatoes on these fields after the sod was broken up, and yet on this half acre the potatoes were literally coated over with scabs. These are the facts. I have no theory to offer at present.

Being ready to commence planting, I open a furrow across the field and have a good active man start to drop right behind me. By the time I overtake him he will have dropped sets to the end of the first furrow. There I pass him and he again follows me and gets to the end of that furrow before I again overtake him. In this way one good man can drop set and do it right as fast as a team can plow the field. Be careful to have the sets dropped close in against the land side of the furrow. If dropped promiscuously on the bottom of the furrow many will be crushed by the horses' feet, and the drills will be so irregular as to cause trouble in after cultivation. I drop from 16 to 20 inches apart. Potatoes the size of hen eggs and smaller, plant whole. Those of a larger size I cut to two or more eyes, the rule being that the larger the sets —other things being equal—the stronger the plants will be. Without a vigorous plant to commence with the best results can never be attained. If you are growing a variety that has a tendency to grow large, coarse and "prongy," you can overcome the objectionable habit by leaving more eyes to a set, or planting closer in the drill. The most fatal mistake made in planting with the plow is to plant too deep. The weight of the plow, if it is not carefully held, will in a light loose soil, carry it down to a depth of 7 or 8 inches Sets placed at such a depth require at least three weeks to push the strongest shoots to the surface, and there will be blanks where many less vigorous ones should have appeared. Then such plants as have reached the surface will appear the reverse of vigorous, and will remain stationary for about a week, or until the young plant has had time to throw out a set of roots as near the surface of the ground as there is any moisture, the roots which had started in the natural position at the base of the sprout as it left the eye having ceased to spread or attempt to perform their proper functions.

After the new set of roots have commenced to supply food to the plants it will again begin to push upwards, but has got a bad start in life, and will never fully recover. I am not theorizing in this matter. What I say is the result of careful and repeated examinations of plants from deeply planted sets.

Seed selections.—Almost all growers practice some manner of selection, the general plan being to take from the pile at planting time the most desirable looking specimens. This is better than no selection, but I have, I believe, a more excellent way. When a variety which I desire to grow on account of quality begins to show signs of deteriorating in productiveness, I take a potato fork about October 1st, or as soon as the tops have pretty well ripened up, and go over the field or "patch" where that variety is growing. I dig all the hills showing the most vigorous growth of tops and that have remained vigorous the longest. If the yield of the tubers on digging the hill justifies the promise of the tops I throw the product into a snug pile to show it is selected; if not, I leave it scattered as it came from the fork to show that it is rejected. Having gone over the piece in this way, or dug five or six bushels of selected seed, I gather it up and pit it carefully. The next year I plant this by itself and again go over its product in the ensuing fall, selecting in the same way. In practice I find that two such selections leaves nothing to be desired for several years, the variety being restored fully to its original productiveness. I do not doubt that by persevering in this method for longer periods still better results can be obtained.

If early potatoes are desired plant whole, and plant not over three inches deep, of course using an early variety.

If I have to use seed from a heap of potatoes in which there are a number of decaying potatoes intermixed with the sound ones. I plant every potato whole which has been in contact with a rotten one. If such are cut the germs of disease attack the raw surface, the sets will rot in the drills, and the sprouts from them, even if they grow for a time, will finally decay to the very top.

Cultivation.—As soon as the field is planted, harrow. A light wooden harrow is best on a mellow, sandy soil. On a stiffish clay some heavier implement is better, and on such a soil I have used the roller to break down lumps and get a fine surface. In four or five days repeat the harrowing, and make it thorough enough to kill all starting weeds. I harrow at least three times before many plants are up, and by so doing destroy most of the weed seeds that are near enough to the surface to germinate.

As soon as the drills can be traced by the young plants start the scuffler. If thistles are appearing I cut three inches deep and get over the field as quickly as possible, and then turn round and go right over it again the reverse way. This with the scuffler I use will cut every thistle off three inches below the surface and about finish them. If the sets have been planted at a proper depth the plants will in a week or ten days after they appear over the piece be six or eight inches high. After this scuffle not over one and a half or two inches deep and not oftener than is necessary.

If rains form a crust run through lightly and break it up as long as there is room; but remember that the roots are interlocked in the centres of the drills and are as near the surface as there is any moisture in the soil.

Never "mould up" or "ridge up." These processes are all labour very much worse than thau wasted. It should be superfluous to say this now, but I see a deal of it still being done every year. The injury wrought by it is three-fold:—

(1) The drilling is generally done ofter the little threadlike feeding roots of the plants have occupied the whole field, and are interwoven almost in every inch of the soil between the drills. When three or four inches of this soil is scooped out and thrown up against the plants, millions of these small feeding roots are brought to the surface and left to perish in the sun.

(2) A large percentage of the best soil in the field is thrown up into a ridge which inevitably and rapidly dries out and remains dry during the summer. So far as the crop then growing is concerned it might about as well have been removed out of the field.

(3) If the feeding roots of the plants had been broken and mutilated by running the scuffler too deeply, to the same extent as has been done in the drilling-up process, nature, who always does what she can to remedy our blunders, would have proceeded to repair damages by pushing out a new supply of roots from the broken ends to re-occupy the soil. But the best of the soil has been thrown up to dry out at the base of the plants, and in doing this the mulch of loose earth has been scraped off the subsoil in the centres of the drills. The consequence is that it, too, loses rapidly its moisture by unchecked evaporation, and dries and bakes to such an extent that whatever plant food it contains is not available for the crop.

I know that most of those who practise "drilling up" will think that I am exaggerating the damage done to the roots by the process. These roots will not trip a man or get tangled around his feet as he walks behind his plow or scuffler. Indeed, as a rule, he has never seen them, and has no idea that they extend into the centre of the spaces between the drills. If any doubter will put on his spectacles, get down on his knees, and make a careful examination he will find that I have not overdrawn the picture.

Q. Do you roll the ground before planting?

A. I never roll the soil either before or after planting in order to pack it. If it is a clay or clay loam and lumpy, I roll and cultivate or harrow repeatedly in order to get a mellow seed bed of at least three inches in depth, if I find it necessary.

Q. How do you treat the potatoes for the potato bug?

A. For the potato bug I use Paris green—one teaspoonful to three gallons of water. Use it with water entirely. Two applications are always sufficient, one as soon as the first young beetles begin to show on the vines, and another as soon thereafter as another supply of young beetles make it evident that they need attention. This is a matter that requires close watchfulness. The man who is not "dead sure" that he will not neglect it should plant no potatoes. A spraying that should have been done on Saturday, deferred till Monday, may mean the loss of a crop.

Q. What is your best variety of potato?

A. For quality I prefer Beauty of Hebron and have a strain of it that is as productive, or nearly so, as Empire State, which is also of very good quality. These two varieties are good enough for me and all that I now grow. There is perhaps considerable amusement, but very little profit to the ordinay grower, in running after new varieties. Some of these are only old kinds under a new name, and of the remainder many are mere accidental variations, or "sports" instead of new seedlings. I will not grow for the market a potato of inferior quality and do not believe it is good policy for anyone to do so.

Q. Do you find the character of the potatoes affected by the character of the land?

A. Yes. A well-drained deposit of black muck will grow a fair to large crop of smooth, handsome potatoes but they always appear to me to be of inferior quality. I also find a sandy loam having no perceptible admixture of clay in its composition, inferior to a loam having such an admixture so far as quality is concerned. It will, however, be a long time, indeed before buyers will judge of potatoes otherwise than by appearance. Indeed overgrown specimens such as no discriminating farmer will eat are largely sought for by the ordinary buyer.

Q. How deep do you plow for potatoes?

A. The depth that land should be plowed for potatoes, or any other crop, varies so much with different varieties of soil and subsoil, that no definite rule can be laid down. As a rule all soils denominated sand or sandy loam, are being plowed too deeply for potatoes as well as everything else grown upon them. Indeed I believe this is true of all Canadian soils. I know that if four inches in depth is removed from the surface of the best soil in Ontario it will be so utterly barren that no crop can be successfully grown upon it for years by any practicable course of cultivation or manuring. Potatoes are shallow feeders if they can find a sufficient supply of moisture near the surface. The roots penetrate to nothing like the depth of most of the cereals even in the greatest drouth.

Q. How do you cut your potatoes?

A. In cutting a potato into sets I commence at the stem end and cut obliquely towards where the stem was attached, cutting, generally, two eyes to the set, then revolve the potato till two more eyes show for the next set, cut it and repeat the process till as much of the "seed" end remains as will make two sets of about the same size as the other sets made from it; then cut the remaining piece perpendicularly from point to point but into two pieces. These last two sets will inevitably have a greater number of eyes than the others but I regard them as of at least equal value. Of late years I have planted about one-half of my crop with whole potatoes of about the size of hens eggs and find, on the whole, more uniform and better results than with sets. This is especially true if there are any decaying potatoes in the heap from which you plant.

Q. Do you use commercial fertilizers on your potatoes?

A. I have never used commercial fertilizers on potatoes.

Q. How deep do you plant your potatoes?

A. I plant from three to four inches deep. In a light, dry, sandy loam four inches is not too deep if whole potatoes, or large sets are used. It is too deep in any soil if the sets are cut from medium to small potatoes, and to one eye. If the soil is rather wet at planting time or is of such a nature as to pack closely, I never want to plant over three inches deep.

Q. Do you plant the seed end?

A. Yes. I regard the seed end as the most vigorous. If a whole potato is planted having say twelve eyes, twelve plants will rarely, if ever, be produced by it. From five to seven sprouts from it will generally be all that will reach the surface. Now if after these sprouts are well up you carefully remove the earth down to the potato planted, you will find that the sprouts are all from eyes at and near the seed end, while the eyes having failed to produce plants are those from about the centre back to the stem end. If these eyes had been cut away on sets, every one of them would have produced a plant; but I regard their failure to do so when the whole potato is planted as a sure indication of inferiority.

Q. I would like to ask Mr. Patterson of Agincourt how he grows his potatoes.

A. Mr. PATTERTON.—I generally plant potatoes about the end of May, having first worked the land until in good order. With potatoes, except for very early ones, you can manure as well in spring as the fall before. I usually plant small potatoes but would not advise taking the smallest from the same variety of potatoes year after year. In using small potatoes I generally plant the whole potato, with larger ones I cut in two. I never knew a miss where the whole potato was planted. I plant fifteen inches apart.

A. Mr. WM. MILLER, Milliken.—I plow my potatoes in not too deep and have the rows three feet apart. By adopting this wide planting I am able to keep the scuffler going later in the season. I do not hill up more than is thrown up by the scuffler. If the seed is medium size I plant whole, if large I cut in two. I believe emphatically in large seed.

Q. Do potato cuttings planted with one eye do better than with more?

A. Mr. ANTHONY IONSON, Wexford.—I planted one row with cuttings containing one eye, one with cuttings containing two eyes, one with cuttings containing three or four eyes, and one with whole potatoes. There was no difference in the gross weight of yield, but the row planted with the one eye gave the biggest potatoes, but these big potatoes also developed the most rot.

Q. How do you prevent scab in potatoes?

A. Mr. SIMPSON RENNIE.—I have had three years' experience in treating potatoes with bluestone as a preventive of scab. Care is needed in using this preparation in sowing. The first year I made it too strong. There should not be more than two pounds of bluestone to twenty or twenty-five gallons of water, the bluestone being first dissolved in warm water. In this preparation I dipped a sack of potatoes, containing about a bushel, for two or three minutes. I then held the sack up until it drained, emptied the potatoes in a pile, afterwards spread them out to dry on the floor, and when dry next day I cut the seed. By this means I got potatoes last year completely clear of scab. I have also heard that spraying with bluestone will check rot but as we have no rot here I have had no experience in this line. In spraying you make up the same mixture as you do for apple trees—bluestone, lime and paris green, the latter killing the bugs and the former preventing rot. I do not mould up potatoes, but I keep the ground loose all about them. Just after they are up I loosen the ground right under the hills with a grubber tilted for the purpose. If the ground between the rows is kept well worked you will have moisture within half an inch of the surface even in the driest time. I have cultivated

mangels up to within ten days of the time they were shown at exhibitions. This may have injured some of the fibres, but the benefit from stirring the soil more than offset any injury so caused. I can do better with roots when we have only one or two showers a month than in a damper season.

Q. Have you had any experience in the respective effect of horse and cow manures in producing scab? I have been told that cow manure is more likely to cause this trouble.

A. Mr. Simpson Rennie.—My experience is the very reverse of that. I have found horse manure the worst.

PLANK FRAME BARNS.

By G. C. Creelman, B. S. A., Superintendent of Farmers' Institutes.

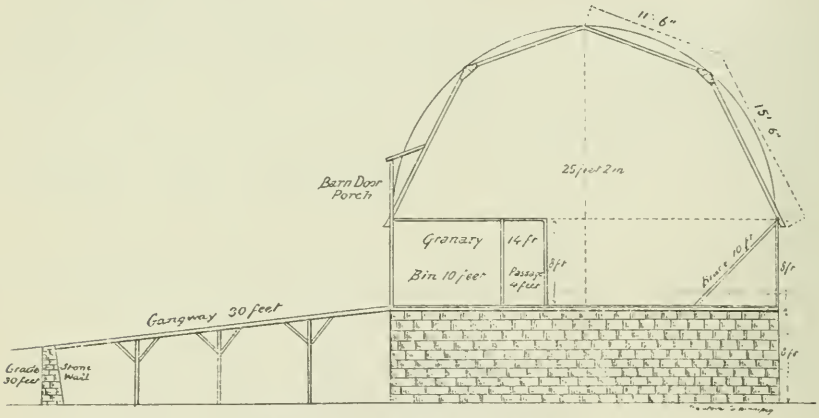
To the Canadian farmer following a mixed system of stock raising and grain growing a barn is the first necessity, and must continue to be a part of his equipment so long as he follows the present methods of storing grain and fodder crops. Fifty years hence people may find that it would pay better to thresh the grain in the field and bale the hay and straw so as to save valuable space, but at present existing conditions must be considered, and calculations made for the storing of a considerable amount of bulky material during a portion of the year.

The Old Style Barn. The conventional plans on which the majority of barns have been constructed have undergone but little change during the past fifty years. The necessities of particular cases called for slight deviation in form or for different sizes, but usually a marked uniformity prevails. An oblong shape with from four to six bents and a liberal allowance of timbers for the inside framework have been characteristics of most barns built in Ontario. Timber being until recent years plentiful neither the size nor number of the sills, plates, beams, girths and braces were considered as affecting the cost very materially; hence the result was in most cases a structure which was substantial rather than economical. When, however, the timber instead of being taken from the woods at slight expense has to be purchased at high prices, the problem of cost has suggested to inventive minds a new idea, and there is now being built in some localities a style of frame for barns which presents considerable modification on the old. One of these is known as the "plank frame," so called because it dispenses entirely with heavy timbers and substitutes therefor two inch planks of widths varying from 6 to 12 inches for the support of the siding and roof.

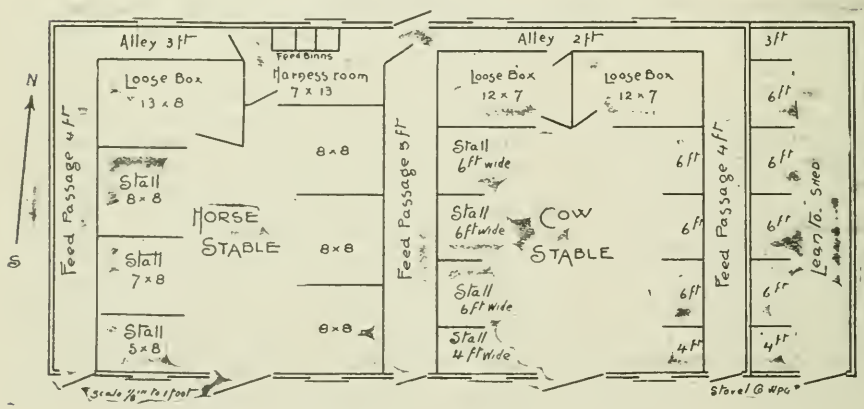
Two Advantages. Of the many distinct advantages claimed for this style of frame there are two features that will appeal strongly to the farmer who is about to build—the reduction of cost and avoidance of timbers which would come in the way of handling grain or hay with horse forks or slings. A description of one of these frames will serve to show how these objects are accomplished.

How to build. A barn of the average size, say 60x44 feet and 44 feet high would meet the needs of most farms, and may or may not have a basement beneath, which, however, does not effect the general design. Three courses of 2x8 planks are used across the bottom. The posts consist of two planks 2x8 and 20 feet in length, while the girths or braces are also planks about 6 inches wide and 22 feet long. They may extend in about 12 feet to insure good bracing though less would do and reach within about a foot of the top of the post. The first or lower part of the rafter is 20 feet, the second part 16 feet, and the girth across and connecting the middle of each will be 16 feet. These rafters and girth are double and spaced 2 inches apart and 2x8 stuff, the same as the posts. The rafters butt together, and are fastened by spiking or bolting with clips over joints. On the bent the space between truss and hip is 8 inches. The intermediate rafters are made of 2x6 material trussed by a single piece 1x6 and 16 feet long, which will make the open space between truss and hip of ten inches. Pieces of 2x10 stuff of the same length as the distance between the bents are used for purline plates. At the ends they are cut down two inches on the top side, and far enough back to allow them to enter the 8 inch space. They will then be flush with the bottom sides of the intermediate rafters. There is no particular necessity for having this purline plate continuous as the sheating will hold the rafters in place. These purline pieces may be inserted when that point is reached in the work of sheating. The pitch on the lower part of the roof is 18 inches rise to the foot. On the inside and outside of the posts 2x8 pieces are bolted on to serve as plates and hold the bents together. Enough of the length of the posts should be left above to catch the lower part of the rafters that are firmly bolted between. They should also be kept level, so that a 2x12 cap may be firmly spiked on top between the bents, and any style or weight of timber may be adjusted in place below for studding. In erecting this building the posts, tie beams and girths may be fastened together and then raised without difficulty. After all the bents are up and in line, the girths are bolted in place and the short braces put in; then bolt and spike on the plate.

Plank Frame Barn on the farm of F. B. Miller, Solsgirth, Manitoba.

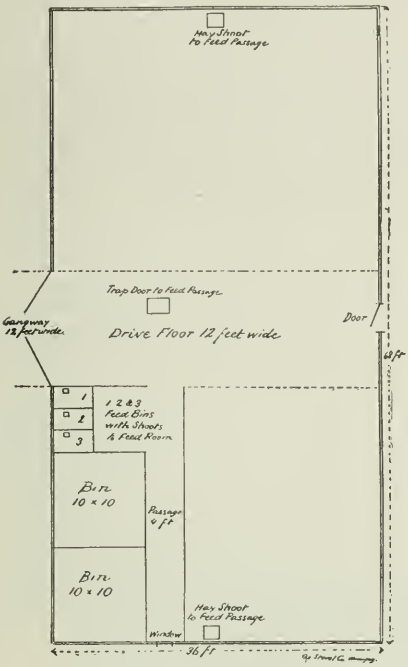


Mr. Miller's Barn showing end elevation.



Objections might be made to this plan on the score that too much material is required and that the bottom girths extend so far out on the floor as to prove inconvenient. Their length could be reduced several feet thus bringing them in closer to the wall, but a projection of even six or seven feet is undesirable.

Another type of plank frame simplifies the construction somewhat, and avoids this difficulty of obstructing the floor by setting purline posts on the floor inside the main posts and running them to the purline plates. This leaves the floor space clear, and though the posts with the necessary braces extend out over the mows, yet in practical use these will be found to give no trouble at harvest or threshing time. With purline post so placed the roof will of course be straight. A support should, however, extend from the main plate horizontally to the purline post, and another from this point to a short collar beam under the ridge. This should make the roof sufficiently rigid to bear the strain of operating a hay fork under it.



Barn floor plan of Mr. Miller's barn.

Now in use in Manitoba. In "The Nor'-West Farmer" there was published some months ago a description of a barn erected by Mr. F. B. Millar & Son at Solsgirth, Manitoba. In it the walls are 8 feet high, 2x6 frame, one ply of siding braced to the floor with joists by sixteen 2x6 planks making a solid wall. The principle of constructing a hip roof is that of the semi-circle, the wall plate, the peak of the roof and hip roof joint all falling on the semi-circle line. For a barn 32 feet wide the longer rafter would be 14 feet, the short one 10 feet in length There are no supports inside. The owner states that there is no reason why such a barn should not stand the force of storms as well as any other. A similar roof in his neighborhood has stood for many years the trying ordeal of Manitoba winds. This reduces the frame to the extreme limit of simplicity consistent with maintenance of position.

It is Cheap. The saving in cost will always be the main argument in favour of the plank frame. Those who have built them claim that only about one-half as much material is required in the framework; that it takes only about one-sixth as long to frame or get ready to raise, thus saving wages and board. Sufficient strength is obtained because almost all the timbers are made to answer both as supports and as braces. The weight or strain is supported by the timbers endwise rather than crosswise. The braces are usually much longer than in the common frames, hence much more serviceable. Another feature which may be overlooked at first consideration is that the timber will be more durable on account of there being no mortise in which moisture can accumulate to set up decay of the ends, and no tenons to rot off. There is also economy in the use of material, since stuff that could not be used in building a large frame barn can be utilized to advantage in the plank frame. In localities where all the large timber has been used or sold off the farm, this is an important consideration. A moderate estimate of the cost as compared with the old style frame would put it at from two-thirds to three-fourths, with results quite as satisfactory.

A Few Opinions from Men who have Built Plank Frame Barns.

In reference to the Plank Frame Barn, Mr. Thomas Convey, a member of the Farmers' Institute staff of Wisconsin, says,—"I enclose you a photograph of the model from which I built my own barn. The plank frame has a great many advantages. It can be built of almost any length of material, requires less labor and material and can be made stronger, more convenient and more durable than the usual solid frame. With a steep roof such as the picture indicates and especially in a larger barn, it can be built for two-thirds the expense of the solid frame. There is a saving in labor, material and long timbers, the latter especially being quite expensive."

Mr. Alex. Crawford of Sarnia, Ontario, says,—"I got drawings for a barn 40 x 60, but changed my mind and built smaller, making it 12½ feet less each way. It is all built of plank ranging in size from 2 x 4 to 2 x 10. If I were going to build another barn, no matter how large, I would build a plank frame. I have had mine filled to the peak with hay and grain and no part gave way in the least. I may say that all in the neighborhood who have seen it declare it is the coming barn frame, as heavy timber is getting scarce. I built mine myself, and think it is cheaper and stronger than any heavy timber frame. The weight inside, and the wind outside, have no effect on it as it is so well braced. I got all my material from the lumber yards. There

is no tearing and hauling in the bush getting out timber as in the days of heavy timber frames. I cannot say enough in favor of the plank frame barn."

Mr. W. H. Wallace, Sussex, N.B., writes,—"Two years ago the Sussex Exhibition Association asked the builders of our town to submit plans for a building for exhibition purposes in the summer, and to be used in winter for a skating rink. I saw cuts of the plank frame barn in *The Carpenter and Builder*, and it struck me that it would answer the purpose for this building. In order to get the size required I made many changes, and added leantoos on sides and ends. The committee was very much taken with it, but some of the farmers doubted its strength and said it was some new fangle, would blow down, etc. I also gave them an estimate of cost, $2,635. This also looked unreasonably low. However, at last I got them to send my plans to Mr. Shawyer for his opinion and a model. Then they decided to build and accepted my plan, paying me a small sum for it. They asked for tenders and received four, viz. $5,200, $4,600, $4,500 and $2,900, the latter being my offer. This amount was considered too high, as they did not care to spend that much money.

After a number of meetings the committee decided to let me build by day's work, which I did and it cost about $2,500, so you see they saved money. They gave me $5 a day and I built it in 25 days with the help of about 12 cheap men. It gave the best of satisfaction. Last year I erected another building for the same council similar to Mr. Shawyer's barn plan, which answers the purpose and is satisfactory. It is the first building of the kind built in New Brunswick or Nova Scotia that I have heard of. I have great faith in them and I believe there is a great saving in material and time, and they are much stronger than the old frame. I might say the size of our first building was 76 feet by 210 feet long. The other building was 40 by 100 feet."

J. N. Cowdrew, writing to the *Country Gentleman*, says:—"We have also read of, and many of us have seen the Shawver plank frame. We have two large barns of this kind in our neighbourhood. Four men in three or four days will frame and raise a large barn of this kind. It does not require nearly the timber or work to construct such a modern barn. Sills, beams and posts are made by spiking 2 by 8 inch planks together, and where a mortise is needed the middle plank is left out, or where a tenon is required, the middle plank extends out the required distance.

"These classes of beams are much stronger, lighter and cheaper than the regular timber frame. Why are they stronger? It has been found that if you take a stick of square timber, rip in two lengthwise in the middle, change ends with one of the pieces and firmly spike them together, it will stand more strain than it would before being ripped. The plank barn is built all the way through with mis-matched lumber; hence it is stronger all the way through. The bracing is more complete. Long braces are used, while short braces are used in the timber frame, which, in a storm, only acts as fulcrums to pry over and help break the tenons or pins A brace extending from the bottom of one post to the top of another makes the strongest brace possible. A barn can be built so that it will require one of the hardest storms to blow it down. It will roll over before breaking to pieces. Of course it won't stand a cyclone, for they will pick the barn right up from the foundation and whirl it to pieces. No building, no matter how well built, will stand one of these 'twisters' when they get in real earnest."

HORTICULTURE.

PRUNING THE ORCHARD.

By W. N. Hutt, Southend, Ont.

Pruning is a means to an end. In the practice of pruning there should be in the mind of the operator, some definite purpose in view. The kind of pruing will depend on the purpose for which the tree is intended, whether for wood, for fruit, for shade, or for ornamental purposes.

Natural Pruning. Trees under natural conditions are constantly being pruned. Every fall nature strips the trees of their leaves. This is their regular annual pruning. Besides this, there is a continual pruning of buds and branches. If every bud on a tree were allowed to develop, the tree would become a veritable brush-pile. The buds most favorably situated as regards light, get most nourishment, and the less favored become starved and drop of. The lower limbs of trees and those within the crown become weakened and die from lack of sunlight; then the wind, nature's pruning knife, comes along and removes the dead branch. In this way trees are constantly ridding themselves of useless branches, and the pruning so effected is undoubtedly a benefit to the branches that remain, and to the general growth and improvement of the tree.

Artificial Pruning. The trees of the orchard by virtue of selection, hybridization and cultivation are in a highly specialized condition, and to be maintained so must receive special treatment. The fruit tree is in a sense a machine for manufacturing fruit, and intelligent pruning is one of the means by which it can be made to manufacture the most fruit of the best quality in the shortest time and to keep up the output for the longest possible period. A correct understanding, therefore, of this machine and all its working parts, is necessary to its most successful manipulation.

Structure of the Tree. If the trunk of a tree, or a large-sized branch or root be cut through, it would show the bark, the light colored sap wood and the darker central portion, or heart wood. Just between the bark and the sap-wood, if we could see it, is a layer of very delicate tissue known as the cambium.

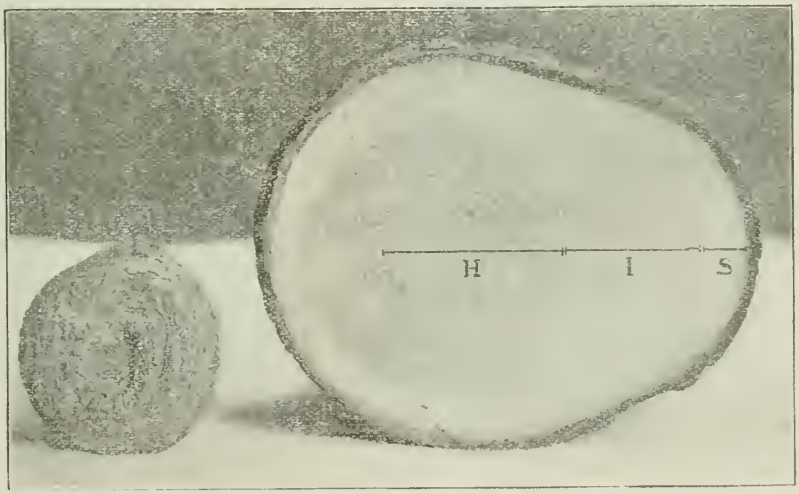


Fig. 1 Fig. 2.

Fig. 1.—A painted wound almost healed over.
Fig. 2.—Cross section or trunk of apple tree. (S)—Sapwood; (I)—Portion changing from Sapwood to Heartwood; (H)—Heartwood. At the outer end of the line is the thin cambium layer under the bark.

Cambium. The cambium is the only tissue that retains the power of active growth. It can best be seen by removing the bark on some actively growing tree, and so sensitive is it that exposure to air will kill it ina few minutes. It appears as a soft slimy or doughy substance

that can be scraped off with the thumb-nail The cambium is a very delicate substance, easily affected by frost or wet, and may be easily crushed or torn. It is the giving way of the cambium that that causes the bark to strip off from the wood. During the growing season, the cambium gives rise to a layer of wood on the inside and a layer of bark on the outside, and a thick layer of cambium is left between the new wood and bark to carry on the growth of the tree next year.

The Bark. In bark, nature has formed a perfect covering for the delicate cambium beneath. Being corky on its outer surface, the bark is a waterproof covering to keep in the sap and at the same time exclude external moisture from decaying the cambium. Bark being somewhat soft and spongy in its construction, contains consiberable air, which, acting as a non-conductor of heat, serves the same purpose as a dead-air space in a building, and keeps the cambium from being frozen or dried out. From this, it appears how careful nature is of the delicate parts of the tree, and in all our operations of pruning we should exercise a similar care. The orchard should always receive the best thought and practice of its owner, and should never be left to the tender mercies of the hired man or the itinerant pruner.

FIG. 3. FIG. 4. FIG. 5. FIG 6.

FIG. 3.—The healing of a torn wound, also cut too long.
FIG. 4.—A well-healed wound, the result of a properly made cut.
FIG. 5.—Result of leaving a stub.
FIG. 6.—Result of removing scions from grafted limb before the cut has been entirely healed over.

The Wood. The light-colored portion of the stem is the sap-wood. It is through this that the sap containing its dissolved mineral elements, finds its way up to the leaves. In the leaf the watery portion of the sap is evaporated, and the remainder, under the action of light, is combined with the carbon-dioxide of the air, and returns downward through the cambium to be used up in growth. The darker portion of the stem is the heartwood, which is dead tissue, whose only use is to give support to the tree.

The Root. The root presents the same appearance when cut across as the stem, and may for present purposes be considered as simply the branched extension of the stem underground. The cambium of the stem is continuous with that of the root, and is covered and protected with bark, except at the growing points. This covering of bark, being as was said before, impervious to moisture, requires that all water absorbed by the plant under normal conditions, be taken in at the root tips. In order to facilitate the easy and speedy passage of moisture into the plant, the small roots are supplied with innumerable small hair-like bodies known as root-hairs.

Root-Hairs. Root-hairs may best be seen on some seedling plant such as beans, yet every plant has them in thousands. Like the cambium, the root hairs are so delicate that drying for a few minutes will kill them. It is the destruction of the root-hairs that makes successful transplanting so difficult If trees could be taken up and planted again without the loss of root-hairs they would never know that they had been moved. This, however, is practically impossible except with the smallest seedling trees, yet it shows that too great care cannot be exercised in protecting the roots of trees during transplanting. It is owing to the heavy loss of fibrous roots with their root-hairs that makes it so difficult, nay almost impossible, to transplant large trees. Most of the smaller roots with their absorbing root-hairs are cut away, and the large roots on account of their thin bark have little power of producing the hairs. The leaves on coming out evaporate the sap from the tree, and since there are but few root-hairs to take up moisture from the soil, the tree dries up and dies.

Pruning for Transplanting. It is a good practice in the transplanting of large trees, or indeed of any tree, to cut back the large roots the year previous to taking up, so as to cause the tree to send out nearer the trunk, a strong growth of fine roots, which will be removed when

the tree is dug up. Since more or less roots are cut or broken off in transplanting, the top should be cut back proportionately with root. All broken or decayed roots should be cut back to fresh healthy tissue, otherwise they become a source of disease. Roots pruned smoothly without injury to remaining tissue will callus over quickly and send out a good growth from the callus. For this reason the rooting of layers can be hastened by cutting away the bark on one side and exposing the cambium to the soil so that a callus is formed.

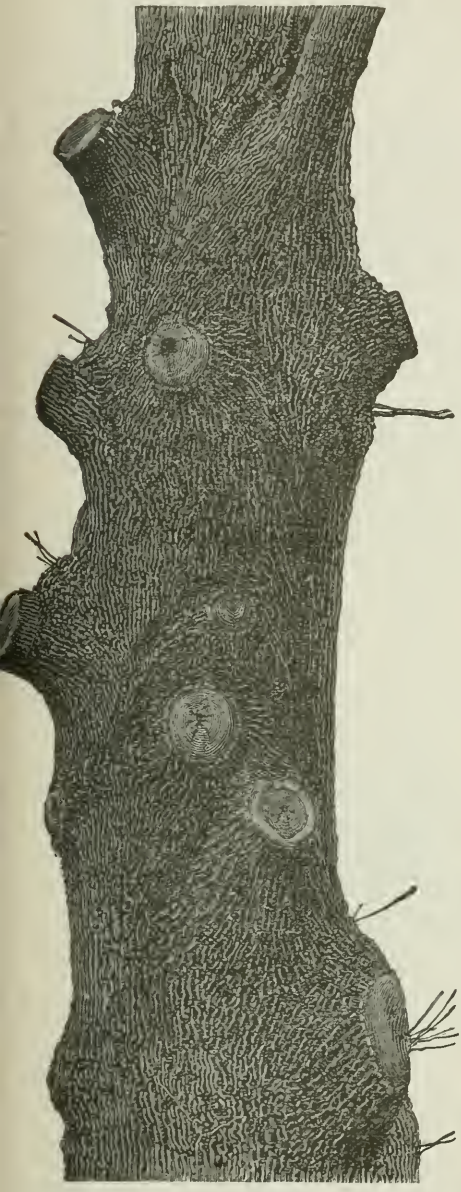


FIG. 7.—Oak tree from which some of the lower limbs have been properly cut and most of the upper ones improperly cut. (By permission from U. S. Year Book of Agriculture, 1895.)

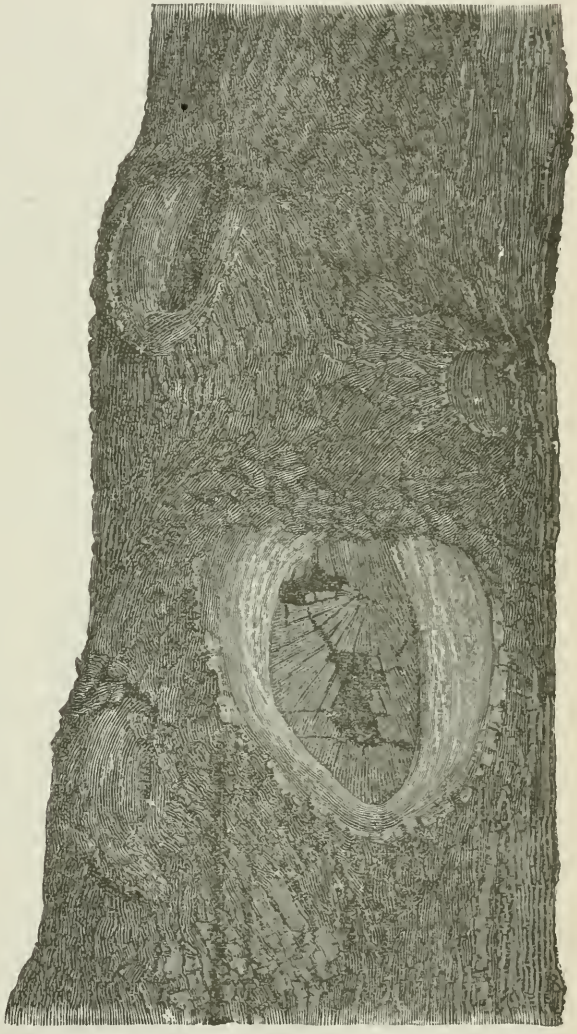


FIG 8 —Decay caused by the cutting of too large a limb. (By permission from U. S Year Book of Agriculture, 1895.)

Forming the Young Tree. As soon as the young tree has become established after transplanting, the formation of its top will commence. When the head of the tree is once formed the trunk does not lengthen, so that the lowest limbs must be started at the height we wish them to be in the mature tree. On account of ease in picking the fruit a low spreading head used to be considered most convenient. Of late years, however, the greater frequency of cultivation and driving back and forward in spraying, make the high formed head most convenient. Upright growing varieties such as the Spy may be started lower than trees of crooked or drooping growth such as Greening or Roxbury Russet.

Number of Main Branches. Trees should not be started with too many main branches, as afterwards they thicken up and crowd each other and make it necessary to cut out very large limbs As nearly all of the food of the tree is made by the leaves, the removal of a large limb with a great deal of foilage is a blow struck at the vigor and longevity of the tree. Trees so pruned suffer a process of starvation till the normal foliage is again restored, while the large wounds are a source of disease to the tree.

Ideal Pruning. The ideal pruning consists in removing not branches but buds, not in checking growth but in directing it. It is easier and also less shock to the tree to pinch off buds here and there, than a few years later to saw off large misplaced limbs. Trees should be so formed and shaped when young that in later years trimming should be only slight, and it would never be necessary to cut out large limbs. Three main limbs started at different points so as to evenly distribute their pressure on the trunk, will make a well formed head. Opposite crotches are to be avoided, particularly in peach and plum trees, for when the limbs are heavily loaded the trunk is apt to be split down by the wind and the tree is practically ruined.

Pruning for Fruit. Trees have two natural methods of reproducing themselves. The first is by means of shoots or buds, this is known as the vegatative reproduction or reproduction by growth. Every bud on a tree if, placed under proper conditions, as is done in the practice of grafting or budding, is capable of producing a tree like the one from which it was taken. The other method of reproduction is by the seed of the fruit. If the tree is growing a great deal of woodi produces little fruit and *vice versa*. The skill of the pruner is required to maintain the proper balance between the reproduction by growth and by fruit. If one kind of reproduction is getting too much the start of the other, it is only necessary to check the predominant one. If trees are pruned in the growing period, growth will be checked and fruiting stimulated. Summer pruning should be mostly confined to heading back too fast growing branches. If, on the other hand, the centre of the tree is thinned out, the fruit bearing branches are removed, and the energies of the tree are again forced into wood growth. The growth of the tree might also be checked by stopping cultivation and sowing the orchard to some clover crop, or the plow might be made to run a little deeper so as to cut off the surface feeding roots, and root prune the tree.

Pruning for Wood Growth. Pruning for vegetative or wood growth is that which has been outlined for the young growing tree. Cut out all dead, broken and deformed limbs and those which cross or rub one another. Care should be taken to keep the tree free from suckers, so that there is a free circulation of air through the tree, and the sunlight is let in sufficiently to give the fruit a good color.

Healing of Wounds. Limbs to be removed should be cut off as smoothly as possible with a sharp saw, and as close to the main stem as possible. When a limb enters a shoulder at the trunk, the cut should be as close to the shoulder as possible, yet never through it. There should never be any stump left because the cambium dies back, and when the stump decays there is a hole left which is apt to cause the trunk of the tree to rot and become hollow. Pruning shears are bad tools, as they pinch the bark and injure the delicate cambium beneath, and a badly healing wound is the result. Torn wounds are a source of danger to a tree. If large limbs are to be removed, which should never happen in good pruning, there is a danger of the weight of the limb tearing the bark. To avoid this cut from below first and meet this cut with one from above, or if this cannot be done cut off the limb a foot from the tree and remove the stub. Large wounds should be smeared over with tar or thick paint to keep out moisture.

Time to Prune. It is very important that the healing process should start soon after the wound is made, otherwise the cambium will be killed back quite a distance from the exposed surface and healing will be greatly retarded. For this reason winter pruning should be avoided, particularly in frosty weather. In the early fall or late spring, the cambium is active, and wounds made at this time start to heal at once and there is little or no dying back of the cambium.

FIG. 9.—Soft maple, cut back, giving the undesirable effect of a brushpile on a top pole in winter, and a haycock on a gate post in summer. (By permission from U. S. Year Book of Agriculture, 1895.)

Discussion.

Q. How would you go to work to handle an old neglected orchard that had become very full of suckers and limbs and did not bear much?

A. The reason the orchard did not bear much is because it had gone too much to wood growth. I would first cut out all suckers so as to let light and rain into the tree, and then take out a few of the most objectionable limbs. An orchard of this kind cannot be reduced to a normal condition in one year, as such heavy pruning would be too great a check to the trees. A little of the brush can be taken out each year, till the trees are brought into a productive condition.

Q. Do you approve of slitting the bark of young cherry trees to relieve the hide-bound condition?

A. No. This was a common practice twenty or thirty years ago and to-day its evil effect is very evident. I have on my farm several large cherry trees whose trunks are split from top to bottom on one side, owing to the bark being split down when the trees were young. It is difficult to cut a slit in the bark of the cherry tree without cutting into the living tissue beneath and this causes a scar.

Q. If the bark could be slit so as not to cut into the living tissue would it be all right?

A. No, not even then. Even if the living tissue is not injured there is a tendency for growth to take place only where the pressure is removed, and a ridged trunk, which later splits open, is the result. Nature, if given her own time, will force the bark open not in one place, but here and there all around so that the trunk grows evenly. However, we might assist nature by cultivating and manuring the trees to stimulate growth.

Q. What is the best time of the year to prune to avoid suckers?

A. Winter pruning is usually followed by a vigorous growth of suckers, particularly if the pruning has been severe If pruning is done, however, during the growing season, the growing tissue takes up the surplus sap and but few suckers are formed.

Q. What is the cause of suckers growing at the base of trees?

A. Suckers at the base of trees are mostly caused by injuries to the bark, made during cultivation. The best method of treatment is to avoid their occurrence, but if they do occur they should be bent over and cut off smoothly with a knife. An axe or adze for this purpose generally makes more wounds for a new growth of suckers next year.

Q. How would you treat a tree that had been barked with a plow or cultivator?

A. A wound of this kind should at once be banked up with moist earth to keep the cambium from being dried out. If this can be successfully accomplished the cambium will grow over the wound and form a new bark under the old. If the soil is dry a poultice of fresh cow manure would be useful.

Q. How would you treat trees that have been girdled by mice?

A. Bank up with earth as soon as noticed. If girdled completely around, the wound may be bridged over with scions by inserting in a wedge-shaped cut above and below the cut. This, however, never makes a good tree as sooner or later it will rot or break off. Orchards should never be left over winter with long grass about the trees, as it is a dangerous harbor for mice. If the snow is tramped solidly about the trunks of the trees it is a considerable protection from mice. Hawks and owls, which are the natural enemies of mice, should always be protected.

Q. You spoke of the loss of root-hairs being the cause of trees dying after being transplanted. Would this be the cause of the great loss in planting evergreens?

A. Precisely so. Being always in full foliage, the many leaves of the evergreen tree evaporate all the sap from the tissues before the root-hairs have become sufficiently numerous to supply it, and so the tree dies. For this reason too great care cannot be exercised in handling evergreens to keep as much soil about the roots as possible and to have them covered and protected from the air and wind.

Q .I have had very bad success in transplanting maples from the woods. Why is this?

A. The great loss of root-hairs in these, as in the trees before mentioned, would probably be the trouble. In addition to this, the sudden change of a tree from the moist vegetable mould of forest conditions to the dry soil of the open, must necessarily be a shock to the tree. Trees taken from the forest should be given conditions are nearly like their original conditions as possible. The forest humus can be substituted in the open by a heavy mulch of manure to keep the roots moist. If this is not done all the loose, spongy soil of the forest, which would soon dry out in the open, should be shaken off from the roots and its place filled in by having moist earth packed firmly about the tree.

Q. What is this new method of transplanting trees that we sometimes hear about?

A. You probably refer to the Stringfellow method of transplanting trees The Stringfellow method consists in cutting back both root and top till the tree is like a club or old fashioned shinny stick. The idea is to reduce the tree to as nearly as possible the condition of a seed. This method was originated in Texas, where under their almost hot-house conditions, it was fairly successful. However, it is found by experiment to be quite unsuitable to our Canadian conditions.

Q. Do you approve of the common practice of heading down the soft maple?

A. Decidedly not. Trees headed down are destroyed for beauty and rendered subject to decay. When the headed down tree comes out with its full crop of suckers it resembles a brush-

pile on a pole, or a hay cock on a gate post. On the other hand, the ideal shade or ornamental tree should have a straight central trunk throughout its entire length with side branches evenly disposed around it. If trees are headed back at all it should be when they are young, and the heading back should be confined to the too rampant side branches.

Q. Would not low headed trees be less liable to sun scald ?

A. Not necessarily. A tree headed either high or low must be sufficiently thick to protect its trunk from sun scald. A low headed tree cannot be cultivated by horses unless the main limbs are forced upward and serve the purpose of a trunk, and in that case you have more trunk than before. That would be an example of the old ox-gad method of trimming.

Q. Should trees be trimmed every year ?

A. In trimming every year the trees are kept in good shape, useless limbs are taken out before they become too large, and suckers can always be kept down. When pruning is done annually the work is comparatively slight, and an orchard can be gone over in a comparatively short time.

Q. I have a block of Spys in my orchard that is well trimmed and cultivated like the rest, but it seldom bears fruit while the other varieties generally fruit annually. Could you assign any cause for this ?

A. The unfruitfulness of the Spy is probably due to lack of fertilization of the blossoms. Spys should not be planted in solid blocks, but should be interspersed with varieties like Baldwins or Greenings that have blossoms with a greater amount of pollen in them. Your trouble could be remedied by grafting central rows with some self-fertile variety that blossomed at the same time as the Spy.

A FEW OF THE MORE COMMON DISEASES OF ORCHARD TREES AND FRUITS, THEIR REMEDIES AND PREVENTIVES.

By J. E. Orr, Fruitland, Ont.

In selecting the diseases to be treated the writer has included those which have been found most troublesome in a long experience in fruit growing, and those which have been most frequently enquired about during several years of Farmers' Institute campaigning. Those who wish for fuller information will have no difficulty in obtaining it, as the bibliography of this subject is quite extensive.

Fungi. A fungus is a cryptogamous plant destitute of chlorophyl, and therefore unable to assimilate plant food from the air. It derives its nourishment almost wholly from organic compounds. It is those fungi which are parasitic on cultivated plants and trees which are of interest to us as fruit growers.

The usual life history of a parasitic fungus is that it arises from a spore which is microscopic ; this germinates and gives rise to thread-like structures which penetrate the plant upon which the fungus grows and derives its nourishment. Upon these structures in time spaces are produced, as new sources from which the fungus may develop and continue to be injurious to the vitality of the plants attacked.

A fungicide is anything that kills or checks the growth of fungi. The action of most fungicides is preventive rather than curative. Copper salts have proved most effective. In nothing is the old adage, "An ounce of prevention is worth a pound of cure," more true than with regard to these plant diseases. Proper pruning, cultivation, fertilizing and drainage will do much towards keeping the tree thrifty and enabling it to resist the attacks of fungous diseases.

Fungicides. The following is from the special bulletin issued by the Ontario Department of Agriculture, entitled "Instruction in Spraying" :

Bordeaux Mixture.

Copper sulphate	4 pounds.
Lime (fresh)	4 "
Water	40 gallons.

Suspend the copper sulphate in four gallons of hot water. This may be done by putting it in a bag of coarse material, and hanging it so as to be covered by the water. Slake the lime in the same quantity of hot water.

Do not at once mix the two solutions thus made, but proceed as follows : Put one of the solutions in the barrel, add a few pails of water, then add the other solution and bring it all up to 40 gallons. Use only fresh Bordeaux mixture, or what is not over two days old. The copper sulphate and lime solutions should not be mixed until required for use. Strain the solutions.

Only the best fresh-slaked stone lime should be used. If the lime is good the above amount is likely to be sufficient. It is an easy matter to know how much lime is required by using what is termed the ferro-cyanide of potassium test. This substance can be got at any

druggist's, and very little is required. Take a small bottle (2 oz.) and get it filled with a saturated solution of this compound. If there is not plenty of lime in your mixture, a drop of the test added to it turns brown. Add more lime and stir. As soon as the test fails to color in coming in contact with your mixture, it indicates there is sufficient lime present to neutralize the effects of the copper sulphate. Use wooden vessels in preparing the Bordeaux mixture.

Ammoniacal Copper Carbonate Solution.

Copper carbonate	1 ounce.
Strong ammonia sufficient to dissolve the copper carbonate.	
Water	10 gallons.

This solution is not much used, and is recommended only in cases where the fruit is so far advanced that it would be disfigured by using the Bordeaux mixture.

Experience in spraying indicates that it is best to use the fungicide, commencing as soon as the buds begin to swell, again when the leaves appear, and continue it at intervals of 10 to 15 days, until the trees have been sprayed three to five times, which will depend upon the weather. In the case of a rainy season, it may be necessary to spray at least five times, while if dry, and the mixtures have been allowed to remain on the foliage, three or four times may be sufficient.

A stock solution for the preparation of Bordeaux mixture may be prepared as follows: Dissolve 25 pounds of copper sulphate in 25 gallons of water. One gallon of this contains one pound of the copper sulphate. In another barrel slake 25 pounds of good lime, and add 12½ gallons of water. One gallon of this contains two pounds of lime. To make the mixture, take four gallons of the copper sulphate solution and two of the lime. If there is any doubt about there not being sufficient lime, try the test already referred to under Bordeaux mixture. Now fill up the amount to 40 gallons with water.

Prepare the mixtures well, apply them at the proper time, and be as thorough as possible in the work. Three-fourths of the so-called spraying done is not spraying at all. The trees are only drenched. When spraying is properly done, the mixture is broken up like a mist and settles on every part of the plant. A great deal more of the mixture will remain on the plant when applied in this way, and there is also a saving of material, as every drop which falls to the ground is lost.

Paris green for chewing insects may be added to Bordeaux mixture whenever it is necessary to apply it.

Scab—Apple and Pear. This is by far the worst fungus that the fruit-grower has to contend with. It attacks both fruit and foliage of apple and pear trees. The first indication of its presence are small olive green spots which gradually increase in size and grow darker until they become about half an inch in diameter, causing the leaves to turn brown and fall, and causing the unsightly scabs and cracking upon the fruit, which unfits it for market.

A systematic plan of spraying with Bordeaux mixture will almost entirely overcome this fungus, and guarantee 75 per cent. to 100 per cent. of clean marketable fruit, as has been abundantly demonstrated by the experimental spraying conducted by the Ontario Department of Agriculture for a number of years.

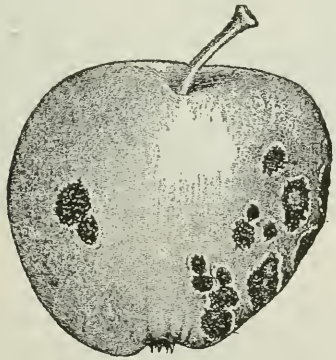


FIG. 24A Apple-scab.

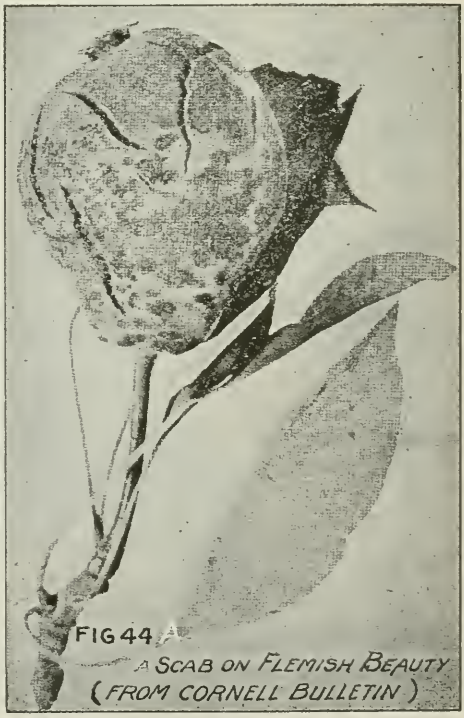


FIG 44. A SCAB ON FLEMISH BEAUTY (FROM CORNELL BULLETIN)

Apple Tree Canker. Although this disease is quite widely distributed throughout Ontario, and some orchards are almost ruined by it, until recently the injuries caused by it were attributed to bruises, sun scald and frost canker, which it closely resembles. It usually attacks the larger limbs of mature trees which assume a rough and swollen appearance, and finally the bark dies, frequently adhering to the wood, which is not the case in sun scald, etc. Experiments in fighting this disease are incomplete, but the suggestions of experts based upon observations and studies of it are as follows: Remove all diseased limbs when possible. When giving the regular sprayings with Bordeaux mixture, coat the limbs well with it. Cut away the diseased portions of bark and remove all rough bark from the trees. Wash the larger limbs and trunk with thick Bordeaux mixture.

Fire Blight—Apple, Pear and Quince. Soon after the blooming and well on into summer the fire blight appears, causing first the twigs, then the limbs, and frequently the entire tree to turn brown, having the appearance of being scorched by fire. The leaves adhere to the tree and the fruit shrinks. It is a bacterial disease and acts very rapidly, three or four days sometimes destroying an apparently heal hy tree. It is very serious on pear and quince, and frequently attacks some varieties of apples.

The only treatment known is to closely watch the orchard and remove diseased twigs and limbs as fast as they appear, burning them at once. Make the cut several inches below the diseased part, and never cut a healthy tree with a tool used on a diseased limb until it has been disinfected with kerosene or some other germicide. There is a popular impression that trees under cultivation are more subject to fire blight than trees standing in sod. This, however, I believe is not true.

FIG. 35
Effect of soft rot. *Monilia.*

Brown Rot or Fruit Rot—Plum, Cherry and Peach. This fungus attacks not only the fruit, but under favorable conditions the young twigs and blossoms. However, it is usually the fruit which is injured. It attacks unripe fruit, but is most active just as the fruit is ripening. Sometimes the entire crop will rot, especially if the crop is heavy and the fruit hangs in clusters.

Spraying with Bordeaux mixture will partially control this trouble, but all diseased fruit should be gathered and burned at the end of the season, that the spores which would continue the disease may be destroyed.

FIG. 14
Root-galls upon apple trees from a nursery. BAILEY

Leaf Blight—Pear and Quince. As soon as the first leaves on pear trees are developed there will frequently appear small bright reddish spots on the upper surface which increase in size until in bad cases the leaf turns brown and drops and the young twig is killed back. It sometimes attacks the fruit checking its growth and causing cracking similar to the scab. It also attacks the quince. Treatment is the same as for scab.

Black Knot—Plum and Cherry. This well known fungous disease which attacks plum and cherry trees and has totally destroyed them in some localities, is easily controlled by united effort. The unsightly black knots are so common that they need no description.

The Yellow and Black Knot Act of Ontario provides that municipalities may appoint inspectors to see that all black knot is cut and burned. In localities where this is enforced the disease has practically disappeared. It is useless for one man to try and clean it from his orchard while his neighbor is constantly growing spores to produce new knots.

The knot should be cut in the early winter, and the trees again gone over for new knot in the early summer. All cuts should be made three or four inches below the knot to be sure that none of its roots are left in the wood. After removing the knots a thorough spraying of Bordeaux mixture will help to prevent new knots from germinating.

FIG 34

CORNELL BULLETIN ATKINSON

Curl Leaf—Peach. This disease attacks the leaves and twigs of the peach tree, causing the former to swell and crumple, and assume a loathsome yellow appearance. Finally they drop from the tree, sometimes defoliating it. The tree will leaf out again, but the crop will drop and the crop for the following year will be injured.

Spraying with Bordeaux mixture while the trees are dormant, and again after the blossoms open, will control it. Care must be taken, however, not to apply it too strong at the second spraying, as the foliage, especially of narrow leaved varieties, will be injured. About one-half the ordinary strength is all that is required. We have had little or no curl leaf on trees which were whitewashed through the winter for the protection of buds.

An application of whale oil soap just as the buds are swelling is said by many to prevent this disease. We used it this year for the first time on peaches. There were no curled leaves, but could not speak definitely on so limited an experience.

Leaf Spot or Shot-hole Disease—Plum and Cherry. In the early summer the foliage of the plum and cherry are often attacked by shot-hole fungus. First a purple spot appears which afterward turns brown, loosens and drops out, giving the leaf the appearance of having been pierced by shot. In severe cases the foliage is injured to such an extent that the crop will not mature. It is easily controlled by spraying with Bordeaux mixture, or in the case of cherries where there is danger of marking the fruit a clean fungicide should be used.

Root Knot or Crown Gall—Peach, Pear, Apple, Plum, Cherry, etc. Root knot or crown gall as it is frequently called, as the gall usually appears at the crown, although frequently on the roots and sometimes even on the trunk, is a soft irregular growth varying from the size of a pea to several inches in diameter. These will be frequently seen on young trees sent out by the nurseries. No remedy is known, and trees affected with it in any degree should be refused as they will not develop into thrifty, profitable trees. This knot will be found on apple, pear, plum, grape vines and berry bushes.

FIG. 33.

Yellows—Peach. The most destructive peach disease is of course Yellows. Its nature is not understood, and no remedy is known. The best and only treatment is to dig out and burn diseased trees whenever found. The Yellows and Black Knot Act of Ontario allow municipalities to appoint inspectors to carry out this work.

The symptoms are pale and sickly foliage, red spots on the fruit running from the surface towards the stone, premature ripening of fruit, sometimes as early as the middle of July, and the appearance of tufts of sickly willowy shoots from the trunk and the branches. This latter symptom is claimed by some to indicate a disease called Peach Rossette. But be it Yellows or Rossette the result is the same. There is no cure known except the axe and the match box. It is no loss to the grower to destroy the affected trees, as the fruit is unsaleable, and the tree soon dies.

THE SPRAYING OF FRUIT TREES.

By G. C. Caston, Craighurst, Ont.

Owing to the increase of injurious insects and fungous diseases of late years, it is necessary to spray our fruit trees. Otherwise we need not expect to have thrifty, healthy, trees, or clean saleable fruit.

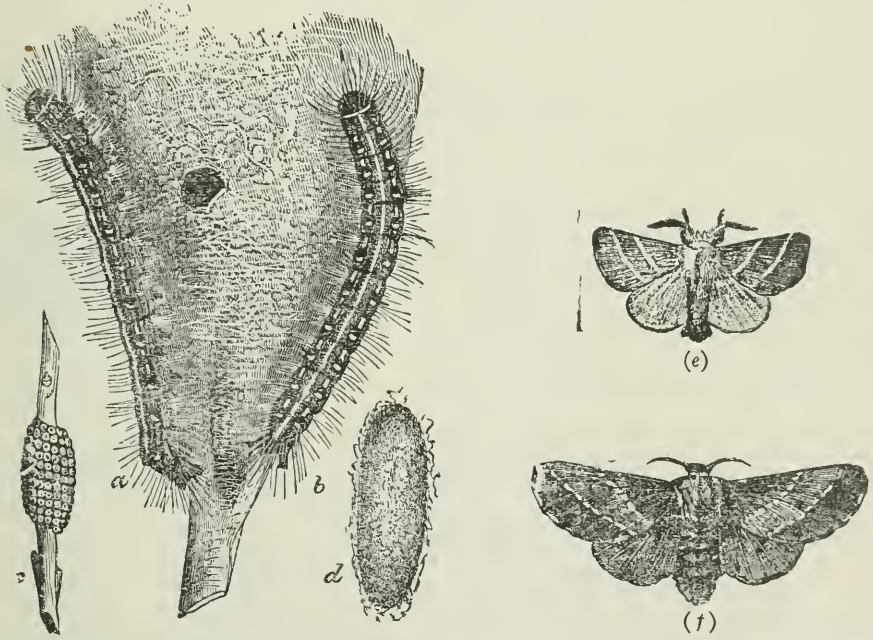


Fig. 1. American Tent Caterpillar—*a* and *b*, caterpillars on nest; *c*, egg cluster; *d*, cocoon; *e*, male moth; *f*, female moth.

Fundamental Principles. There are certain fundamental principles underlying the operation of spraying that it is well to consider. Is it necessary, and if so, why? What are the benefits to be derived from it, and will the results attained be sufficient compensation for the trouble and expense of the operation? First, then, as to the object and the reasons for it. The object is to prevent injury to our trees from the ravages of insects and fungous diseases. A fruit tree cannot maintain a normal degree of health, cannot build up sound healthy tissue or perfect its fruit buds, if the foliage is injured to any serious extent. A tree without healthy foliage is like a man with diseased lungs. The leaves are the breathing apparatus of the plant, and it cannot perform its functions when these are destroyed or eaten by insects, or corroded by fungous diseases.

Spraying for insects and fungus. In spraying we have to deal with two classes of insects, and several forms of fungous diseases. There are the masticatory insects, those provided with jaws that devour the leaves, such as the Tent Caterpillar, (Fig. 1), Bud Moth, (Fig. 3). and the Codling Moth (Fig. 2), that eats its way into the apple. The other class of insects are called suctorial, and are provided with tiny beaks with which they suck the juices from the leaves and stem of the trees.

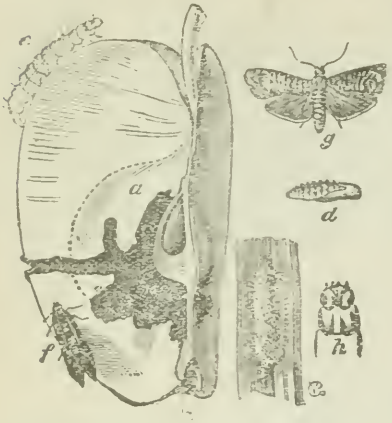


FIG. 2. CODLING MOTH—*c*, larva; *d*, pupa; *i*, cocoon; *g* and *f*, moths.

FIG. 3. APPLE TREE BUD MOTH, *Tmetocera ocellana*; *a*, moth; *b*, larva; *c*, pupa.

The green and black Aphis or plant lice, and the oyster shell and other bark lice, come under this class. The masticatory insects are destroyed by spraying the trees or plants on which they feed, with Paris Green. The suctorial insects cannot be controlled in this way, and must be treated with something that kills them by contact with their bodies, such as kerosene emulsion, whale oil soap, etc.

The masticatory insects and the fungous diseases can be treated at the same time with Bordeaux Mixture and Paris green.

Fungus Diseases. Of the fungous diseases affecting fruit we have Apple Scab, Leaf Spot of the pear, Black Knot of the plum and cherry, Anthracnose of the raspberry and blackberry, and the Red Rust of the strawberry. We have also as affecting the fruit, Bitter Rot of the apple, Plum Rot, and others, but the most common, most prevalent and most injurious of the fungous diseases is the Scab of the apple and pear. For this and most other fungous diseases the most successful remedy used so far is the Bordeaux Mixture. The formula of which, as used in this country is 4 lbs. copper sulphate, 4 lbs. fresh lime, (and where insects are to be dealt with at the same time 4 oz. of Paris green is added) to 40 gallons of water. The American formula is 6 lbs. of copper sulphate and 4 lbs. of lime to 40 or 50 gallons of water. But so far as I know the Canadian formula has given as good results as the more expensive American one. In cases where an orchard is badly infested with fungus, the bare trees should be sprayed just as the buds begin to swell. For this first application, 2 lbs. copper sulphate to 40 gallons water without any lime, is the formula usually recommended. But in some sections where the Bud Moth (Fig. 3) is prevalent it would be better to use the full Bordeaux with 4 to 6 oz. Paris green. Repeat the application just before the blossoms open.

Second Spraying. At this stage we have to deal with the Tent Caterpillar, a pest that has done immense damage through the country. At this time the young caterpillars are beginning to feed on the leaves. And where they are present in large numbers, I would increase the quantity of Paris green in the mixture to 6 or 8 ounces, or even more, which can be done safely pro viding plenty of lime is used. And for this reason always use the ferro cyanide test. Get from the druggist five cents worth of ferro cyanide of potassium, otherwise known as the yellow prussiate of potash. Dissolve this in a half pint of water, and when making the spraying mixture after adding the lime and Paris green to the copper solution, when the barrel is $\frac{3}{4}$ full, stir the whole thoroughly, and drop into it a few drops of the potash. If it turns purple or changes color when it comes in contact with the mixture, this indicates that there is not sufficient lime in it. Add more lime until no color shows, and then add a little more to make sure, and your mixture is safe; it will not injure the foliage. Then fill up the barrel to the top. Before starting to spray pull the peg out of the piston of the pump, and work the agitator lively for a few minutes to get the whole mixture well stirred. Always do this, whenever from any cause spraying may be stopped for a few minutes. It is very important.

Third Spraying. The next application should be made just after the blossoms have all fallen (see figure 4), using the Bordeaux mixture with Paris green. If heavy rains occur just after spraying it will have to be repeated. Then they should be sprayed about ten days later. This course, if followed up every year will keep an orchard in fine healthy condition, other things being equal.

Fig. 4. Just right to spray.

The Suctorial insects are treated with kerosene emulsion or whale oil soap. The emulsion is made by dissolving a ½ lb. of soap in a gallon of hot water, to which is added 2 gallons kerosene. It is emulsified by churning with syringe or pump. This is diluted with 20 gallons water. This remedy is most used for the aphides or plant lice that affect the leaves of fruit trees, slugs, etc. This emulsion would be still more effective by using the whale oil soap, instead of the common hard soap.

Whale Oil soap is now being used as a summer remedy for the dreaded San Jose Scale. Just how effective it will be is yet to be seen as the treatment of this terrible pest is yet in the experimental stage. The Oyster Shell Bark Louse is common all over this country, and does considerable damage to fruit trees, more particularly the apple. I have found it very bad on the Black Currant also. Young trees should have the trunks scrubbed with weak lye or strong soap suds, and the tops sprayed with kerosene emulsion or whale oil soap, just about the first week of warm weather, when the young lice are moving.

Fig. 5.—Oyster Shell Bark Louse.

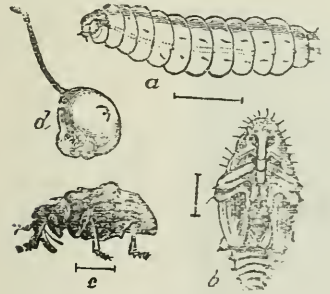


Fig 6.—Plum curculio, *a*, larva; *b*, pupa; *c*, beetle.

For the Plum Curculio (see Fig. 6) spraying with Paris green has given variable results. Some report greater success in jarring the trees and catching the insects in sheets spread underneath. My own practice is to spray the plums with Bordeaux and Paris green when spraying the apples, and this practice has given good results in healthy foliage and very little injury from curculio.

Spraying Outfit. And now a few words as to the *modus operandi* of the whole business. Get a good spraying apparatus. Do not waste time and money on a cheap-made shift. Get the best. If the orchard is small get some one else who has a small orchard to join in the purchase of a good pump. One good pump will do for two or three small orchards, and it will do the work right, and more rapidly and cheaper than if each man with a small orchard bought a cheap, useless, time-killing, pop gun such as some are attempting to spray with.

Having secured good apparatus, take a clean coal oil barrel, it will hold twenty pails of water. If you have four or five acres of trees to spray, fill this full of water, weigh out 20 lbs. of the bluestone (copper sulphate) in a small sack and hang it in the barrel. It will all be dissolved in twenty-four hours. Each pail of this solution represents a pound of bluestone. Stir it well when taking out for use. Your spraying barrel should hold forty gallons of mixture. Fill it about half full of clean water, then put in four pails of the bluestone stock solution.

Have some clean fresh hot lime, and slake it in a separate barrel, dilute with water until it is like milk, pour in two pails of this, using a strainer to prevent anything going in that would clog the nozzle, then add the Paris green. Fill up with water till the barrel is three parts full. Stir the whole well and apply the ferro cyanide test till you have it right ; then fill up the barrel and go to work. With the bamboo extension rod, which is furnished with every good spraying outfit, the operator can reach the tops of young trees (say of from seven to ten years) standing on the ground, as at Fig. 7, but for old trees a wagon should be used, as shown at Fig. 8. If winds prevail spray one side of the rows, and when the wind changes or goes down do the other side. It is little use trying to spray against the wind. It will take forty to fifty gallons of mixture for each acre of trees. If the trees are very large and old, or planted close, it will take more. The nozzles should be adjusted so as to make a very fine spray. A coarse spray is a waste of material. The trees

Fig. 7.—Using the bamboo extension rod in spraying young trees.

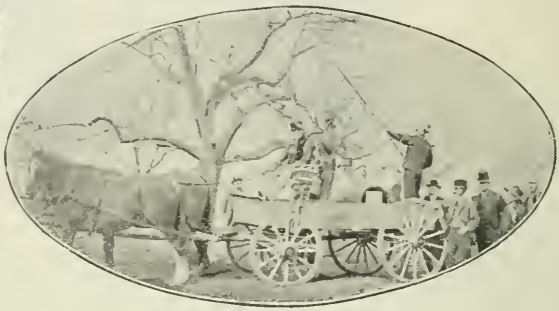


Fig. 8.—Using a wagon in spraying old trees.

should be sprayed until the leaves and bark are wet, but it is not necessary to drench them.

The kerosene emulsion and whale oil soap mixtures should be thoroughly emulsified before applying with the spray pump, and in the case of the aphis or green plant louse, the spray should be applied to the under sides of the leaves as much as possible.

The Spramotor Co. of London, Ont., have perfected an attachment to their pumps by which the kerosene is placed in a separate vessel fitted in the barrel, and the pump makes the emulsion and applies it at the same time, the proportion of oil being regulated by means of a guage. This apparatus simplifies the application of this form of insecticide.

The effects of spraying are not all seen the first year. It is far reaching in its effects. Some years there is comparative immunity from fungus and insects, owing largely to climatic condi-

Fig. 9—Sprayed Apples.

tions of the season. In years like this there is not much apparently in the way of results for the sprayed orchard. However, we should not draw conclusions from the experience of a single season, but from the aggregate results of a number of years. Experience shows that spraying

is of value every year. There is a gradual improvement in the health of the trees. The foliage is better, the fruit is cleaner, larger, from 50 to 75 per cent. more marketable, and the trees are increased very much in productiveness. Those who spray thoroughly have little trouble with insects. This is the experience of those who have practiced it for some time. Everyone who has an orchard should spray it, and spray it thoroughly.

Spraying useful for Black Knot. It is said that there is no remedy for the Black Knot of the plum and cherry except to cut it out and burn it. While that is true, yet my own experience leads me to believe that much can be done in the way of prevention by spraying. I believe that if the bark is kept pretty well covered with Bordeaux during the season of growth there will be little trouble with black knot.

Unsprayed Apples.

Where orchards are properly sprayed the Tent Caterpillar makes no headway. Even where Paris green is not applied with the mixture I notice they will not eat much foliage that is covered with Bordeaux. Experience proves that spraying will pay, and that if we wish to have clean, marketable fruit, and thrifty, productive trees, we must not only give them proper care as to tillage, pruning and fertilizing, but we must have a good spray pump and use it intelligently.

INSECTS INJURIOUS TO FRUITS AND THEIR REMEDIES.

By A. W. Peart, Burlington.

As every fruit-grower knows from personal experience, the amount of damage done annually by various insects is very great indeed. In order to successfully combat them some knowledge of their appearance and habits is absolutely necessary. A few of the more important ones can only be reviewed here. In a general way the subject may be approached from various points of view. Some insects are friends of the fruit-grower, others again are his enemies. As a rule, friendly insects are quick and active in their movements, and may be sub-divided into the parasitic and predaceous. The ichneumon fly is an example of the former, which deposits its egg in the body of its victim. The egg soon hatches into a larva or grub, which eats the vitals of its host, thus destroying it. The dragon fly or devil's darning needle, and the tiger beetle are predaceous, pouncing upon caterpillars, cut-worms and other destructive species and devouring them. The little lady bug, too, destroys plant lice and the eggs of many injurious insects, thus earning our friendship.

Injurious insects may be divided according to the formation of their mouth parts. Some have jaws with which they devour their food, such as the apple and forest tree caterpillars, the canker worm, codling and tussock moths. Others again have no jaws, but a beak or tube-like mouth which they push into the sap of the plant or tree, sucking it out and thus weakening its vitality. The oyster-shell bark louse, the Forbes and Putnam scales, the Lecanium or plum scale and all plant lice are examples of the latter.

It is quite clear, then, that different remedies must be used. If poison be sprayed upon leaves, insects or caterpillars in eating them will be destroyed. But as we cannot place poison in the sap, it is obvious that we must attack sap-sucking insects in some other way. Insects have holes or pores along the sides of their bodies, and if we spray them with some sort of an oily mixture these breathing pores are clogged, and they are suffocated. *For the first class mentioned*, Paris green is probably the surest and most effective remedy, but must be wisely and carefully handled. A general preparation extensively used for fruit trees consists of one pound Paris green, two pounds of fresh water-slaked lime and two hundred gallons of water. The lime prevents the Paris green from injuring the leaves. *For the second class*, kerosene emulsion is widely used, i.e., a preparation of coal oil two gallons, water one gallon, hard soap half a pound. The soap is dissolved by boiling in the water, then remove from stove and add the oil, then churn all up together for about five minutes. Then to one gallon of this mixture add from eight to twenty gallons of water, according to the nature of the insect to be treated. This solution is used when trees are in leaf. Other preparations are also used for various scale insects, such as whale or fish oil soap, crude petroleum and lime spray.

In spraying, a reliable, careful man should handle the nozzle. Throwing a few gallons of water at a tree as you rush by it is not spraying. Both sides of every leaf should be moistened, but the foliage should not be drenched. Suitable extension pipes and nozzles should be used according to the orchard No fruit-grower can afford to do without a good spray pump. Through spraying, profits may be increased from twenty-five to fifty per cent. in many cases.

The Codling Moth. There are four stages in most insect life—*the egg*, *larva* or *caterpillar*, *pupa* or *chrysalis*, and *the perfect insect*. The codling moth or apple worm is an illustration. As a rule, they can be destroyed the most effectually in the second or larval stage. (Fig. 2—page 62.)

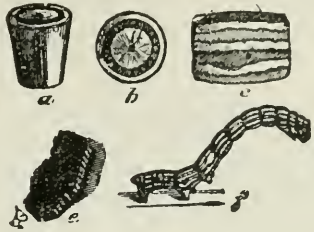
Probably the most destructive insect to apples is the codling moth. Last year a large percentage of otherwise fine fruit was riddled by this pest. Various remedies are used. It is a good plan, where practicable, to let hogs run in the orchard. In eating the fallen apples, some of the worms are destroyed. Spraying with Paris green just after the blossoms have fallen and before the calyx closes, may perhaps kill a few. The best means, however appears to be the use of bands. There are two broods of the codling moth. The first brood is on the wing when the apple trees are in full bloom. The eggs are laid in the blossoms. In a few days they hatch into a tiny worm. The worm bores into the apple and is full grown in three or four weeks, being then about three-quarters of an inch long. It leaves the apple, seeks shelter wherever it can, spins a silken cocoon over its body, and emerges from this a perfect insect in about two weeks. This is the second brood. The object in placing the bands on the trees is to afford the necessary shelter for the worms to pass through the pupa stage. Take a piece of coarse, cheap sacking, fifteen inches wide and long enough to go around the trunk of the tree. Make three folds of this so that when finished it will be about five inches in width. Fasten the band about half way up the trunk. In its folds the worms find the desired shelter. The bands should be tied on the trees the first time about the middle of June and removed before the pupa comes out a perfect insect, say about the 12th of July. They can be crushed in the bands when removed. The bands should be again tied on about the 1st of August for the second brood, and removed in December after the worms have gone into winter quarters. Co-operation among fruit-growers would make this method much more effective, as the mature moths of course fly from one orchard to another, and we earnestly urge each fruit-grower to experiment for himself along this line during the coming season.

The Tent Caterpillar. The tent caterpillar of the apple tree is becoming very troublesome in many parts of the Province. The eggs are laid in clusters by the moth in July upon twigs about the size of a pen-holder. The eggs are little cylinders and are placed in masses side by side, from 150 to 200 in a cluster. The little caterpillars emerge in the spring, spin a web, eat the leaves, and when full-grown are about two inches long. If not very plentiful they may be easily destroyed early in the morning or late in the evening by taking a ladder of suitable length and crushing then in their nests. Spraying with Paris green when they are small is also an effective remedy, both for them and other classes of caterpillars. Some of the latter build no nests, but cluster together on the tree when not feeding. Should they invade a new district, tin guards the shape of an old-fashioned lamp shade with a spring wire at the top and about five inches in depth, should be strung around the trunk of the tree. In climbing the tree to strip its leaves, they find this an almost insurmountable obstacle. (Fig. 1—page 61.)

Oyster Shell Bark Louse. The oyster shell bark louse destroys the vitality of many apple trees by sucking out the sap. It is a brownish colored scale about 1-12 of an inch long, and the shape of an oyster shell. It is found all over the Province. In the winter the scales are full of little white oval eggs. These hatch about the first of June into small yellow lice, just perceptible to the eye. Well-cared for trees resist the attacks of this insect. An application of strong lye to the trunks and main branches of the trees by means of a broom or white-wash brush just after they have hatched and before they have made a scale over their bodies will destroy them by contact. The trees may also be sprayed with kerosene emulsion. (Fig. 5—page 63.)

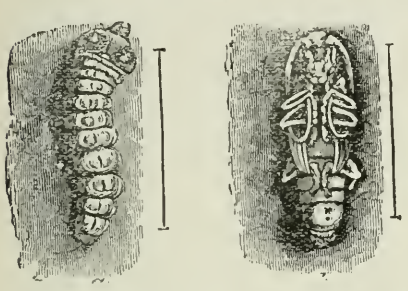
Canker Worms. There are two species of canker worm, the fall and the spring. Late in the fall the moth lays her eggs in clusters on the small twigs. The eggs of the spring moth are deposited in the crevices of the bark. As the warm weather comes on in the spring the eggs hatch. The caterpillars are loopers or measuring worms, feed upon the leaves, are slender in body, sometimes green in color, and are about an inch long. Some orchards have been completely defoliated by this pest. Spraying with Paris green is the best remedy.

Canker Moths : *a*, male ; *b*, female.

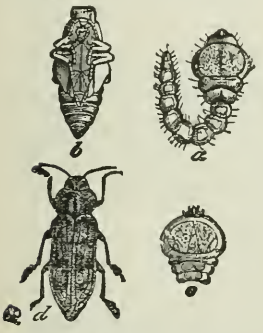


Canker Worm (*f*) and eggs (*a*, *b*, *c*)

Borers. There are two classes of borers, the flat and the round-headed. The former drills holes in the upper part of the trunk and main branches of the apple tree, while the latter works nearer the ground. They are found on the sunny side of the trunk, sometimes in the inner bark and often in the sap wood. The best plan is to go over the trees once a year in the fall with a sharp knife, and wherever the bark is blacked and loose, and holes or sawdust like excretions are found, cut into it and follow up the borer. When they have gone into the wood push in a wire and you may or may not kill them. The moths are deterred from laying their eggs in the crevices of the bark by washing the trunks and main branches of the trees, early in June, and again about three weeks later, with a mixture of one quart of soft soap, two gallons of water and a small quantity of lime. This forms a coating, and may be applied some fine morning when the sun is shining, with a scrub or whitewash brush.



Round-headed Apple Tree Borer, *Saperda candida* ; *a*, larva ; *b*, pupa ; *c*, beetle.



Flat-Headed Apple Tree Borer, *Chrysobothris femorata* Fabr : *a*, larva ; *b*, beetle.

Plum Curculio. The plum curculio is the worst enemy of the plum grower. It makes a crescent shaped cut in the young plum and within this deposits its egg. It soon hatches into a little grub which destroys the fruit. The best method to get rid of it is to jar the trees just after the fruit is set. This should be done every other morning for about two weeks. A sheet is spread under the trees on the ground, or in case of many trees, fastened to a frame mounted on a light wheelbarrow. Directly in front of the wheel is a slot four or five inches in width which admits the frame under the tree. A loose piece of canvas is thrown over the slot. The tree is then jarred by striking it with a padded mallet. This dislodges the curculios, which may be collected and killed. (Fig. 6—page 63.)

Discussion.

Q. How does the use of lime in spraying prevent the Paris green from injuring the leaves ?

A. Sometimes there is soluble arsenic in the poison and when lime is used it unites with the soluble arsenic forming arsenite of lime, thus preventing damage.

Q. What is the best remedy for the currant worm ?

A. The safest and best remedy is fresh hellebore, one ounce to three gallons of water.

Q. Do you believe in spraying ?

A. Yes, most emphatically. Spraying is as necessary as any other operation connected with growing fruit profitably. I spray for the currant worm, the raspberry slug, the canker worm, the caterpillars and various other leaf-eating pests. In some instances the crop would be ruined were it not for effective spraying.

Q. What is the effect upon a tree when its leaves are stripped by caterpillars ?

A. The food of a tree is manufactured in the leaves, and if they are destroyed the tree is for a time starved and its vitality weakened, and in the case of a delicate tree its life may be the penalty. A strong tree will push out new leaves, but its fruiting powers will be seriously impaired for a considerable time.

Q Should trees be sprayed when in full bloom ?

A. No. Spray before the blossoms open, or after they have fallen. There is a danger of poisoning the bees if spraying is done when the trees are in full bloom. We should take good care of the bees as they are among the best friends of the fruit grower in helping to cross-fertilize the blossoms. Besides the pistil of the flower is very tender and susceptible to injury, and might be destroyed.

Q. We sometimes see ants in trees, what are they doing there ?

A. They are often there looking for and feeding upon the honey-dew which has been ejected by the aphis or plant-louse.

Q. What does it cost you per tree to spray an apple orchard ?

A. I find that the average cost per tree for each spraying, and leaving the cost of pump, tank and hose, etc , out of the question, is about three cents per tree for those of bearing age, say from twelve years old and upwards. This is for the Paris green and Bordeaux mixtures when used together. This is also for bearing trees that are young as well as those that are large and old.

Q. What is the value of wood ashes as a fertilizer for the orchard ?

A. A bushel of unleached hardwood ashes is said to contain about three pounds of potash and one pound of phosphoric acid, as well as a quantity of lime, etc. As a fertilizer for an orchard I would say that a bushel would be worth about twenty cents. Leached ashes, having lost most of their potash, would probably be worth about ten cents. Soft wood ashes—that is the ashes of white and red oak, elm and ash—are worth about three-quarters as much as hard-wood ashes. I use ashes in sandy or gravelly loam orchards and not in clay, as the latter is naturally rich in potash, and aim to apply them at the rate of about twenty-five bushels per acre per year to bearing orchards. Wood ashes give a stronger and more hardy tree, and the fruit is finer and of better quality.

Q. What varieties of apples are most popular with the buyers now ?

A. Red apples are preferred in Great Britain, where most of our apples go. Of these in the Burlington district the King, Spy and Baldwin take a first place. The Ben Davis, where it grows well, is also sought after. The Greening, although wrong in color, is still a popular apple. The fall apples, Ribston and Blenheim Pippins, are also in demand, although I would not recommend planting fall apples largely. The King on its own stock is rather a shy bearer and would do better top-grafted on some other hardy variety, say the Talman Sweet. The Spy, too, would start bearing sooner if handled in the same way.

Q. Does quality count for much in an apple for export ?

A. Yes, provided the apple can be placed in the hands of the consumer without injury. Up to date, however, it has been very difficult to do this. Between careless packing and delays in transportation, many of our best apples have in the past been spoiled before they reached the consumer. The result is that it pays the shipper better to export the harder, firmer, but less highly flavored apples, because they carry better. Improved methods of packing, greater promptness in handling and better transportation service, will help to place the apple of quality in its proper position, and as time goes on quality will no doubt tell more and more in the markets of the world.

Q. What are the principal characteristics of a good selling apple ?

A. At the present time a good selling apple requires to be large (not overgrown) firm and hard, reddish in color, somewhat thick in the skin, and free from worm holes, spots and blemishes. The Northern Spy, though thin in the skin, finds a quick sale for consumption both in Canada and the Old Country on account of its superb quality. When better ways of handling apples are inaugurated, it, no doubt as with the King now, will command the highest price in the British markets The Greening is a good selling apple on account of its many good qualities and its well known reputation.

Q Do you believe the Japanese plums have come to stay ?

A. I have a good deal of confidence in the Japan plums. With me up to date they are more hardy than some of our domestic plums, as for instance the Smith's Orleans, Lombard, Reine Claude, Yellow Egg and Imperial Gage. I consider the Abundance and Burbank the best two varieties with Ogon and Wickson standing next The Satsuma and Chabot also offer well. I am also inclined to think that they are less liable to insect and fungous attacks than domestic plums, although not exempt. Some of the varieties are very showy and handsome, although as a class the quality is somewhat inferior. The extreme earliness of some of them is an important commercial point.

Q. What is the best way to apply manure to an old orchard ?

A. It depends a great deal on the way an orchard has been treated. If it has been trained to the plow habit, which is desirable, and stable manure be applied, it should be plowed in early in the spring, while the soil is still moist, but not wet. Next roll and harrow, then surface cultivate until the latter part of July, then quit cultivation altogether. A cover crop for winter protection is desirable. Should the orchard not have been plowed for years, it would probably be better to work well-rotted stable manure in with a disc, as soon as the land is dry enough in the spring Clover or peas plowed in are a good substitute for manure, as all make wood growth. When there is plenty of wood growth, wood ashes are a valuable manure on light soils.

SMALL FRUITS.

Queries Replied to by Prof. H. L. Hutt, O.A.C., Guelph.

Q. What varieties of grapes would you recommend a farmer to grow for his own use?

A. The question of variety is one which depends very much upon locality. In sections where grapes can be easily grown, the following would make a choice collection: Worden, black; Lindley, red; and Niagara, white. In northern sections, or those having a climate such as we have in Guelph, only the earlier varieties can be relied upon to come to maturity. For such sections, we would suggest Moore's Early, black; Wyoming, red; and Moore's Diamond, white.

Q. What varieties of strawberries are best for the Ontario farmer for his own table use?

A In making a selection of varieties for home use, we should aim to get early, medium, and late varieties, and also some of the best for canning. In doing this we would not like to limit ourselves to less than one-half dozen, and would select Van Deman as the earliest, Haverland and Clyde as mid-season, and Saunders for the latest. For canning, the Warfield is a favorite with most house-keepers, as it possesses a very dark, rich color. It is also a heavy yielder on moist soils and in wet seasons but it will not stand drouth. Van Deman, while being one of the earliest, is also one of the handsomest for table use and for canning, but the plant lacks vigor, and requires good soil and good treatment to give heavy yields The other varieties mentioned are all heavy yielders, although not quite so desirable for canning because of their lighter color. The last variety to make up the one-half dozen would be "Irene." This is a very handsome berry, of a dark, rich color, and although we have only given it two years' trial, it last year headed the list for productiveness among 240 varieties under test at the College.

Q. Would you grow strawberries in hills or matted rows?

A. We prefer to grow strawberries in narrow matted rows, believing in this way we can obtain a larger crop and probably nearly as large berries as may be obtained under hill culture. Those who have time to keep off the runners and grow the plants in hills may find a reward for their labor in somewhat larger berries, but we doubt if the extra size obtained will fully compensate them for the extra labor required.

Q. What is the best fertilizer for strawberries?

A. The best plan for applying fertilizers to strawberries is to thoroughly enrich the ground with barnyard manure previous to planting, and apply manure as a covering for the plants when the ground is frozen in the fall; the coarsest of this covering should be raked off and left between the rows as a mulch for the summer. The soluble part of the manure is washed down between the plants, and stimulates a vigorous growth. Upon light, sandy soils, which are the most likely to be deficient in potash, we would recommend giving the soil a liberal dressing of wood ashes, previous to setting in the plants.

Q. Should strawberries be covered in winter?

A. Yes. Strawberries should be covered in the fall, as soon as the ground freezes, with a coarse mulch of some kind. This protects the plants from severe freezing when the ground is bare of snow in the winter, and also prevents heaving of the plants from alternate thawing and freezing in the spring. The greatest objection to a mulch is the introduction of weeds into the strawberry plot; but if a new plantation is set out every spring and but one crop taken from the plot, the weeds will not become a serious trouble.

Q. Should raspberries and blackberries be trimmed in the fall or spring?

A. In southern parts of the Province, or sections where the canes do not winter-kill, raspberries and blackberries may well be trimmed in the fall; but in those sections where the canes are liable to kill back at the top, it is best to defer pruning until the spring, so that the frozen wood may then be removed at the time of regular pruning.

Q. Is there any better raspberry than the Cuthbert?

A. The Cuthbert is probably the best raspberry yet introduced of its type, being productive, firm and attractive in the market. The Columbian and Shaffer are much heavier yielders and are preferred by some for home use, but their dark color is usually somewhat against them in the market.

Q. How shall I prevent my goose berries from mildewing?

A. One of the best remedies for mildew on the gooseberry is to spray them with potassium sulphide at the rate of one-half ounce to a gallon of water. Begin as soon as the leaves commence unfolding, and repeat the application at intervals of two or three weeks. As a rule the American varieties of gooseberries are not subject to mildew, and those who wish to avoid the difficulty of fighting mildew had better grow the best of American varieties, such as Pearl, Downing or Red Jacket.

THE CULTIVATION OF AN ORCHARD.

By F. M. Lewis, Burford, Ont.

Fruit in Ontario. The position held by Ontario apples in the British and other markets of the world is very enviable. The large a nount realized by the farmers and fruit growers of our Province by exportation was $635,700 for the year 1897, and this ought to be many times larger considering we have 6,200,000 trees of bearing age, and nearly 3,500,000 that are not yet of bearing age, but shortly will be. If under the present treatment our trees are yielding such a small return per tree (only about ten cents), let us stir ourselves and try and find out where the trouble is, and apply the remedy to our younger trees.

Orchard Cultivation. From the writer's own experience and that of many others, the conviction is firmly formed that the lack of proper cultivation is the chief cause of barrenness in orchards, although there are many other causes. The cultivation of an orchard should begin before it is set, by having the soil in a splendid state of tilth and rich. The selection of a site is of importance. Peaches and apples do best on a lighter soil, but not leachy. Pears and plums do better in a heavier soil.

Drainage. One of the first considerations is to see that it is thoroughly drained, naturally or artificially. Not simply surface drainage but the sub-soil must be drained. Fruit trees never do well with their roots in the water. When your land is well drained, rich and well cultivated, buy your trees of a reputable home nursery, and an honorable agent. Don't set any more fall fruit than you can use in your own family. Fall fruit is a curse to our market.

Plant Winter Varieties. Select varieties of winter fruit that do well in your own vicinity, and that are known to be of good flavor and keeping qualities. Red apples sell best in the British market. Seek to produce what your best customer wants.

Don't Plant too many Varieties. Don't set too many varieties, as a quantity of good apples of one variety sell better than a lot of odds and ends. Insist on getting trees with good thrifty roots and carefully dug. Cut off carefully with a sharp knive any ragged ends of roots. They heal better. Set your trees just a little deeper than they grew.

How to Plant. Fill in around them with the best surface soil, and carefully pulverize the soil, working it among the roots with the hands, leaving them as nearly as possible in their natural position, then carefully firm by tramping, until within 2 or 3 inches of surface; leave that mellow. For the first three or four years plow deep, six or seven inches, to form in the tree the habit of deep rooting, that they may get a good firm hold of the soil, get food from the subsoil and be able to withstand the summer drouth.

No Grain growing in the Orchard. Do not attempt to grow any kind of a grain or hay crop. They draw too heavily on the moisture which your trees require and you cannot conserve it by cultivation. You may grow a hoed crop for a few years, but do not get too near your trees. As the roots extend keep back with your crop. Put in a hoed crop that comes off the ground early, or that does not occasion any moving of the soil in the late summer or fall season. As an instance, early potatoes may be grown because they are off the ground in good time, but not late ones, for the harvesting of them keeps the soil open and prevents the proper ripening of the wood. Many young trees have been damaged or killed by lack of care in this line. A young orchard that has been enriched and well tilled tending to grow an excess of wood may be thrown by seeding down, but do not leave your seeding but a short time, as an orchard in sod will begin to go down before you are aware of it.

Clover, Peas or Rye. As soon as your orchard begins to bear, stop growing a crop of any kind and cultivate shallow. As soon as the ground is in a proper condition in spring begin cultivating, and keep the ground mellow and well tilled until about the first of August, then if your soil is lacking in nitrogen (if the suckers show a growth of twelve inches and the leaves are a good healthy dark green, it is indicative that nitrogen is not deficient) seed with clover and plow under shallow, the following June. If clover will not take try peas. If you are not needing nitrogen then sow some rye but it must be plowed early the following spring or it will rob your trees of moisture which they need later on. Some sow oats, but barley usually makes a ranker growth than the oats during the fall season. These crops die and form a splendid covering for the land, protecting the roots and making the soil much more receptive to the rain fall, which is a valuable consideration. A good cultivator or disc harrow will put your soil in good condition in the spring without the use of the plow. Cultivate thoroughly.

Value of Cultivation. A finely divided mellow soil is more productive than a hard or lumpy soil of equal richness, because it sets free plant food, supplies air to the soil roots, makes all the soil available by pulverizing it, breaks up the hard pan, makes a resevoir for water, warms and dries the soil, saves the rain by taking it into the soil, prevents evaporation, sends the roots downward, and makes the moisture and fertility of the subsoil available. Study your conditions and cultivate intelligently.

The Orchard must be fed. Lack of available plant food is the cause of unproductiveness in many orchards. An average sized healthy apple tree was plucked of its leaves, which were preserved in the best possible manner and analyzed. Supposing an acre of trees 35 feet apart, from 13 to 18 years of age, would bear 5 bushels each of apples; from 18 to 23, 10 bushels each; from 23 to 33, 15 bushels each, or a total of 225 bushels each in 20 years, the analysis of the apples and the leaves showed there had been taken from the soil in nitrogen, phosphoric acid and potash to the value of $207.

An acre of land producing wheat at 15 bushels per acre, and allowing 7 pounds of straw to 3 pounds of grain continuously for 20 years, would take from the soil in nitrogen, phosphoric acid potash to the value of $128, or $79 less than the apples, to say nothing of the growth of wood. Is it any wonder our apple orchards do not bear? The wonder is that they bear at all.

A soil rich in nitrogen is apt to produce a rank growth of wood. Nitrogen is all important to growing trees, as it enters largely into the formation of wood, but when they begin to bear we want fruit, and potash has largely to do with the formation of fruit. Give your bearing trees an application of one bushel of good ashes annually. There is more money in putting them into apples than into poor soap.

Keep your orchard well fertilized—it pays. Many bearing orchards are not nearly so profitable as might be on account of the inroads and damage from insects and fungi. Spray thoroughly and intelligently—it pays. Many orchards look as though the main crop expected was brush. In such cases it is what is usually got. You get the best apples from the top of your trees, where sunlight and air are in abundance, and the poorest from the bottom where these elements are most lacking.

How to Prune. Prune your trees, to let in the sunlight and a free circulation of air; but use good judgment while doing so. Cultivate incessantly, fertilize abundantly, spray liberally, prune intelligently, and success is assured.

Discussion.

Q How often would you cultivate, and how deep?

A. Now less than every week or ten days, and about three inches, often and deep enough to keep a good thorough surface mulch.

Q. Does it pay to spray?

A. Material, time and labor cost 1¼c per tree each application. Four years ago seven applications gave us 90 per cent. of perfect fruit (free from spot or worm); three applications gave 60 per cent. perfect and when not done we only had 5 per cent. perfect. That pays well.

Q. At what age would you seed down the orchard permanently?

A. I never would. An occasional seeding for one year might do no harm.

Q. What would you do with an old orchard that could not be plowed?

A. If I could plow at all it would be as shallow as possible and turn it over, and then thoroughly work with a disc harrow until the sod was thoroughly subdued. If for some reason it was impossible to plow, pasture with hogs or sheep and feed them some grain. This will enrich the land and keep down the grass. Never take a crop of hay off your orchard.

Q. Why would you plow shallow?

A. You will find that while your orchard lay in sod the tree roots have formed the habit of coming very near the surface, and you cannot afford to cut them off.

Q. What season of the year could you trim?

A. That depends. If I only had a few trees and lots of time I would trim in June, for they will not sucker up so badly as when done earlier. But for the man with a large orchard, he is usually so busy at that season it is difficult to get the brush picked out of the way, and then cultivation is apt to be neglected just when it is all important. For such a man I find March or early April the time, and then get the brush out of the way before the teams get to work.

Q. Is such early pruning apt to injure the trees?

A. I have never seen any bad results.

Q. What would you do with an orchard that has not been plowed for 50 years, and was not productive?

A Go home and plow it the very first day the land was in condition. Give it a good coat of barn-yard manure and ashes, then properly prune it If the trees are of a productive stock, and the soil properly drained, you have every reason to expect fruit.

LIVE STOCK.

MANAGEMENT OF BEEF CATTLE.

By A. P. Ketchen, Brucefield.

This is a subject in which everyb dy is more or less interested, from the big four of Chicago to the humblest individual who buys a s up bone for his dinner. It is a subject, too, that in spite of all that has been written o it never b comes threadba e, for the reason that the more we know about it the more we find there is to learn I believe that our most successful cattlemen are but learning the A.B C's of the art, and that in twenty years from now we shall look back to what we call our present up-to-date methods and call them primitive. It is a business that is conducted by so many men under so many widely different circumstances that it would be impossible to lay down any set of hard and fast rules, and say that these are right and that all other ways are wrong. For instance the methods I might find most profitable under my circumstances might not suit your condi ions at all and vice versa.

Three essential conditions. There are, however, three essential conditions to success that will be found to be important under any and every circumstance, namely : (1) Good cattle, (2), abundance of cheap winter food, and (3), good sound judgment. With these conditions our success is practically assured.

Before investing any money in the cattle business, perhaps the first thing to be done will be to decide the particular class or type of cattle we intend to keep, be ng guided in our choice by the demand of the market, and making our personal tastes a secondary condition. Now as our methods are changing from year to year so s the public demand. Some ten or twelve years ago the cattle required for the export trade were the great heavy four or five year old steers weighing anywhere from 1,450 to 1,800 pounds. Then it was quantity, not quality. To-day we find neat little two or three year old well finished animals weighing from 1,250 pounds up will command the highest price. Of course if weight can be combined with quality, so much the better, but quality is of the first importance. To illustrate the extent to which they discriminate in favor of quality on the British market, let me quote from an address by Mr John McMillan, M.P. : He says, "I was standing on the cattle market in Glasgow one morning, and saw six steers sold. They would average 1,325 pounds, all grades but a little rough. The highest price was £16.10s. The next animal sold was a well built, round ribbed, smooth, compact little beast weighing 1,250 pounds. He was sold for £18.10 s. Here was £2, or practi ally $10 more money for an animal 75 pounds lighter in weight." And this is an incident that is being duplicated every day on the cattle markets of Great Britain.

American Cattle. Did you ever stop to wonder why it is that American cattle are worth a dollar a hundredweight more on the Chicago market than our best Canadian cattle at the seaboard? This may be partly due to cheaper transportation facilities, but the principal reason is that the Americans are breeding a better class of cattle than we Canadians, and are placing them on the English market in a better finished condition.

Quality in Cattle. Now, what do we understand by quality in beef cattle? I define it in this way. That that steer is of the best quality from a butcher's point of view which carries the greatest percentage of its weight in those parts of his carcass which give the highest priced cuts. To do this a steer must be well sprung in the ribs, thickly fleshed along the back, with a good straight underline, and well developed hind quarters. Avoid a light flanked bare backed animal as you would the evil one.

Get a good Sire. Too much importance cannot be attached to the selection of a sire. We should never forget that he is half of the herd. Now while I could content myself with well bred grade cows, I would lay it down as an imperative rule that the sire be pure bred. It is wretchedly poor economy to save fifty cents or a dollar in the first cost of the calf, and lose from $10 to $15 when we place it on the market. Besides this, the prices at which pure bred stock can be obtained in these days leave no excuse for the use of an inferior animal. So much for the breeding.

About Feeding. A few years ago you could scarcely take up an agricultural paper but you would find some one debating on the merits of feeding *versus* breeding : one man maintaining that the breeding was of secondary importance to the feeding, his opponent taking the ground that it does not so much depend on the feeding as on the breeding. But in this enlightened age we have all come to recognize the fact that neither breeding or feeding will of themselves separately and alone produce satisfactory results, but that it is only when we get these two factors in co-operation that we have a right to expect paying return.

The Calf. We will commence with the calf, and just here the old adage applies with peculiar force, the "well begun is half done." By far the most important period in an animal's life is the first twelve months. For this reason I like to have the calves dropped in the fall. It

affords us a better chance to coax them along, and teach them to eat, and when the calf is weaned in the spring he is turned out on the fresh grass and receives little or no check, but goes vigorously along until in the fall he is well started on the pilgrimage of life. I have noticed that in nine cases out of ten, other things being equal, fall bred calves will be better animals at thirty months than their competitors dropped in the spring will be at thirty six.

When a calf is two or three months old we teach it to eat a little clover, hay, oats, bran, etc , and any other dainty that we can induce him to consume. This will pay handsomely It has been proved time and again that a hundred weight can be added to the live weight of a calf at less than one-third the cost of the same gain on the same animal at three years of age. In support of this contention let me cite an experiment conducted by Groff Bros., of Amira, who in their day were perhaps the most successful feeders in the Province.

Experiments. Two animals bred by themselves cost during the first year $3.46 for every hundred weight of gain ; during the second year $10.42, and during the third year $12.53. To corroborate these figures I will quote you an experiment by Mr. Stewart, a standard authority on feeding cattle. He found the average cost of feeding nine animals for the first twelve months was $3.39 ; during the second year $7 97, and during the third year $12.94 for every hundred weight of gain. These cattle were fed at a time when the prices of feeding stuff were much higher than now. If we were to produce beef at anything like that cost then the sooner we got out of the business the better for our pocket books. But these experiments serve to illustrate the point I wish to emphasize, namely the importance of early maturity, and good feeding right from birth.

Finishing. Whenever practicable the farmer should finish his own cattle, if for no other reason than that by raising the stockers and selling them as such he will impoverish his farm very much quicker than he would by buying his neighbor's stock and finishing them on his own farm. Every cattleman knows that a load of manure from a stable of finishing animals is worth at least fifty per cent. more than the same quantity taken from a stable of lean growing cattle. A stocker is chiefly composed of bones and muscle. The bones contain a large percentage of phosphoric acid, and the muscle or lean flesh is accordingly rich in nitrogen, two of the most expensive elements of plant food we find ourselves called upon to supply ; while during the finishing period the animal gains in weight and value and leaves you a much more valuable manure, the fat taken from the food by the animal having little or no manurial value.

Of course it is hard to lay down a general principle which will apply to every individual case. In this matter every man must be a law unto himself and exercise the judgment of which I spoke. For instance, a man may not have the facilities or the feeding stuffs with which to properly finish his cattle, and under such circumstances it might be advisable to part with them in the fall as stockers.

Care in the Fall. In preparing for the finishing period care should be taken to prevent the cattle losing in the fall what they have gained during the summer. It is poor economy to allow our cattle to shiver around during the cold rains and frosty nights of the late fall and early winter consuming as fuel that fat which it has cost us good money to produce. To prevent this it is well to run the cattle in under circumstances such as I have mentioned, and give them a feed of hay or turnips, turning them out again to grass when the weather moderates. In this way the change from summer to winter ration will not be so violent, and you will have your cattle fifty pounds per head heavier at the first of January than you would under the old system of management, namely by allowing the cattle to rough it until the depth of snow obliges us to tie them in and put them at once on winter ration.

Cheap Winter Food. One of the essentials to success in the cattle business is an abundant supply of cheap winter food. The time has gone when we can finish our cattle on a ration of hay and grain with any margin of profit. We must have something which can be produced in larger quantities and at very small cost, and corn whether cured as fodder or as ensilage fills the bill. It is beyond all doubt the best and cheapest winter food at our disposal.

If I were asked to name the improvement of recent times that has contributed the most to the success of the stockmen, I would without hesitation reply the growing of corn and feeding of ensilage. The cattleman who has built for himself a silo, and is handling to the best advantage his corn crop from the time it is planted in the field until it is turned on his farm as a finished product, is taking the shortest cut I known to prosperity. It may be said that this is stating the case pretty strongly, but I feel that if I can induce a man to investigate for himself the merits of the silo (independent of any preconceived prejudices he may have formed) I will have done that man a service.

Chief advantages. The chief advantages of ensilage are : (1) its greater palatibility ; (2, the saving of labor which it effects ; (3 the fact that it can be fed at any time of the year with equal advantage. I known of no better provision a farmer can make for late summer and early fall feeding than by leaving a few feet of well saved ensilage in the bottom of his silo.

Other Foods. While we accord to corn the first place as a cheap winter food, we are not prepared to admit it has a monoply of the field. The farmer who is growing a large quantity of

grain, and has consequently an abundant supply of straw, will find that by growing a quantity of roots to feed with it he can feed cattle at a cost which will compare very favorably with his corn growing competitor.

The objection is sometimes raised to the culture of turnips or field roots, that they are of little value for feeding purposes owing to the fact that they contain about 90 per cent. of water. But the absurdity of this argument is evident when we remember that grass, which is undoubtedly the best cattle feed known to man, contains 87 per cent. of water. Beef itself, which is one of the most nourishing diets found on our tables, contains from 85 to 88 per cent. of water. So it will appear that the feeding value of a substance cannot always be accurately determined by a chemical analysis or at any rate that it does not always depend upon a large percentage of solids. Field roots have a feeding value apart from the digestible nutrients they contain in that they exercise a beneficial effect upon the digestion and general health of the animal to which they are fed. Cattle that are getting liberal rations of succulent food, such as roots or ensilage, will have the sleek, thrifty appearance of grass fed cattle, and there will be little trouble with indigestion or having them go off their feed, as is often the case with cattle that are fed exclusively on dry fodder and grain.

Use Judgment. In the compounding of a grain ration for finishing cattle there is room for the exercise of a good deal of judgment, since our object in all feeding operations is to obtain the greatest gain at the smallest possible cost. The farmer must have a knowledge of the relative feeding values of the various grains at his disposal, and must at the same time consider their market price. I believe it to be a mistake to start cattle off early in the season on too heavy a ration of grain. The tendency is to induce indigestion, and cause the cattle to go off their feed. We find it better to start them off on a very light ration, and keep gradually increasing the quantity until during the last month or six weeks the cattle are receiving all the grain they can profitably consume. It is well to bear in mind that it is not the amount of grain that we can crowd into a steer's stomach that makes him fat, but the amount which he is able to digest and assimilate. If any peas are to be fed I think it wise to reserve them until the finishing period. We cattlemen are under the impression, which I think is well founded, that no grain will put on so good a finish or make the cattle handle firmer or ship better than a few peas fed during the last five or six weeks.

Some General Principles. Let me mention a few of the general principles and close. Let us never forget that it is only with smooth, well bred cattle of a distinctively beef type, carefully and judiciously fed that we can hope to profitably compete in the English market with Argentina and other grazing countries. That if there is any money to be made in the stock raising business it can only be done by keeping the animals gaining as rapidly as possible from birth to maturity. That regularity is one of the first principles of good feeding. And finally that the cattle should be kept as quiet as possible. I know a man who says he would dismiss a man on the spot if he found him unnecessarily abusing a steer He argues, and I believe it is true, that if a steer is unduly annoyed or excited it will take three days of good feeding to make up the loss. So you see it is not a matter of mere sentiment, but a matter of dollars and cents when I say look carefully after these small details of your business, for after all there is no royal road to success in cattle raising. It is the attention to or neglect of these apparently trifling details that will decide whether your business will result in a profit or a loss.

DISCUSSION WHICH FOLLOWED AN ADDRESS ON "BEEF CATTLE," BY MR. SIMPSON RENNIE AT A MEETING IN SOUTH SIMCOE.

Q. Do you raise your own stockers?

A. Mr. SIMPSON RENNIE: I am not a breeder. My practice is to buy cattle at a little over two years from those who have produced them, to feed them between five or six months and then to sell for export to the English market.

Q. Do you find it difficult to buy good steers for feeding?

A. It is difficult to buy steers which will make good shippers. When I entered upon this business twenty-five or thirty years ago, there was no trouble in getting all the stock needed. It is different now, and the difficulty in getting good shippers is increasing year by year. Last year feeding cattle were higher than ever, and the quality not so good as in previous seasons. Why? I have no desire to belittle the dairy business. That is a great and important industry, but there is no doubt that the development of that industry, and the use of exclusively dairy breeds in its prosecution, have caused a deterioration of the quality of our cattle from a beef standpoint. I believe we should endeavor to get back to the Shorthorn or Shorthorn grade. Polled Angus, if pure bred, would also serve well. If you will use pure Shorthorn males on the ordinary cattle about your farms you will get a good quality of feeding steers.

Q. What do you look for in selecting a steer for feeding.

A. Let me give you an illustration of the necessity of using judgment in the purchase of cattle which are to be fed for export. A neighbor of mine decided he would go into the business. Two of the feeders which he bought were what we call Northern Spys. The hides seemed to be almost frozen to the ribs, and they were pointed at both ends. It is true he paid less for these cattle than I did for good feeders of the same age. But what was the result? After a long period of feeding he found that his cattle actually weighed five pounds less than at the time of purchase. In selecting a feeder you should look for a straight back, straight side, silky hair and good chest development. The latter is all important.

Q. You believe, then, that it pays to give a good price for a good feeder?

A. You can go into the Toronto market any day and see yearlings sold as low as 1¼ to 1½ cents per pound, while feeding cattle, showing breeding, will sell readily at 3¼ to 3½ per pound. In fact not long ago I offered 4¼ cents for a steer turned two years, weighing a little over 1,000 pounds, and I could not get it even at that. I am feeding 30 head of cattle this winter which averaged 1,076 pounds when I bought them, and for which I paid $41 each. But I am better satisfied with the payment of $40 for cattle such as I have than I would be with stock of inferior breed costing $15. Some people think it sufficient proof of profit in feeding to say that they have doubled their money. This is no proof at all. You must take into account the value of the feed furnished. Let me make this a little clearer. You buy a real good feeder for say $40 ; if you double your money on that animal you have $40 for your profit and feed. If you buy a poor animal for $20 and double your money you only have $20 for your time and feed.

Q. How long do you feed?

A. I try to begin feeding on the 1st of December, and to have my stock ready to sell on the 20th of May following.

Q. What do you do to kill lice?

A. The very first thing to do when cattle come into the stable is to rub oil along the long hair on the back, around the horns and in the tail. Black oil, known as Champion, made from crude petroleum, and selling at about 25 cents per gallon, will serve admirably for the purpose. If this is done you will have no trouble with lice ; if it is not done, you will find the insects not only on the animals but in the woodwork of the stable, and you will have a great deal of difficulty in getting rid of them. I add about half a pint of spirits of turpentine to a gallon of oil, and one application of this will leave the animals perfectly clean.

Q. Do you tie up your beef cattle?

A. We always tie our cattle in feeding them, and not in any case is anyone allowed to strike these animals during the feeding period. Even if they kick they are not to be hit back. In a short time the animals come to appreciate the kindness shown, and become gentle as lambs. One of the worst things you can do is to allow the prong of a fork when cleaning the stable to strike the animal. Anything that irritates or excites the feeders increases the cost of feeding.

Q. Do you believe in turning steers out to water?

A. No, sir. Water should be in the stable all the time. A neighbor of mine who also feeds cattle, says it is necessary to take them out for water in order to take exercise. But what was the result of his action in following this plan? It took him six weeks longer to feed his cattle than it took to feed mine, and after feeding for that increased period he was forced to sell at 50 cents less per cwt. than I received. He is considered a good feeder, and his ration is certainly more costly than mine. What you desire is to produce as much flesh with as little food as possible. If you expend food in making up the animal heat lost by exposure to the cold while drinking outside you defeat that object.

Q. How do you manage to keep water inside all the time?

A. In one of my barns I have a tank 12 feet deep and 12 feet in diameter. This tank collects the water which runs from the roof of the building, and pipes from it convey water to drinking troughs which are always before the animals. Owing to an accident this tank was broken, and for a time our cattle were watered by a pail from a spring ; but although watered at regular periods, they suffered. I cannot tell you the actual loss to the feeding cattle resulting from the change, but two milch cattle which were in the same stable, and which were affected by the same cause, fell off one-third in their milk. And, as I have said, these cows had water brought to them regularly by pail, but they did not have a supply before them all the time after the tank was broken, as they had been accustomed to before the breakage.

Mr. Jeffs, of Bond Head, suggested that the change from soft to spring water might have something to do with the falling off of the products of the milch cows noted by Mr. Rennie. Mr. Rennie, in reply to Mr Jeffs, took the same view. The chief cause of the falling off was that the cattle did not get the water when they wanted it. Water is the cheapest food we can use, and it should always be before the cattle, so that they may partake of it whenever they wish.

Q. How do you salt your cattle?

A. Mr. RENNIE: We make it a rule to have a supply of salt at all times where the cattle can reach it. Sometimes they may not take it for a day or two, but it is important to have it there when it is wanted. We do not use rock salt, because I do not like to have a big lump about the cattle. I use the ordinary salt and keep it in a box beside the animals.

Q. Do you pulp your roots?

A. No. I feed the roots whole and put the meal on the roots at the time they are fed. Only once in seven years have I had any trouble in cattle choking on whole roots. If I wanted to use a lot of straw I would cut the straw and pulp the roots, feeding both together. This is the only way you can fool cattle into eating something which is of little use to them. If I used straw I would of course use more meal and more roots or else ensilage corn. We are very near the city of Toronto, and we can sell our straw for almost the price of clover hay, and clover hay makes very much the better feed, being one of the best fattening foods we have. The cost of feeding these 32 head of cattle averaged 10 cents each per day.

Q. What grains do you use?

A. We are now using a mixture of oats, barley, wheat, grain and peas. A balanced ration is about one to six. By a mixture of all these grains, with clover and roots added, we get just about an even balance.

Q. Mr. JEFFS, Bond Head: Do you use clean wheat?

A. Mr. RENNIE: We have used it when wheat was cheap. This year we have about 1,000 bushels of grain made up of a mixture of barley and fall wheat, grown on a partially killed out fall wheat field, and which serves admirably for the purpose. Barley is good for hogs, but it is rather too heating for cattle unless mixed with other grains.

Q. What value do you place on the manure from your steers?

A. The manure which you get from the feeding cattle is worth double the cost of the labor expended in feeding them. A ton of clover hay fed to cattle will produce manure which, at the market price of commercial fertilizers, is worth $7.47.

Mr. CREELMAN: A still more important point to note just here, is that a ton of clover does not take $7.47 worth of fertility from the soil on which it is produced. Clover, unlike any other crop except peas and other plants of the legume family, does not rob the soil of its fertility. On the contrary, it actually leaves, in roots and stubble, material which makes the soil richer than before the crop was taken from it. A clover crop is like bees, which work for nothing and board themselves.

Mr RENNIE: If you sell a ton of barley you take from the soil what is equal to $4.74 worth of fertility, and with a ton of peas $9.04 worth of fertility; but by feeding these to your stock, you not only make money on the cattle but at the same time restore fertility to the soil.

Q. What kind of floor do you use in your stable?

A. Scoria blocks—a brick made from crushed granite.

Q. Is not that expensive material?

A. The bricks cost us $9 per thousand in car lots. They will last forever, are not slippery, and in the event of a fire they are not injured. We lay them dry, and if afterwards there is any settling, repairs can easily be made.

Q. Would you dehorn your cattle?

A. It is not necessary to do that when the animal is tied. I would dehorn in cases where the horns are ugly or injured, but I would not think of removing handsome horns. I once bought a lot of sixteen cattle, and you would think the horns of the whole lot had been cast in the one mould. I would not have had those horns removed had anyone given me $5 a head for doing so.

Mr. CREELMAN: What is Mr. Rennie doing? He comes up here into Simcoe County and buys your stocker cattle, and he buys your coarse grains to feed them. By working these two lines of raw material into a finished product, in the form of an export steer, Mr. Rennie makes his profit. He has, as he has just told you, made $500 in less than six months by this simple operation. Is this not a striking illustration of the folly of selling your raw material to another when you may just as well turn it into a finished product yourself?

Q. Are cattle two years old or three years old most profitable to feed?

A. Mr. JOHN MCMILLAN: Two years old if they have been well cared for.

Q. Are they best in loose boxes or tied up?

A. In my opinion they are better in loose boxes.

Q. What quantity of meal is sufficient per day for steers weighing 1,300 or 1,400 pounds?

A. About eight or nine pounds with silage, but always give a mixture. Never feed to beef cattle only one kind of grain.

Q. How often should cattle be fed?

A. We feed three times daily.

SHEEP.

By J. S Woodward, Lockport, N. Y.

Hidden by the broadcloth of the rich or the coarser tweeds of the common people ; hidden by the stately pile of the modern woollen mills ; hidden by the sweaty operator running the loom and the jenny, will be found millions of sheep quietly chewing the cud of contentment, but furnishing the material from which is made nine-tenths of the clothing of the civili ed world. At the same time they furnish the healthiest, most palatable and cheapest of all flesh foods. They not only do these, but more than all other animals they help the farmer in the great never ending battle with the weeds. Neither horses, cattle or pigs will eat any of the very persistent plants we call weeds, and it is well they do not, particularly with the cows, for to do so would ruin the milk produced. But with sheep, no matter how sweet and fresh the grass they will leave the finest to eat weeds and bushes and even eat the most acrid and bitter with the keenest relish. Weeds that, if eaten, would ruin the milk of cows and even injure the flesh of the swine add to the quality of the mutton. The highest and most sought after mutton of England owes its superiority to the character of the herbage on the heather covered hills of Wales.

Sheep should therefore be more largely kept, not only to assist in clothing and feeding the people but to aid the farmer to keep the mastery over noxious weeds and bushes ; but, above all and beyond all, to add to the profit side of his business. Even the man on the dairy farm needs a few sheep, for it is an absolute fact that on the same farm more cows can be kept with a suitable number of sheep than with none, for, where no sheep are kept, weeds, bushes and the coarser unnutritious grasses will gradually spread and crowd out those more valuable.

But the task now before us is to consider the sheep as a source of revenue without reference to these valuable services. Although it is unfair to ignore that which is worth hundreds of dollars to the farm, I am to try and show how to make money in keeping sheep solely from the market value of the fleece and carcass. There are several ways in which money can be made in sheep, but one of these is not the ancient one of keeping them solely for the wool produced. The time was when this could be done and when the fleece would sell for money enough to pay for a whole year's feed and care. Even in those "happy days" this was not the most profitable course. But the conditions have changed, wool has decreased in price, though now higher than for a few years back, and people have learned to value mutton more highly as an article of food. Besides this, it now costs more to keep a sheep than when they were allowed to roam loose over the roads and public commons. It is also lucky for the sheep owner that people are coming to know the value of mutton as human food. I well remember seeing thousands of sheep killed for their wool, tallow and hams. No other part was considered of any value as food and was fed to the hogs. Now all parts of the carcass are utilized, and the price of mutton compares very favorably with the meat of any other animal. We must, therefore, heed these changed conditions, and now make the production of meat the primary consideration in keeping our flocks, and count the wool as a secondary though valuable adjunct.

There are now only three ways in which we can keep sheep with any profit, (1) raising winter, or so called "hot house lambs"; (2) raising an annual crop of lambs to be sold as soon as mature ; (3) winter feeding of lambs for spring market.

Hot House Lambs. There is no branch of the sheep industry that will begin to pay the same profit as winter lamb raising, but to get this large profit all the conditions must be just right. First of all an appreciative market is needed, and, unless this is within easy reach, one had not better embark in this branch. Large cities are where the markets are, but all large cities are not good markets. It is not the men who live by their daily wages, though earning from $10 to $30 weekly, that eat winter lambs, but men of abundant wealth and who think more of a good dinner than of their dollars, and the city to be a first class market must have plenty of this class. New York is the best winter lamb market on this continent. While other cities may have more wealth, they have not the people who spend money so lavishly to gratify their tastes. While a lamb from seven to ten weeks old, properly grown and fattened, will sell from two to four times as much as the same lamb at a year old and from six to ten times as heavy, yet Canada has so few large cities, and fewer of those reckless livers, that it would not pay many to go into this branch of the business.

Winter Feeding of Sheep. Of the two remaining branches of profitable sheep keeping, the winter feeding of lambs is surest of profit. Not every year will this pay a big profit, but the man who fits his folds properly and who goes steadily into it each year and sticks to it, will at the end of five or ten years, have no reason to feel dissatisfied with the balance on the right side of the ledger. But, in order to make the most money in feeding lambs, we must have the folds properly constructed, select the best kind of lambs to feed, and then feed a proper ration and have plenty of clean fresh water, always accessible. Most people give lambs to much room, utterly forgetting the plain rules that govern animal nutrition. What is wanted is to produce most growth at the least cost of food, and meat that is lean, tender and juicy. They seem to think that exposure to cold and compelling them to run over the fields will make them healthy and make the best quality of mutton, but such is not the case. What would be

used in keeping the lamb warm in the cold would add to the growth in a warm fold, and exercise, never makes muscle or lean meat, it only hardens it.

The best fold for winter feeding of lambs is not over 10 feet wide and just long enough to allow each lamb room to come to the feeding rack. For ordinary lambs a pen 10 by 25 feet will easily accommodate 20, and no more than that number should ever be fed together and they should always be selected of uniform size. The best fodder and grain rack combined I have ever seen can be made as follows :

For posts use 2 x 4 cut 36 inches long, and three pair will be enough for a 16 foot rack. Cut a piece 2 x 4, 26 inches long and nail across 1 inch from the lower end of posts. Now put a board 1 x 12 on these close against one post, and nail it for the bottom of the manger. On this put boards 18 inches wide, with the lower edge chamfered to fit on the bottom board and the top resting against the other post to make the slant part of the bottom ; nail to the bottom board and posts firmly. On this put other boards 16 inches wide and nail to the posts. Now nail a 4 inch strip to the posts resting on the bottom board and nail the bottom up unto this. On top of these posts nail a 6 inch board on the inside over the 4 inch strip, and on these two on the inside nail pieces 3 inches wide and 14¾ inches a part from the centre.

Figure 2 shows a front view of one end of the rack. One side of this rack, as can be seen, forms a part of the feeding alley, and they may be only a couple of feet apart. Put the lambs into these pens as soon as the cold has ruined the food value of the grass ; provide an abundant supply of clean fresh water, and never let them out till ready for the market. I need not say that these folds must be dry, kept clean and thoroughly well ventilated. As it has been so clearly demonstrated time and time again by the Stations that the mutton can be made almost to order by varying the food, no one should attempt to feed lambs without a full knowledge of the food required and an abundant supply. Peas and pea vines are splendid foods, and Canada is fortunate in being so well adapted for their growth. Clover hay is also an ideal food, but under no circumstances would I use timothy. Lambs don't like it and it is not much better than wheat straw for them.

In addition to clover hay and pea vines, nothing will better fill the required variety of coarse forage than well-matured, well-cured corn silage. To be cheaply and healthily fed, lambs must have an abundance of succulent food, and, while roots are fine for this purpose, I know of nothing quite so good as silage. I like plenty of both roots and silage, but if I would have but one I would prefer silage. Some people seem afraid to feed too much succulent food, and, of course, if sheep are compelled to run out in the snow in zero weather, it is not well to feed too liberally of this kind of feed : but, keep them in warm quarters, and there is no danger of their eating too much.

What is wanted in mutton is the lean, tender and juicy meat, and we must not forget that by the feed furnished the character of this can be almost controlled. So, if we want lean meat we must select nitrogenous food in large proportions. Of course the lambs require much of the carbonaceous foods, but by feeding silage, if made from well-eared corn, we will supply plenty of this. Under these conditions the grain ration should consist of wheat, bran, peas and oats, to which may be added a little linseed meal, and, for a few weeks towards the last of the feeding, a little corn.

Kept and fed as described, a lot of lambs will eat a large quantity of straw if it is bright and barn-housed, and they should have all they will eat and enough besides to keep pens clean and dry. No animal is so much neglected and no animal so much needs an abundance of fresh water as fattening sheep. Thousands are fed which get no water but in the form of snow, but, if water clean and fresh is always available, they will drink very often ; but they are very fastidious, they won't drink dirty or stale water until compelled by severe thirst. The water dishes should be kept so clean that the shepherd would be willing to drink from them, and it is better if water is allowed to constantly run into them.

A serious error is made in selecting stock for winter feeding. Too large and well finished lambs are taken. These cost too much money, and there is not enough chance for growth. I would prefer younger lambs weighing not over 40 to 60 pounds when purchased, to the heavy, fat, 80 to 100 pound lambs, and this kind can usually be had for more than a dollar per hundred less than the heavy ones, and it is as easy to make a gain of 40 to 60 pounds on the lighter as half that on the more mature ones.

Another very important thing to be remembered, to make the most gain, the lambs should be shorn not later than New Year's day. It is better to shear as soon as they are well quieted down in feeding quarters. The advantages of winter shearing are several : More can be put into the same space ; can be more closely and warmly housed, and, above all, it takes all the ticks. A half dozen lively ticks are fatal to all gain ; what then would be the effect of several hundred, and I have seen more than a thousand on a single lamb ?

We must not neglect to provide for an abundance of salt for our lambs. It is well to fix a stationary box in some suitable place to be kept full of salt, to which one-sixth its weight of sulphur has been mixed, with a large tablespoonful of turpentine to each pint added. A lamb's stomach is a good time-keeper, and it is very requisite that the lambs be fed and cared for with regularity, "*to the minute*" is the best way.

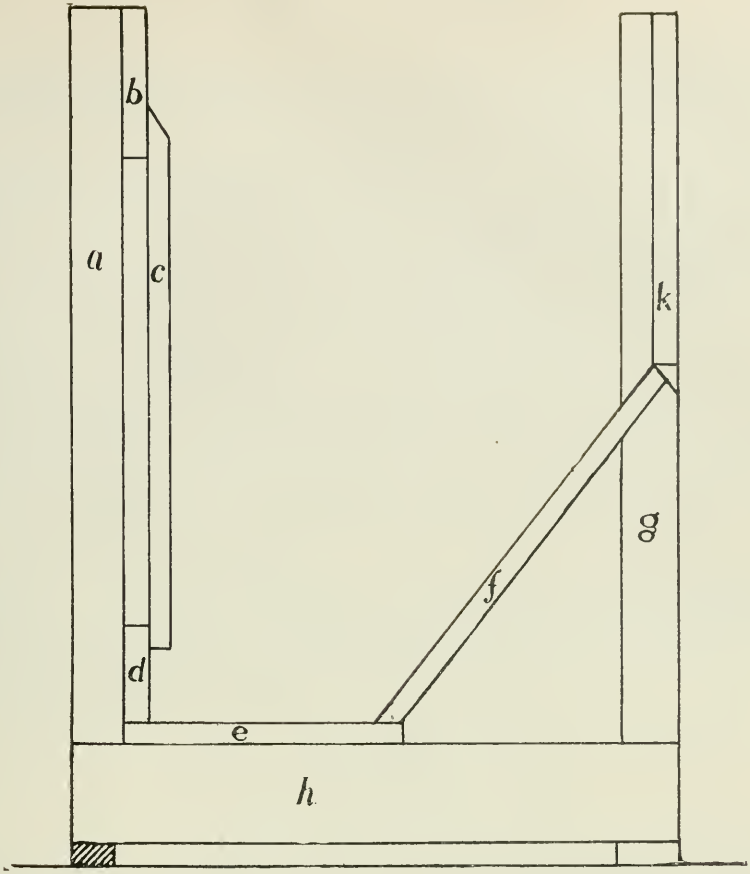


FIG. 1—End of Rock, section to show construction. *a*, post, 2 x 4 x 36 inches; *b*, top board 1 x 6 in.; *c*, slat, 1 x 3 x 24 in.; *d*, base board, 1 x 4 in.; *e*, bottom board, 1 x 12 in.; *f*, slant boards, 18 in. wide; *g*, post, 2 x 4 in.; *h*, bottom support, 2 x 4 x 26 in.; *k*, front board, 16 in. wide.

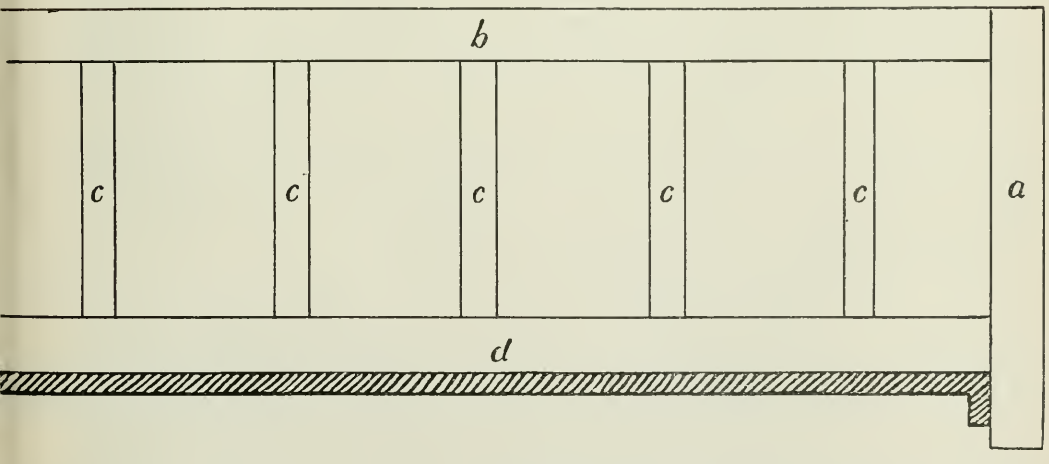


FIG. 2.—Front view of Rack. *a*, *b*, *c* and *d*, see Fig. 1. Openings between slats, *c*, *c*, eleven inches.

As has before been said, there will be an occasional year when very little besides the manure will be left as profit (but this should be satisfactory when it is so much needed); but then there will be other years when the feeder will more than double his money, and for a period of five years a good margin will be on the right side.

Raising an Annual Crop of Lambs. One other way remains to be considered in which the sheep keeper is reasonably sure to make a good profit—the steady annual production of a crop of lambs for market. For this purpose the lambs should be dropped before the ewes are turned to grass. The conditions are more favorable, and the shepherd is around to closely look after the flock, and, when ewes and lambs go to pasture, the lambs can take care of themselves, and it would be a poor shepherd who should lose 2 per cent. of his lambs. While if lambing does not take place till the ewes are out to pasture, the sudden spring squalls, the chilly winds and other untoward conditions cause from 5 to 10 per cent. loss even with the most careful handling. Within four days of birth the male lambs should be castrated, and within ten days all lambs should have their tails cut. The ewes should have been generously fed on succulent food, which should be continued until they go out to grass. It is a good plan to provide a separate pen into which the lambs can go to get a little supplemental food every day. As soon as lambs are four months old they should be weaned. To do this, put them into good feed with a few very tame old ewes to mother the flock, and put them entirely beyond the hearing of the ewes. They should be regularly fed each day a little wheat bran, and, if one can have a rape field into which to turn them, it will pay largely. They should be fully supplied with salt into which a little turpentine is mixed, and can be fed in winter as before indicated and made to go to market in spring weighing from 150 to 200 pounds, and fit to bring the highest price for export.

Marketing the Wool. Do not wash the sheep nor submit to a deduction of one-third or one-quarter for dirt in the fleece. Keep sheep as clean as possible and sheer in a clean place. Do up the wool singly, but don't use too much or too large twine. Don't sell wool to a local dealer who pays as much for the dirty, greasy fleece filled with tagged locks and filth as for the cleanest and best samples. To avoid this, ship your wool to some good, substantial sorting house. Your wool will then be sorted and graded, and each grade sold for all it is worth and you will not be asked for a deduction for unwashed or buck's fleece. Intelligently handled and honestly treated, sheep are a necessity on all farms, and will pay as well as anything the farmer owns.

Discussion.

Q. What breed of sheep do you find best for winter lambs?

A. Nothing we have ever tried equal Merino ewes or their grades as mothers, and Dorset rams for males. The Merino lamb will not be as large as some of the mutton breeds, but it will be much fatter and this is what is wanted. A fat lamb of twenty-five pounds dressed will sell for much more than a scrawny one of fifty pounds.

Q. Do you have no trouble in getting ewes in lamb so early?

A. We do. If we get twenty-five per cent. of the ewes to drop lambs before New Year's day we consider ourselves fortunate. Of course Dorset ewes will lamb at any time, but they do not make their lambs fat young enough.

Q. Would it pay to raise winter lambs at four or five dollars each?

A. It does not cost as much to raise a winter lamb to six or ten weeks as it does to keep a lamb until fall, does it? Then why won't it pay to sell the winter lamb at $4, when you get no more than $2.50 to $3 00 for the same lamb if kept until fall.

Q. Do you really mean to be understood to say that lambs can be penned as closely as you have indicated and remain healthy?

A. Most assuredly. I have seen lambs penned as closely as in pens only six feet wide and with only rack room to eat. The whole secret in close penning is in having folds of good height, keeping them well ventilated, having dry air and keeping plenty of litter in the pens so that they will be dry, and then keeping down all smells with land plaster.

Q. How often do you feed fattening lambs?

A. Hay twice, silage twice, roots once, grain twice, and straw once.

Q. That keeps the shepherd busy all the time, does it?

A. Yes. That is what we have him for.

Q. Would it not be less trouble to have pens larger and put more lambs together?

A. Quite likely, but they would not do nearly as well. We have tried different sized pens, and have concluded that twenty lambs are enough for any pen, and, besides, one should use great care in having them graded uniformly

Q. You say castrate before four days old. Isn't that pretty young for this operation?

A The younger, after they are well on their milk, the better, as at this time the organs are but little developed and there is not much blood in them. When so young they scarcely mind it.

Q. Is not barley a good food for fattening lambs?

A. Very good to take the place of corn, but at the price it usually brings in comparison to corn it is pretty expensive. Corn in silage is by far the cheapest feed of the carbonaceous kind.

Q. Do those very heavy lambs you say we can get by raising an annual crop and winter feeding them, bring the highest price?

A. Usually not, unless good enough for export, but they will make so much weight that the small difference in pound price will not materially reduce the profit in growing them.

Q. You speak of buying lambs for winter feeding weighing from forty to sixty pounds. Do you mean to buy the scrubs and culls from the flocks?

A. By no means; but to buy the late lambs for which there is not much demand, and none for shipment. I once fed a lot of cull lambs that weighed less than thirty pounds after being shorn. When put into winter quarters they were alive with ticks. In shearing I took most of these off and then killed the rest. They cost me on an average less than seventy-five cents a head, which the wool nearly paid. I fed them till May, made a gain of forty-two pounds each, and sold them at seventy-two pounds for 7½c per pound. You will see there was a good margin of profit even if they were culls. But I much prefer the late thrifty lambs.

Q. How do you get rid of the ticks?

A. An old hen with a brood of late chickens is a splendid "tickicide." I usually aim to have several of these in my folds. They don't disturb the lambs and not a tick will stir but they will take it, and ticks make eggs of first quality. Many of the sheep dips are sure death to ticks. A certain death easily applied is to take common coal oil and fried meat fat or lard oil, one part kerosene to two of the fat or lard oil, put in plenty of salt and heat the mixture as hot as possible, as it will not burn the lamb. Pour along the back of the lamb and it will kill every tick and tick egg that it touches. It is also good for the wool.

Q In weaning lambs you say give them good clover pasture or turn them on to rape. Would you confine them on such pasture?

A. You cannot do better than shut them on a field of second growth clover giving them plenty of salt, but by no means shut them continuously in a field of rape. Rape is a splendid feed for lambs from weaning time until winter, but they should never be confined exclusively to the rape. Always allow them the run of an old pasture. Give plenty of salt, and it is better to feed a little dry bone every day with it.

THE CARE OF BREEDING EWES.

By James Tolton, Walkerton.

It would be folly on my part to lay down any hard and fast rules for the management and care of the breeding flock that would apply to the whole Province. In the first place, climate, locality and nature of the soil have very much to do with the production of feeds that are profitable and suitable for the feeding of the flock. So that in what I say about the care of the breeding flock can only be in a general way.

In Selecting a Flock. First, get the flock. If it is to be a purebred one, see that you have the type and character of the breed, that they have constitutional vigor, and that there are no culls, or ewes that are too old, for when a ewe begins to lose her teeth she is getting too old to be profitable. If it is only possible to have a grade flock, much the same conditions will apply. Aim to have them about the same type and be sure that they have constitutional vigor, for upon this much will depend as to your success or non-success with them.

Mating Season. Now suppose it is about the mating season; the flocks should be carefully looked over, and if in too low or thin condition from suckling one or two lambs the preceding season, they should be put on better feed, so that they may be gaining in strength and flesh during the breeding season. By attending to this the offspring will be more vigorous and there will be a larger proportion of twin lambs.

Vermin. Another thing, a small matter apparently in itself, watch for parasites that sheep are subject to. I mean the sheep tick and sheep louse; if they are infested with them they should be during the warm days of the fall, dipped, or have poured over them one of the antiseptic non-poisonous sheep dips that are now obtainable at almost any drug store.

Sire should be Pure-bred. It is of vital importance that the sire that is used should be purebred. If he is to be used on a purebred flock, he should be of the same breed as the flock. If on a grade flock, of a breed that best meets the requirements of the owner, and the flock; that is, in some localities a fine wool breed would be more profitable than a long wool breed, and *vice versa*. After making the selection of the breed, next comes the selection of the individual animal. He should have the type and character of the breed; he should be robust, vigorous and of a masculine character. The time of mating depends largely on the locality and the use the flock is to be put to. It should be regulated so that the lambs may dropped in comfortable and dry quarters, or else not before the weather has become warm and the fields are partly dry. It is better to apply some kind of marking on the sire's breast, so that he may leave his mark of

service. This application can conveniently be put on when he is going to his grain ration, which he should have daily while in service. There are two objects in this marking process. You can know for certain in two weeks if the service is effectual, and you can keep a record of service, and if necessary make suitable arrangements for the ewe dropping her young. In some parts of America no protection against the inclemency of the weather is required. In others suitable buildings are necessary. But in no case need they be expensive ; all that really is necessary is that the flock be kept dry, protected against draughts, and have plenty of pure air and exercise. It is proper here to say that the flock, particularly the long wools, should be protected against the cold and drenching rains that we sometimes have during the late fall.

Food. Now about feeding and foods. The natural habit of sheep is to run at large and pick its food from the grasses or other feeds, and the nearer to nature we can keep along this line the greater will be our success. But sheep, as well as other of our domestic animals, will accommodate themselves to confinement and prepared foods, and none of our domestic animals respond to generous treatment more readily than sheep. While we have winters we will not only have to provide protection, but suitable food for the flock. I have already observed that the ewe should have generous treatment during the fall. This may be done by having good pastures of clover or other grasses, or by providing some rape, and during the winter giving plenty of good sweet clover hay. Where peas and beans are grown the straw of these grains can take the place of the hay to some extent, say one feed per day of hay and two feeds of straw, or *vice versa*. In addition to the hay and straw a breeding ewe shou'd have two or three pounds of roots per day, the quantity being increased as parturition draws near, and after that period give her as much as she cares to eat.

Oats and Peas. The ewe should also be fed during the winter some grain for at least two months before dropping her lamb. One to two pounds is sufficient. I think, perhaps, the most suitable grain is oats, or oats and peas mixed, and where peas are not grown, corn can take their place Where roots cannot be conveniently grown wheat bran will take their place to good advantage ; in fact, for increasing the flow of milk, no food will excel wheat bran. Sometime before the ewe is shorn she will be put on fresh and succulent grass. Before this is done she should be tagged, or the wool clipped from between her hind legs, to prevent her udder getting dirty, causing the lamb to refuse its food.

Salt. Then sheep require salt regularly once a week, or, what is better, keep rock salt, or a box of salt, at all times within their reach. While the ewe is suckling her lambs she requires generous treatment, so that the lamb may not be stunned but kept growing in its youth. In about a week or ten days after the ewes are shorn the lambs should be dipped in a sheep dip, for about this time if any sheep ticks are in the flock they will be upon the lambs.

In my opinion more of our farmers should have a breeding flock corresponding in numbers with the size of the farm and the other live stock kept. For the capital invested, the feed consumed, and the time and labor expended, none of our domestic animals are so profitable.

Mistakes in Sheep Breeding. It is a mistake to pasture sheep on the highways during the summer months, to be run up and down by all the passing dogs who take great delight in chasing them. Besides the owner is losing their manure, which is very important. For the amount of food consumed the droppings of sheep have more manurial value than that of other animals kept on the farm

It is a mistake to think that a straw stack is sufficient protection, and that the sheep can pick from it all the food they need during the winter. Is it any surprise the sheep kept in this way are a disappointment, and the owner says that sheep do not pay ? For in the spring the sheep that remain alive to tell the tale will probably have lost about half their wool, and the little that remains will be of very poor quality.

It is a mistake to think that the only use for a sheep is as a scavenger to eat down the briars and other bushes on the back lot and around the fences, and to keep down the thistles and weeds upon the summer fallow, if there should happen to be one. None of our animals respond to generous treatment more readily than the sheep.

Don't Crowd Sheep. It is a mistake to crowd too many sheep into an ill-ventilated pen or stable, during the winter season, or to have too many on the pasture during the summer. During the winter sheep need protection from the storms, but the buildings need not be expensive nor too warm ; all that is needed is for them to be kept dry and sheltered from the winds. In the summer they require plenty of pasture, but it should not be allowed to grow too high or to run to seed, because they prefer the sweet and fresh grass near to the ground. They like changes, and it is better if it can be so arranged to have them a few days in one field, or portion of a field, and change to another field.

It is a mistake to use a scrub sire, because he can be bought cheap. Some farmers go to a sheep dealer and pick a ram from the flock he has bought to ship to some lamb market, and get a sire at about mutton prices, because they say that it would not pay them to go to a pure-bred breeder, and pay the price for a good pure bred sire. The result is that in all probability they get a mongrel-bred sire, and as like begets like his get have no particular type or character, because he has none to transmit.

Avoid Changes of Breed. It is a mistake to change the breed every time a change of sire is necessary. It is better to aim to have some particular breed in view, and keep to it, always buying sires of that particular breed. If good sires are selected the flock will soon have the type and character of that breed, and it will be uniform, and when either wool or mutton is desired to be sold it will command the highest price.

Essentials to Success. It is a mistake to go out of keeping sheep every time there is a change of government, or because there is a temporary depression in prices. It is true that legislation may help some industries, but it would be folly for the stock breeder or farmer to look for success in that direction. Success depends more on the knowledge, thrift, energy, economy and business-like tactics adopted by the manager of the industry, whatsoever kind it may be. Besides is it not a well known fact that there is nothing we raise or produce upon our farms but has its season of depression?

Sheep do Pay. It is a mistake to say that sheep do not pay. There are but few farmers or breeders who carry on their business either for the pleasure or fun there is in it. Nearly all of us who are engaged in these occupations are doing so because our bread and butter depends upon them. If the sheep business does not pay us, we should certainly go out of it. There are two sources of revenue from the sheep each year, wool and mutton. It used to be said that the wool would pay for the sheep But that was when wool commanded a higher price than it does at present, but with the addition of the crop of lambs we not only get return for food consumed and attention given, but interest on the investment and a profit besides. I have sold lambs for mutton purposes in the early part of November at $4.12\frac{1}{2}$ per cwt. that realized $5.60 each. A flock of grade ewes are worth $6 to $10 each, and the flock of ewes raise one and a half lambs to the flock. By selling the crop of lambs in the fall the investment is returned, and the flock of ewes remains to the good.

It is a mistake to assume that sheep require but little or no attention. The careful shepherd will see that his flock has plenty of nutritious food during the summer months, and a similar ration during the winter, for he knows that it is only in this way that the crop of wool will have a long, lustrous, and strong fibre. The flock will be kept healthy and vigorous and, consequently, profitable.

SHEEP FOR BREEDING PURPOSES.

By Prof. John A. Craig, Ames, Iowa.

The Ram. The ram should show masculinity in many features. In those breeds that have horns, the latter should spring strong from the head and turn clear from the face In all rams the face should be broad between the eyes, somewhat short, and with a Roman nose. The crest, or schag, should be thick and rising, and the neck full. A point deserving emphasis is the depth of the chest. The body should sink deep between the fore-legs, and the ribs back of the shoulder should be deep and round, making the girth large and the brisket prominent and wide—two features that are indicative of a strong constitution. A live fleece, that is one that is springy and not dead to the touch, and especially a dense, thick covering of belly wool, is also indicative of vigor of constitution. For the same reason, in those breeds that are woolled about the head, the more complete and dense this covering is, the better it is liked. The legs of the ram should be straight, and strong and short. In movement, the ram should be bold and active. This is often influenced by the condition. A ram should never be so heavy in flesh as to be useless for service, as is too often the case in the show ring. The flesh should be even and firm, and not gathered in masses or rolls at any part of the body It is very apt to gather at the fore flank, leaving the back bare or raw. Excessive condition is likely to make the ram unwieldly in action, or result in broken-down pasterns, which usually render a ram useless for breeding purposes.

The Ewe. The ewe should be rather long in the face, with fine features. The neck should be slender, and without any of the thickness noticeable in the ram. The body should be deep, round-ribbed, and specially long, so as to provide room for the growing lamb. The type of the good milking ewe verges strongly toward that which is typical of the good dairy cow. The ewe that milks well, and consequently rears early maturing lambs, tends toward the wedge shape, deep in the chest, large-bodied, and wide across the loins and hips. The condition of the ewe should not be such as to impair her breeding qualities. Excessive fatness, as a rule, is in this way injurious. The flesh should be evenly distributed, and not gathered in bunches about the tail-head, and it should be firm and not flabby.

As a result of our consideration of the good and bad qualities of sheep, there arises the more important problem of breeding to reproduce the former and to remove the latter. I have failed to find, up to this day, where success has been obtained by in-and-in breeding, cross-breeding, or any other form, but that there was a man behind the system who knew well the merits and demerits of the animals he was breeding. And further, knowing these, he made his selection to get the best blend. This is the basis of a method of breeding that arises from what

has gone before. For want of a better term, I have named it "balanced breeding," and I believe that this method has the means of developing and adding to the good qualities, and at the same time lessening and removing the demerits of our domestic animals.

To follow balanced breeding in sheep would mean the selection of rams which the leading thought of removing the weakness of the flock. When one realizes the force of balanced breeding and acts on it in the selection of sires, it is wonderful what strides may be made toward perfection in a few years. With this sire we correct a deficiency of the fleece, and yet retain the good qualities of form ; with another, we add a little more bone ; another deepens the flesh on the valuable parts, and so on, each marking a new advance ; while closer discrimination and riper judgment keep disclosing new features to be attained in each additional effort.

DISCUSSION.

Mr. ANDREW ELLIOTT answered the following questions :

Q. Does the feeding of turnips have a bad effect on breeding ewes ?

A It is believed so by some. My impressions is that a lack of exercise is the great evil. Ewes must be exercised, fed on the snow away from the barn when practical and so compelled to move around. I have always fed turnips largely and never had any trouble.

Q. What is the use of keeping sheep, dogs kill them all ?

A. Perhaps no one thing prevents the more extended keeping of sheep than the dog nuisance. Our legislators apparently have more regard for the success of the dog industry than the success of our flock masters. While we are indebted to the Hon. John Dryden for a more stringent dog law, yet much requires to be done. What reason is there that one of the most profitable branches of stock-keeping should be paralyzed because a lot of unresponsible voters should be allowed to keep dogs ? I is seldom a farmer's dog that does the damage, but those kept by the roadside, town and village voters, people who have little or no interest in the country and as a rule keep dogs in proportion as they are unable to feed and clothe their children The dog law ought to be made much more stringent. A heavy tax should be put on all dogs, not less than $5 or $10 per head would be better. Payment of losses should be made compulsory, and all losses should be assessed and paid by the municipality but afterwards refunded by the county in order that the inhabitants of the town and villages whose dogs mostly do the damage shall pay a share. It may be said that $10 is an oppressive tax on a dog. Well, assessed as we are, what difference whether we pay a $10 tax on our dog or that amount on something else, and it would rid the country of thousands of worthless curs which prey upon the flocks of the farmers.

Q. Do you think more Ontario farmers should raise sheep ?

A. Owing to a long continued system of grain growing, our lands have become impoverished to such a degree that it is no longer profitable and some system must be adopted that, while it will afford a means of obtaining a livelihood, will at the same time restore the fertility to our exhausted soil. It is admitted that there is no kind of farm stock that will do this as rapidly and surely as sheep and at the same time yield a handsome profit to the flock-master.

Q What are the peculiar advantages of sheep-breeding ?

A. (1) They are profitable. For the same investment no such profit can be as surely obtained from any other kind of stock Any careful farmer can buy his breeding stock and inside of a year pay the entire cost and have a handsome profit left.

(2) They enrich the soil. It has passed into a proverb that the foot of a sheep is golden.

(3) They destroy weeds. Eighty-five per cent. of our weeds to-day are totally consumed by sheep. It is noticeable that farms on which sheep are kept are comparatively free from weeds

(4) They require little care compared with other stock, are easily fenced, easily housed and easily cared for.

(5) They require cheap buildings ; any frame building that will keep them dry and free from draughts is suitable.

(6) The profits from sheep are largely derived from their capacity of consuming the coarse, cheap, unsaleable products of the farm.

(7) The price of sheep and their products have fluctuated less in value during the last twenty-five years than that of any other kind of live stock.

(8) They are healthy, no disease being present in Canada. The climate also is admirably adapted to sheep raising.

(9) They yield a quick and constant return—two crops per year, lambs and wool. They also find a market at any season.

(10) There is a growing demand for pure-bred sheep from the United States, which demand if intelligently met by us will be permanent.

(11) Sheep pay and will continue to pay.

Q. What kind of sheep are the best ?

A. The kind you like best, but having decided what kind to keep, stick to that breed. How often do we find in one flock, grades of all known breeds and of no breed at all. Buy from time to time the best ram you can afford of your chosen breed, remembering that the ram is more than half the flock. Keep the best of your ewe lambs, and in a few years you will have a flock of which you will be proud.

Q. What kind of lambs take the market best?

A. A lamb carrying a dark fore and legs, not too large and well fatted. In Buffalo market lambs from 90 to 100 pounds sell much more readily than heavier weights and at a better price. The same is also true regarding lambs shipped to Great Britain, extra weights being classed as sheep.

Q. Can our lambs be sent to the British market at a profit and compete with frozen mutton from Australia and Argentine?

A. If we send lambs of a sufficiently good quality they do not compete with the frozen mutton of those countries, but against the product of the British Isles. The evil is that a large proportion of our exports to that market consist of rams and old ewes which spoil our reputation with the English consumer.

Q. Would you dock or castrate lambs?

A. Yes, by all means. They are much cleaner if docked and lambs are quieter and thrive better if castrated. They also, later in the season, bring a better price, as much as a cent a pound difference being paid for wether lambs.

Mr. A. George, Port Elgin: Q. Would you feed roots to breeding ewes?

Prof. G. E. Day: A. We have fed five pounds of turnips per day to our breeding ewes all winter, with excellent results. Along with the roots, we feed hay, pea-straw and a light meal ration of oats and bran. I am of the opinion that no bad effects need be feared from a reasonable root ration, if a little grain is fed. The quantity of grain must be regulated according to the condition of the sheep. The backbone of the ewe should always be well covered with flesh, and the shepherd should frequently put his hand on the backs of the sheep to determine whether this is the case or not. The grain ration may vary from next to nothing to over a pound per ewe per day, depending upon the quality of the other fodders, and the condition of the ewes when they come into the pens. Do not let the ewes get thin.

HORSE BREEDING FOR PROFIT.

By G. C. Creelman, B.S.A., Superintendent of Farmers' Institutes.

Every business seems to have its ups and downs, its times of prosperity and its times of adversity. For a number of years a well-bred Ontario horse was "as good as the wheat," and then all at once everybody seemed to have more horses than could be fed, and even good animals went a begging. The causes for this were overproduction, indiscriminate breeding of totally unsuitable animals, the substitution of electricity for horse power on street cars, and last, but not least, the general depression all over the world. The inevitable result followed. The majority of farmers ceased to breed horses, and many of those who did continue in the business became careless as to what kind of sire they used. Men stopped importing high-priced stallions, and the trade became demoralized. For the past year or so the balance has been gradually shifting again. The scarcity of good horses, due to the cessation in breeding, caused a rise in prices, and then the war coming on in South Africa increased the demand. This has brought the price of horses back to a point where it is profitable for an Ontario farmer to breed them.

Horses Scarce and Higher Prices. Alfred Marois, of Montreal, who buys extensively in Ontario, and who is a good authority on the conditions of the horse market, states that he finds horses from 1,200 to 1,600 pounds in weight, which are most suitable for export to Great Britain, very scarce. These horses are in demand for the London bus trade, and with the exception of fancy carriage horses, these of the heavier weights bring in more money to both seller and buyer than animals weighing less. A few years ago Mr. Marois bought twenty carloads of such horses in one winter around Lindsay and Peterboro', paying for them prices from $65 to $100 apiece The best of the same class now cost him $140. While large horses are scarce, however, small, light horses are very plentiful, and he can buy ten good horses from fourteen to fifteen hands to one of sixteen hands high.

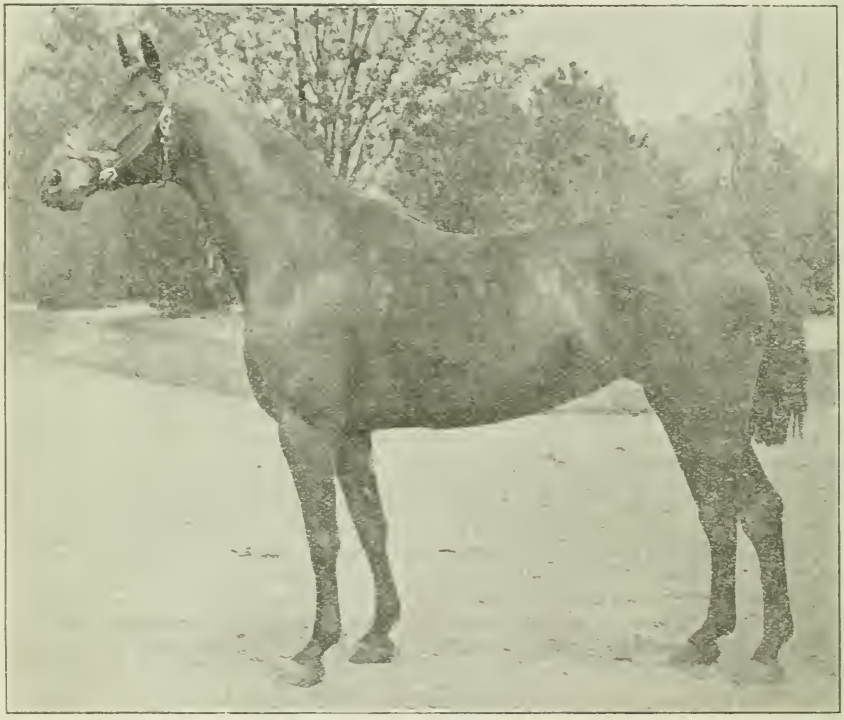
With the improvement in prices has come increased attention to the breeding of draught horses, and the majority of mares bred are put to heavy stallions. Owners of good, heavy sires have no difficulty in getting a fee of from $10 to $15 to-day, where a few years ago they were soliciting mares at $5 to $6.

The Most Profitable Kinds to Raise. While the increased demand has affected all classes of horses to an extent, there are certain kinds which are more profitable to the breeder than others. First among these are heavy horses, next carriage and saddle horses of the best type, and lastly what are a new class in Canada, military horses.

Heavy Horses. The draft horse is, undoubtedly, the most profitable animal that the farmer can breed. By putting a good mare to a heavy Clyde or Shire stallion he can always secure a heavy colt which at five years old will bring him in not less than $125. Besides this,

there is less risk of a heavy colt getting blemished. A blemished light colt cannot be sold except at a sacrifice, whereas on a horse employed on slow work such as teaming, a blemish is not such a disadvantage. Moreover, if the blemish is very pronounced the farmer will still have a good useful animal for his own farm work, and in the case of a mare he can profitably use her for breeding if the defect is not hereditary.

Carriage and Saddle Horses. Carriage and saddle horses of the best type will always sell for good prices, both in the United States and Great Britain. We often hear of the high figures paid for a fine carriage team or for a hunter, but of course the farmer does not get prices like these. They are only got after weeks, and sometimes months, of training and of fitting in the hands of dealers. The farmer seldom has the time and the necessary knowledge of training and "fixing up" to produce the "finished article." Still the dealer, as a rule, pays the breeder a fair price, and so long as he does so it will pay to raise such horses. The best carriage horses are sired by Hackney, Coach or Thoroughbred stallions, and in some cases by a Standard bred, provided that the latter has sufficient substance and style of action, as some of them undoubtedly have. The thoroughbred produces the best style of carriage horse when the mares have good size and sufficient quality.



Bred in Ontario and bought by Major Dent for the Cavalry class. (15.1½ to 15.3½ hands.)

Military Horses. Formerly there were only two classes of horses purchased by Great Britain for military purposes, viz., those for the cavalry and the artillery. Now, however, there is a third class for mounted infantry. This is the lightest class of the three, the animals ranging in height from 14.1 to 15.1 hands Cavalry horses must measure from 15.1½ to 15.3½ and artillery from 15.2 to 16 hands. Illustrations of two of each type are given in connection with this article, and give a good idea of the animals suitable for each class. They are types of the horses purchased in Ontario for shipment to South Africa for active service.

The Types Required. Major Dent, one of the British officers who selected the horses, gives the following descriptions of the necessary qualifications:

"The stamp of horse required for artillery purposes is a blocky sort of horse with as much breeding and bone as possible.

"The cavalry horse is of a lighter type, with good shoulders, loins and neck.

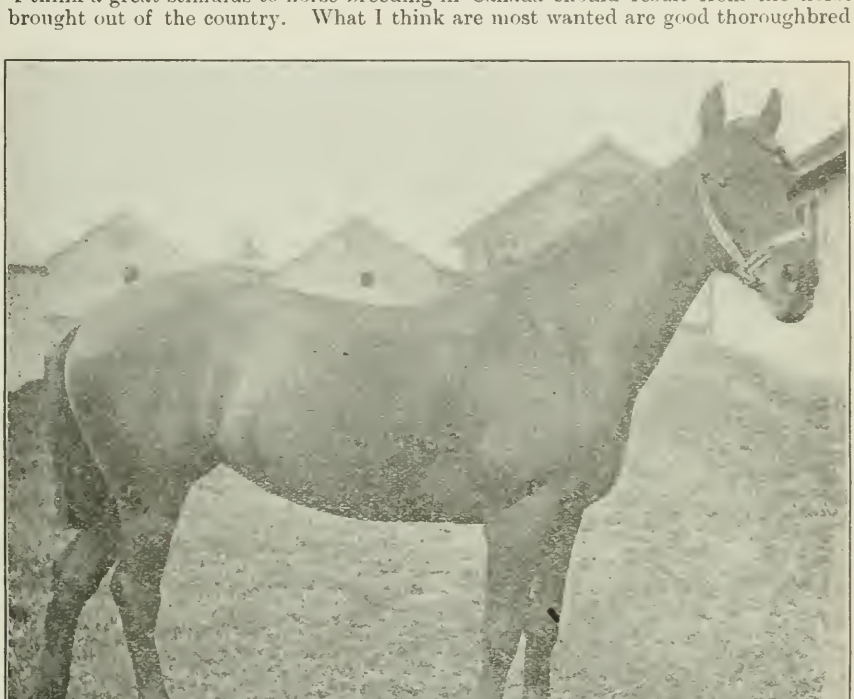
"The mounted infantry cobs are a minature horse. The best stamp I have come across is the French-Canadian, the only fault in their case being often a shortness of rein (neck).

"The type of horse for whatever branch of the service required should be that of an English hunter, with short legs, short cannon bone, good shoulders, back, ribs and loins—the more breeding combined with strength the better.

"The faults I have chiefly found in the Canadian horses are too much length in the back, making a horse weak in his couplings, lightness of bone especially under the knee, and many horses are failing in the quarter, a complaint commonly called 'goose rumped.'

"In all horses true action is a great necessity ; any horse that cuts (or brushes) his fetlocks is unsafe. *I have found the Canadian horses wonderfully sound in wind, the rejections for this failing not exceeding two per cent.* The horses as a rule have fairly good shoulders, also depth of girth, but the longer-backed ones naturally are deficient in back rib. The horses are of a kind disposition, answering quickly to kindness, and it is rare to find a kicker. I anticipate that they will be found very hardy in South Africa.

"I think a great stimulus to horse breeding in Canada should result from the horses now being brought out of the country. What I think are most wanted are good thoroughbred sires,



Of the Cavalry stamp. Now in South Africa.

not over 16 hands, compact horses with plenty of bone and action. I am sure there must be plenty of good mares in the country judging from those which I have bought, and in many cases it seems a pity they are leaving the country."

Canadian Horses Stand Fire Well and Have Great Endurance. Major Dent's remark about the probable suitability of Canadian horses for the work in South Africa has been amply borne out by the statements of independent witnesses on the battle-field and line of march. The correspondent of the London *Times* who accompanied Sir Charles Warren's column to Douglas, writing of an attack made on the camp by the Boers, said : "The English Yeomanry horses had been kraaled, and taking fright at the firing burst through the kraal walls, and stampeded, together with the English horse of the other corps. Most of the Cape horses and all the Canadian horses remained quiet."

Lieut. Morrison, who went to the front with the second contingent, thus wrote of the pluck and endurance of our horses : "The vitality of the Canadian horse is wonderful. The Australian and English beasts do not stand the service nearly so well. Yesterday six dead horses marked the line of march from Blaan Spruit to Carnarvan. Only one Canadian horse, in D. Battery,

dropped and it was the most awful looking skeleton you ever saw in draught. It was left for dead some distance back, but half an hour after the old chap walked into camp, and the boys gave him a cheer."

Another proof of the endurance of our horses is seen in the wonderful forced march of the battery of Canadian artillery, which by its opportune arrival did such signal service at the relief of Mafeking.

No Lack of Light Horses. Mr. Walter Harland Smith of Toronto, who purchased some 2,000 of the horses shipped from Ontario to South Africa as remounts, states that he had no trouble in securing plenty of the lighter kind for mounted infantry and cavalry. In fact his agents reported they could have got 10,000 more in this Province. Of the heavier or artillery class, however, there was a scarcity. In other words there are thousands of surplus horses in Ontario under 1,100 pounds which are selling for less than $100, and there is a dearth of animals over that weight which are worth from $100 to $175. Surely the difference in price should induce farmers to breed to the heavier sires.

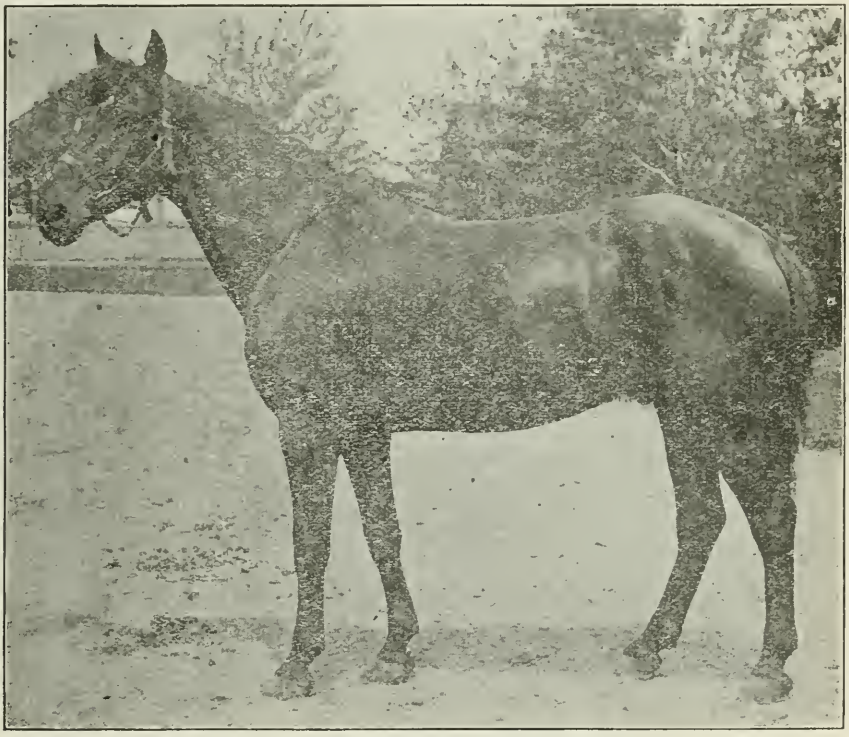
Artillery class. A good type and always in demand. (15.2 to 16 hands.)

The Market for Canadian Horses in Great Britain. Our horses have steadily won their way to favor in the Old Country in spite of the great indifference shown towards them at first. For this their lasting qualities, kindness, ability to work and general soundness are responsible. Wm. Huntley, expert veterinary adviser in Great Britain to the Canadian Government, in a report to the Dominion Minister of Agriculture, says: The prejudice against all imported horses, which for many years led buyers to confine their purchases to home stock, has now entirely ceased so far as Canadian draught animals are concerned. The demand in England for Canadian horses suitable for omnibus and light van work is constant and large. I cannot advise the breeding of smaller kinds suitable for tramways. The demand for light horses, 15 hands high, due to army requirements, will not be permanent. Heavy draught horses are always saleable. The taking up of the bus horses by the War Office cannot fail to increase the demand for Canadian horses, so favorably known to the bus companies for their strength and endurance above all other breeds employed, local or foreign."

Hints on Breeding. In breeding care must be used in the selection of both the sire and dam. It is not enough that the stallion be as perfect as possible of the type desired, but the mare should be a good one and not have any disease or blemish that she is likely to transmit to her foal. In breeding to a heavy sire, the heavier the dam is the heavier is the foal likely to be, and conse-

quently the more valuable, provided it is not deficient in quality. She should be as perfect as possible, kind, sound and with plenty of room in her barrel for the development of the colt. It should be an object to select a sire, all other things being equal, strong in those points in which the mare is deficient.

Time of Foaling. Most people prefer to have the foals dropped early in the spring, March being a month in which a large number see the light. When foaled at that season of the year they get a good start in growth before they and their dams run out on the grass, and seem to go ahead better. Besides this the mare has time to recover from the strain of carrying the foal, and consequently can take her share, to an extent, in the spring work, it required. This work, if given in moderation, does not hurt the mare or foal. It is best not to allow the foal to run with the mare at work, but to keep it in a loose box, and when possible at first take the mare to the foal during the morning and afternoon and allow the youngster to suck, being careful always to milk off a little milk if the mare has been heated, as otherwise the stomach of the foal may become upset. The question of the time of foaling is really a matter of convenience to each breeder. With some the favorite time is after seeding is over, with others in the fall. Each time has its advantage according to circumstances.



Strong but active, for the Artillery class.

Weaning the Foal. The foal can be weaned when about six months old. It must be fed liberally and kept growing straight along, but not allowed to get too fat. Well-cured clover and timothy hay, with about three quarts of oats a day, some bran and a few carrots occasionally, make a suitable winter ration. If the foal is well looked after the first year it will never lose the benefit of it afterwards. Exercise is also necessary to its growth and development.

After the first year, pasture in the summer time, and hay with some grain, roots and bran in the winter will be all that is necessary to keep it steadily growing. Heavy horses are able at three years old to do some farm work; after that they more than pay for their keep. From this time on till they are eight years old is the best age at which to sell them.

Cost of Raising a Colt. Mr. Andrew Sein, of Holstein, Ontario, figures out the cost of raising a colt as follows:

"Take oats at 20 cents per bushel and hay at $6 per ton. These are the average prices for the past three years. In the first place we have the service of the horse, which is $10. It does not pay to use a cheap horse, and this fee will enable a man to secure the service of a good stallion.

1st year—20 bushels of oats at 20c	$ 4 00
1 ton of hay at $6	6 00
Stallion fee	10 00
Total	$20 00
2nd year—Pasture	5 00
30 bushels oats at 20c	6 00
1½ tons hay at $6	9 00
Total	$20 00
3rd year—Pasture	$ 5 50
35 bushels oats at 20c	7 00
2 tons hay at $6	12 00
Total	$24 50

A good type for the Mounted Infantry class. (14.1 to 15.1 hands.)

" According to this the total cost for the three years would be about $64.50, without the veterinary surgeon's fees, if he should be lucky enough to have occasion to be called in. Now at three years old a colt ought to be able to earn its feed. Let it work for its feed till it is five years old, and if it is a good Clyde colt it will bring from $90 to $120, or say $100 on an average, leaving a net profit of $35.50.

"Let us take another class from the mongrel stallion. Fee, $6 ; or some at $4. It costs the same for raising a mongrel till it is three years old, less the difference in the staliion fee. What can you realize for this mongrel colt? You cannot sell it unless some particular kind of man comes along wanting that particular kind of horse, and you have to peddle it off, and the price you realize will range from $45 to $60, or from $5 to $20 is what you pay to keep it company.

I do not wonder at the breeder of this kind of stock becoming discouraged, and saying there is no monhy in raising horses. Whose fault is it but his own? The man who hasn't a good brood mare should make it a point to get one, or not breed horses at all. I think when the breeder doesn't look after his own interests the Government should pass a law for his protection, and have every stallion examined, and have them come up to a certain standard as to quality, breed, etc. Any not coming up to this standard should be put before the plow, and made to earn a more honest living."

HORSE BREEDING.

By M. E. Devitt, Freeman, Ont.

The horse markets of the world to-day are vastly different from what they were a few years ago. They have now been cleared of the surplus stock which was forced upon them by the introduction of electricity and the general use of the bicycle. These inventions threw thousands of horses on the markets at a time when every available mare in the country was being bred—in many cases to any horse that came along if only he was cheap enough—and consequently the country was full of an inferior class of horses, for which, under the new conditions, there was no market. This condition of affairs affected every branch of the horse-breeding industry to such an extent that horse-breeding was in some sections entirely suspended ; though during all this time a strictly first-class horse of either the carriage, saddle, or draught type, could be raised and sold at a profit. During this season of depression many serviceable horses were

Selected for the Mounted Infantry class, and sent to South Africa.

slaughtered throughout the country, and many of the best mares were sold for export, or for city work, as they were the only horses on the farms that could be sold at any price, and the general cry was that horses would never be worth raising again.

Breed horses that the market demands. But what is the condition of affairs now? A demand for good horses has sprung up, and we are not prepared to meet it. Now, before we begin breeding again let us look around and see what brought on the last depression ; next, let us find what classes of horses are in demand, and likely to be in demand for all time. We must also consider what other motive power is likely to come in competition with the horse. There are several classes of horses which I do not believe will ever be replaced by machines or automobiles or any other agency. The gentleman's carriage horse, the saddle horse and the heavy draught horse are horses for which there will be a demand so long as there are men in the world. A very important point is the selection of one of the marketable classes of horses. I say one, because few, if any, farmers will make a success of more than one breed, and there is enough study in one breed for any farmer if he wishes to put his mind to it.

Neighbors should breed the same class of horses. In making a selection several things should be considered : You must have love for the work you undertake if you would make a success of it ; so, if you do not like a draught horse and cannot cultivate a liking for him, don't expect to make a success of breeding that class. The same holds good in other

classes. A very good plan is, if there is any one in your locality making a success of any of the marketable classes of horses, to breed the same class, as the more animals of one class there are produced in a section the better will be the market for that class, as it will attract buyers that would not go to a section if only one or two horses of their kind could be found there. Another advantage would be that better sires could be bought, as few individual farmers can afford to pay the price of a first-class sire, and most men who buy a stallion for other people buy as cheap a horse as they can, as they give the owner better returns for the money invested. Having made our choice let us learn as much about it as we can, then fix in our mind an ideal horse, and get the best mare you can afford. If you cannot pay a high price for a mare you need not be discouraged, but select the mare best suited to the class of your choice. If you are fortunate to own more than one, breed them to the best horse you can get. Do not think because your mare is not good that a poor horse is good enough. If your mare is good enough to breed a foal, the best horse you can get is none too good. Another mistake often made is to breed to any horse that happens to come along your line at a low fee. Now, first-class horses cannot go into every farm lane and serve at any fee you may offer. Select your horse, then go to meet him if he does not come your way.

The draught horse the most profitable for the farmer. I believe that for the average farmer, the draught horse is the most profitable to breed. In the first place a draught brood mare is more suitable for farm work and can be successfully worked on the farm when carrying and sucking a foal. Young draught horses will also earn their keep at a younger age than any of the other classes, as heavy work on the farm has a tendency to make fine young carriage or saddle horses clumsy, and they cannot be sold from the plow for near their real value ; while the young draught horse is getting the best kind of training for his future usefulness and can be sold right off the plow for a good price, leaving the farmer a large percentage of profit, which in the lighter classes goes to the town or city dealers.

Draught horses are not so liable to get blemished as are some of the lighter classes. A scratch or a bruise which would lessen the value of a carriage horse would not affect the sale of a draught horse. If you decide to breed draught horses don't try to produce a horse to do your own work, but rather try to breed a horse that will suit a city carter, and you will have a horse that will do your work for a year or two and will then be in the market at the most desirable age. The nearer you can come to the true cart horse the better will be the price you will get. You may ask, " How shall I find the model cart horse ?" A good idea is to visit some of the large Cartage Co.'s stables, such as Hendrie & Co. or the Shedden Co., and if you ask the manager to show you the best type of horse for their work they will cheerfully do so, and, perhaps, tell you also where he might be improved upon. After visiting the stables and gathering all the information you can, fix in your mind the ideal horse and go to work on business principles to produce that ideal. The first step is the selection of a mare. if you have the means it would perhaps be best to buy a good draught mare. If you do not wish to invest the money, breed the best mare you have to the best draught horse you can get. Remember, if you wish to breed up, you cannot make much improvement unless you get the best. If you are fortunate enough to raise a filly, keep it, and, when she is three years old, breed her to the best horse you can get, and continue on in this way, and you will in time have as good horses as can be produced anywhere.

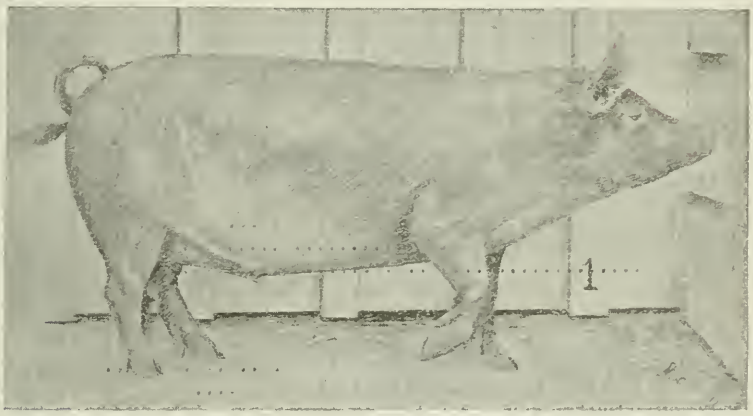
Desirable fitness in the draught sire.—In selecting a draught stallion always see that he has a good strong constitution and good sound feet, for a horse without those two qualities is of very little use no matter what other qualities he may possess. Feet should be of medium size, round, evenly sloped from crown of hoof to toes, of good width at heel and not flat. Hoof should be fine grained and tough ; pasterns medium length, clean, and show the cords well and set at an angle of about 45 degrees ; cannon bone short, straight, broad, and show the muscles well, and have a nice fringe of silky hair up the back side. Knee should be large, broad across front and by no means bent back ; arm well muscled and evenly tapered towards the the knee ; shoulder well muscled not too straight, broad and thick ; chest deep and broad giving plenty of room for lungs ; legs should be well set under. Back should be short and straight, with strong cords running parallel with the spine and forward slope ; ribs well sprung from back, of good length, and come close up to hips, thus giving room for digestive organs. Hind quarter should be broad, nicely turned and of good length and well muscled, the muscle running down to hocks. Hocks should be broad, the joint should be of good length, clean, and not too straight, as a straight hock and a straight pastern give a horse a stilted action, while a hock with a proper bend and a well-set pastern give spring to the movement and lessen the jar on the body as well as on the legs and feet, and will wear much longer than the straight-legged horse. The head should be prominent but not coarse, forehead broad and full between the eyes. Eyes should be bright and not set deep in head. Deep eyes indicate a bad disposition. Neck should be well set on shoulder, nicely arched and of medium length.

In conclusion I cannot too strongly impress upon your minds the importance of good feet, strong bones and a good roomy chest, deep and broad, with front legs well set under, and a good, long, well-sprung rib, giving a good barrel, and with those qualities you will have a strong horse that will seldom give any trouble or require the services of a veterinarian.

BREEDING AND FEEDING THE BACON HOG.

By W. J. Whaley, Dereham Centre, Ontario.

Perhaps there is no subject which is attracting so much attention, or which is of as much importance to the farmer, as the question of the bacon hog. Especially is this so in regard to the product for last year, prices being so low and feed so very high. It has been a subject of much discussion, written about in every agricultural journal and discussed in almost every phase, and yet we see, with very few exceptions, the hog neglected, the farmer turning all his attention to the horse or the cow, seeing that they are comfortably quartered, well cared for and fed with that food which is likely to bring him the best returns for the labor bestowed. We have in the past been trying to force on the packers and through them on the English market, what we could raise the cheapest and with the least trouble. There was a time when we could do this, but times are changing, and the English middleman and the steady workingman have come to the conclusion that what is good for the upper ten in the shape of first-class Irish or Wiltshire bacon is good for him. He has tried it, and he now tells you he has no use for the short, fat, oily bacon of the past. Now, what an Englishman wants in the way of eating he must have, and he is going to have it if at all possible. Being an Englishman I speak from experience. Let us therefore try to give the packer what the consumer wants. Let us give them a continuous supply all the year round and help them out of their troubles and losses, and eventually they will give us better prices for our hogs. In order to do this it is necessary to produce the best.



A good bacon hog; light jowl and good neck, shoulders well proportioned; belly sags a little towards the rear; a good length of side.

In the pas we have considered the hog of the least importance of any product on the farm. We see the hog under many circumstances, most of them of a very unfavorable character. As we pass along through our rural districts we find that a few farmers have given the matter some little thought, and have made some provision for his comfort, but most of the pens are very unfit for raising the bacon hog. We find them too low, being let down into the ground for the sake of warmth, with little or no light, and with doors so low that the hog is forced to stoop in going out and in to avoid hurting his back. In the majority of cases we find the hog pen to be the worst old building on the farm, or perhaps a few boards thrown across a fence corner, and the said hog has become so abused in many instances that he has almost lost his identity, and becomes an object of pity to the passer-by and a disgrace to his owner. You say, "What shall I do, then?" Now, I am no better man than the rest of you, perhaps not so able as most of you present, but I have tried to raise the right hog with the right conditions and feed for profit and have, in a measure, made it a success.

Essentials to Success.—There are a few points very necessary to success: (1) *The home of the hog.* I care not what material you build with or of what size. Every person must build that which will cost him the least, so long as he builds well. The pen should be high, from the floor to the ceiling not less than eight feet—ten is better. Have it above ground with floors made so that water will not stand on them. Concrete, properly made, will be found the cheapest and best. The troughs should be made of the same material. Sleeping apartments should be built about three feet above the floor. Make lots of windows for each pen, and don't be

afraid to have them large, so as to admit plenty of sunshine, for the hogs like it. The doors should be large enough to admit of easy passage. If possible the pen should be a two storey building to admit of storing feed and bedding overhead.

(2) *Cleanliness.* One cannot be too clean with hogs. They are not nearly so dirty as the majority of persons suppose. We clean our pens every day when the hogs are housed, first cleaning the lower floor and then throwing down all straw from the nest and putting in fresh straw again. You will find it will not take any longer than if you left it to do once a week or month. It can be done so much better and quicker if done before it gets so dirty. I cannot say too much on this point ; it is the most essential, especially with small pigs.

(3) *Care and choice of breeds.* In my opinion there are only two breeds which have given satisfaction in every point as thoroughbreds—the Tamworths and Yorkshires. These may be crossed with other breeds and give good success. The best I have ever raised have been one-quarter Berkshire and three-quarters Tamworth. Be sure to make choice of a long, straight-backed pig, deep, short in ham and narrow in shoulder. Then make them feel at home, keep them as quiet as possible and feed them good bone-producing feed, mangels or sugar beets with bran or shorts and very little corn ; also give them plenty of exercise. About a week or two before farrowing put them into a good, clean, suitable place and keep them quiet. Do not feed at time of farrowing or for twelve hours after. Then feed a little bran or oatmeal scalded, making a thin drink. Increase until about one month old, then give all they will eat, but avoid corn. At about six weeks of age castrate the pigs. There is no better time for performing this operation than when the pigs are on the sow, just before they are weaned. At about eight weeks of age they should be weaned. Give them good food, not too much at a time and not too sloppy. The food should consist of shorts principally, and a few cut mangels will be eadily eaten with profit. Growing pigs should be fed on a mixed ration. I feed principally horts, corn and some bran and mangels. In winter during cold weather I cook the feed and lop twice a day, always feeding pulped mangels at noon, and I find that the pigs grow and relish this treatment. I always let them out for exercise every day a little while. As they advance, increase the quantity of corn, and you will have at about seven months of age a good bacon hog, weighing from 180 to 200 pounds, according to your breed.

In conclusion, I would say give the hog a chance. There are lots of markets for them if you get the right kind. There is more money in them than any other product of the farm. Give them half the labor and care you give your cows and horses, and you will find them pay nearly $2 for one of profit with the same invested capital. The following is a statement of account with my hogs fed this last year under these conditions :

Stock on hand December 31st, 1898	$ 395 50
Sold 18,905 lb. pork at 4 2/100	795 89
Sold fat sows	57 63
	$1,249 02

Food consumed during the year :

Shorts, 20 tons and 1,472 lb. at $16.38 per ton	$ 339 45
Corn, 5 tons and 1,957 lb. at $13.90 per ton	82 80
Mixed chop, 4 tons and 40 lb. at $15.25 per ton	61 84
Bran, 2 tons and 436 lb. at $14 per ton	31 68
Peas, 15 bushels	7 50
Mangels, 800 bushels at 5c. per bushel	40 00
Stock on hand December 31st, 1899	347 00
Balance for care of hogs	338 75
	$1,249 02

I also used the whey from about 87,000 pounds of milk sent to the factory, and as an offset we had 60 loads of first-class manure.

GOOD PORK FOR THREE CENTS A POUND.

By J. S. Woodward, Lockport, N.Y.

There is *pork and pork.* Pork that is made in filthy, ill-smelling pens, fed on city swill offal from slaughter-houses, dead horses and other foods of like character, and finished off on corn-meal, which is fit only to breed scrofula and other maladies that afflict humanity.

Pork made in pure air, open fields, clean pens, fed on grass or other cooling and succulent foods is healthy, sweet, delicious and fit to be placed on the tables of the most fastidious epicure of any country.

Character of meat depends largely on food. Experiments made at stations have demonstrated beyond question that the character of the meat produced is very much due to the nature of food eaten, and in no animal more so than in the pig.

That corn foods of like composition produce meat largely fat with small bones, and but little muscle or lean meat, and that dry and hard ; while nitrogenous and succulent foods make strong bones, plenty of blood and lean meat, and that juicy and tender.

They have further shown that the modification or change of character can only be made when the pig is young and growing. As in the human family, "Early impressions are most lasting and hard to obliterate," so in the pig, it is hard to overcome the effect of the food in the first few months of its life.

What the farmer wants to know is, how to make pork most healthful and of highest quality, and consequently most in demand, so as to bring the highest price. Luckily, such pork can be produced at the lowest cost. In order to make such pork cheap he must start right. Of course there is much in breeding, but so long as there is so much more in feed and care I am not going to enter into a discussion of breeds further than to say : Select one that will respond quickly to good feed and care.

To produce best pork at least price. When such a one is found, remember there are certain principles in animal nutrition that must be understood and certain conditions complied with to produce the best pork at least price. Among these principles the following are important :

The pig eats, first to sustain life after that to increase in size.

The most of the food used in sustaining life goes to support bodily heat. The balance in replacing worn-out tissues and keeping up the functions of life.

All growth comes from food eaten in excess of that necessary to sustain life.

The elements of nutrition needed in the food vary according to the functions to which they are to go. Those used to keep the pig warm must be carbonaceous or heat-producing.

The supply of fat in the growth or in fatting comes from the same element, which is also largely drawn upon by the exercise the pig takes.

The hair, hoofs, lean meat or muscle, as well as the blood, comes from the nitrogeneous elements, while the bones are from the mineral elements in the food.

If the pig be fed wholly on food deficient in any of these elements it cannot thrive. If lacking in bone material its frame will be dwarfed, and its bones weak and liable to break. If on food rich in the carbonaceous and lacking in the nitrogenous, elements it will cease to grow and become excessively fat. It may be even "starved to death as fat as butter."

If, on the contrary, the food contains an excess of the nitrogenous and bone-making material, the pig will develop a larger frame with lots of muscle and very little fat.

Another very important principle is involved. The digestive and assimilative ability of the pig is very much greater than when it comes to "hoghood."

Stunted pigs unprofitable. And lastly, but by no means least, comes the fact that a pig once stunted *can never after* be made to make pork at a maximum profit.

With these principles established as well as the fact that people can now call for and eat lean meat, and reject that which is unduly fat, it follows that to make the best pork at lowest cost the pig must be well-bred, started right and then fed, from its natal day till it brings up on the block, on the right kind of food to produce juicy, lean meat and enough to make the largest gain.

The pig that is wintered, weighing no more in the spring than in the fall, has been fed all winter at a dead loss, and worse still it has become stunted and dwarfed beyond hope of recovery or profit from subsequent feeding.

The best pork, most economically made, is that which is produced on the pig in the shortest time after it is born, one that gets most of its living on a fresh pasture in the open summer field.

But in order to get the pigs in the spring for this purpose we must winter a lot of breeding sows to drop pigs ready to go on to the fresh pasture of early spring. To do this successfully and cheaply is one of the prime factors in this whole problem.

An unhealthy sow cannot produce a healthy, thriving pig. An over-fat sow will be sure to bring small little pigs hardly worth the raising.

What is wanted is a strong, healthy, big-formed pig with lots of growth, and to get such a one we must have a strong well-developed muscular sow in the most robust health, with a system so nourished as to be free from all feverish tendency, and natural in all functions, and able to furnish an abundance of good milk for the pig from the moment of birth.

Caring for the Sow. Such a sow in such a condition can never be had by feeding on any food rich in carbonaceous material and running out of doors and sleeping in a snow bank.

She must be put into a dry, airy, well-ventilated, warm and roomy pen, and fed on cheap, succulent food, nitrogeneous in its nature and with an abundance of bone-making material. A dozen sows weighing from 200 to 300 pounds each may be put into a pen as above described, 30x40 feet, with a good height to the ceiling, and be safely wintered on six bushels of mangels

and 24 pounds of coarse middlings or fine, re-ground bran each day, with all the good, early-cut, well-cured clover hay they will eat, and be in the finest condition to farrow an average of eight well-developed healthy pigs each.

The mangels should be fed whole, so as to give the needed exercise in eating them.

Suitable feed. These sows should be bred so as to farrow in March or very first days of April, and of course a few days before each is expected to farrow she should be penned off by herself, with the proper conditions of bedding, etc., to render it sure she will have no difficulty in bringing forth the expected litter. As the mangels can be grown very cheaply, and the bran bought for from $10 to $15 per ton, the cost of wintering will be but very little, and your pigs cost only a song. Having thus secured a lot of pigs very cheaply, and what is of more importance, having them well born, the remaining thing to do is to feed them at least cost on the most desirable food. No food is better or cheaper for the young pig than sweet skim milk when it can be had. But as soon as old enough, pigs should always have the use of a pasture field. Clover makes an excellent pasture for pigs, but no plant is better food for the pig, or more easily provided, than Dwarf Essex rape. By having land rich and prepared in the fall it can be seeded to rape with the first warm days of spring, and in from four to six weeks be large enough to begin feeding. Pigs are very fond of this, and may be pastured on it, or it may be cut and fed to them in another place. If the rape gets the start of pigs it should be mowed off for sheep or cattle ; in any case it grows quickly after being cut or eaten off, so that a comparatively small field will feed a lot of pigs.

In addition to all the rape or clover they will eat the pigs should have some dry food ; for this purpose nothing is better than coarse middlings. Bran, even if ground very fine, is not as good for the young pig : it is all right for feeding the old sows in winter, but is too coarse and laxative for the pig. Unless it prove too laxative the addition of a little linseed meal, one part to four of middlings, will be a good change for the pigs occassionally.

They should have all the middlings they will eat clean, so as to keep them gaining as fast as possible until they weigh from 100 to 120 live weight. There may now be added to the feed one-fourth its weight of corn meal, and this should be increased from time to time until the food is half corn meal.

As soon as the pig will dress from 115 to 175 it should be sold, and if one is reared and fed as above indicated, it will have cost less than three cents per pound for the dressed weight, and the meat will be lean, tender and juicy, and sell for such a price as to leave what should be a very satisfactory margin of profit.

A good condiment. If the following mixture be prepared and kept in a bag under cover and always accessible to the pigs and hogs it will be found very beneficial and go far in keeping them free from internal parasites :

One and one-half bushels corn cob charcoal, three pecks hardwood unleached ashes, fifty pounds fine bone meal, six pounds salt and one pound copperas.

Break the coal quite fine, mix coal ashes and bone meal together, and dissolve salt and copperas in water, and with the solution sprinkle the mass frequently, stirring so as to have all well incorporated together. To prepare the cob coal, dig a hole in the ground, start a fire in the bottom, pile on the cobs, and cover quickly. Leave just vent enough so the whole mass will get on fire, and then cover up and leave until the whole is cooled down.

This is a capital condiment for the hogs at all times.

THE HOG AND EXPORT BACON TRADE.

By John McMillan, M.P., Seaforth.

Three years ago no product of Canada was labelled "Canadian," whereas now everything shipped from Canada is labelled "Canadian." There is great opportunity for the extension of our bacon trade if carried on properly. Britain imported 8,000,000 cwt. of hog products, of which 5,711,322 cwt. is bacon, but only 290,283 cwt. Canadian, or about one-twentieth of the amount supplied in the British market. The cheese and butter industries showed the same figures at one time in their history, but Canadian cheese has superseded all other. Canadian butter has been doing the same, and Canadian bacon might take the lead if we paid the same attention to quality. Nothing on the farm pays better, if followed properly, than hog production, giving quick returns for the investment. The increase in live weight in the ox per cwt., according to experiments, is represented by 13.2 per cent.; by the sheep, 14.3 per cent., while the hog is represented by 29.3 per cent. At the same time the carcass of the steer represents only 62 lbs. of beef to 100 live weight, while the hog dresses out from 75 to 80 per cent. of live weight. In bacon production we require from four to five pounds of meal to produce one

pound of bacon. The impression has gotten abroad that there is no money in the farmers shipping hogs at from less than 200 to 250 lbs. weight, but experiments show that increase in weight in earlier age is attained easier than later on.

Do not feed hogs too long. An experiment by the Wisconsin Experimental Station shows that up to 100 lbs. weight the amount of food required to increase the live weight one pound is 10 per cent. greater than that required to add one pound live weight when under fifty pounds weight; from 100 to 150 lbs. weight, required 17 per cent. more to increase the weight one pound; from 150 to 200 lbs., required 24 per cent., while from 200 to 300 lbs., required from 34 to 48 per cent., according as the animal was near the 200 or 300 lbs. weight At the Ontario Agricultural College, from frequent weighings of thirty-six hogs, the following facts were brought out: While increasing live weight from 54 lbs. to 82 lbs., hogs require 3.10 lbs. of meal per 1 lb. of gain; from 82 to 115 lbs., 3.75 lbs. meal to 1 lb. gain; from 115 to 148 lbs. 4.38 lbs. meal to 1 lb. gain; from 148 to 170 lbs., 4.55 lbs. meal to 1 lb. gain—the amount of meal increasing steadily as the hog grows older.

The first requisite in successful bacon production is a comfortable pen—not necessarily expensive—elevated, well aired, well lighted, warm and clean. In every case avoid damp bedding, and keep the hogs out of draughts. As to breed, while good bacon specimens may be found in all breeds, yet the best bacon hogs are obtained from crosses of Yorkshires and Tamworths with Berkshires. Feeding experiments with the different breeds show that to increase the live weight of the animal 100 lbs. required 398 lbs. for the Berkshire, 417 lbs. for the Poland-China, 468 lbs. for the Yorkshires, 452 lbs. for the Chester White, 400 lbs. for the Tamworth, and 424 lbs. for the Duroc Jersey. The typical bacon hog will possess the following characteristics: Light head, jowl, neck and shoulder; medium width of back, great length and depth of side, good thickness through from side to side of belly, well developed ham and medium bone, showing no coarseness in any portion of the body.

Sows should not be bred until eight or ten months old, and should be fed little but mangels. At farrowing nothing should be fed for twenty-four hours.

Variety of feed. In feeding, a variety of food is necessary, and much better results are obtained from mixing foods than feeding one kind of food alone. If 100 represented the feeding value of corn, 108 would represent the feeding value of middlings, while 128 would be the feeding value of both mixed, or 28 per cent. better results than by feeding corn alone. Mangels or roots of some kind are necessary for the health of the hog, and should be fed from the time the pigs begin to eat. To hogs weighing 100 lbs. I am at present feeding two pounds of meal and eighteen pounds of mangels daily. I am also strongly of the opinion that soft bacon results from allowing hogs to become stunted when young, hence the necessity of keeping them growing constantly to produce the best results. Skim-milk is a splendid food, and will produce the best results when fed in conjunction with meal, and in no greater quantities than five pounds per hog each day; 100 lbs. corn meal fed alone produced 10 lbs. of pork, 100 lbs. of skim-milk produced five pounds of pork, while both fed together produced between 18 and 19 lbs. of pork. Boiling feed does not produce extra results sufficient to pay for the fuel and labor used.

In 1895 Mr. Rennie, of Guelph College, conducted an experiment to see if bacon could be produced with profit. On November 18, 1895, he purchased twenty-four pigs in Guelph market, selling on June 2nd, 1896. The following statement shows the results:

Cost of 24 pigs	$31 00
" feed until June 2, 1896	99 33
Total cost	$130 33
Weight at selling, 4,841 lbs., at $3.85 per cwt	186 37
Net profit	$56 04

Food consumed for the six and one-half months was as follows:

847 bushels of roots, at 7 cts	$59 29
1,082 lbs. middlings, at $15 per ton	8 11
2,500 lbs. bran, at $12 per ton	15 00
1,464 lbs. grain and bran, at 75 cts. per cwt	10 98
3,300 lbs. skim-milk, at 15 cts	4 95
30 lbs. ground flax seed	1 00
Total	99 33

The cause of soft bacon has been attributed by the packer to the feeding of corn, but experiments have proved differently, and corn-fed hogs have produced as good a quality of meat and have made as rapid gains as those fed on pea or barley meal. In an experiment by Prof. Rob-

ertson, three pens of hogs, divided as nearly equally as possible as to size, etc , and under the same treatment for two weeks previous to the experiment, were fed corn, pea and barley meal respectively. Pen No. 1 (corn fed) required 4.74 lbs. of meal for 1 lb. of gain, and shrank 14 per cent. from live to dressed weight ; pen No. 2 (pea-meal fed) required 4.84 lbs. to produce 1 lb. of gain and shrank 17 per cent. when dressed ; pen No. 3 required 4.57 lbs. of meal to produce 1 lb. of gain and shrank 15 per cent. in weight. The meat produced by pen No. 1 was brighter and equal in firmness to that produced by pen No. 2, and the distribution of fat in all three cases was so nearly the same as to be scarcely noticeable.

Experiments at the Ontario Agricultural College have also shown that corn when fed does not always produce soft bacon, that it might be produced from the feeding of any other grain, and that the addition of skim-milk and whey have a tendency to produce firmer bacon than when the grain is fed alone.

Discussion.—Feeding and Marketing Hogs.

Q. When buying hogs to feed for bacon how much do you like them to weigh ?

A. Mr. Simpson Rennie : I usually buy hogs which will weigh from 60 to 100 pounds ?

Q. Is there any profit in feeding hogs in winter ?

A. There should be if the pens are warm and convenient, and the proper feed fed.

Q. How warm should the pens be ?

A. So that no ice will form about the trough.

Q. Do you cook the food ? A. No.

Q. What do you feed ?

A. After the hogs get to be over 100 pounds live weight, I feed a mixture of ground grain, oats, barley and peas with sugar beets or mangels once each day, and when under 100 pounds they should be fed less meal and more roots with milk to drink.

Q. How do you like a clover pasture for hogs ?

A. I think it is the very best for young hogs, especially if they are fed wheat middlings and a few roots at the same time.

Q. Would a clover pasture be suitable for finishing hogs ?

A. No. Hogs should be fed for the last five or six weeks on a grain ration.

Q. How do you account for so much soft bacon ?

A. Those are hogs which are not matured, or those fed on too soft and bulky food until slaughtered.

Q. What will a hog shrink in dressing ?

A. I find that they vary very much all the way from 18 to 30 pounds per hundred.

Q. Is there any profit in selling hogs at $4.00 per 100 pounds live weight ?

A. That will depend on the price of grain. It requires about 4¼ pounds of grain for every pound of increase live weight, but by feeding roots and a little milk there should be a profit if the price of grain is under 1c. per pound.

Q. What breed do you prefer ?

A. I prefer a cross between the Yorkshire and Berkshire. Although the Tamworths are good bacon hogs, they are a little hard to feed.

Q. How do you account for the price of hogs coming down every year at the end of summer and fall ?

A. Too many sows farrow about March or April, the product of which go on the market about the end of summer and fall, and this class of hogs are at once turned into bacon which is mild cured. Now this bacon cannot be kept any great length of time, and has to be placed on the British market at a time when poultry of all kinds is pouring in from every country, and little pork is required.

Q. Would you breed a sow under one year ?

A. Mr. Edwin Martin, Canning : Many farmers make the fatal mistake of breeding their young sows to farrow under the age of one year. This should never be done ; sixteen months is a better age.

Q. How do you feed your sow after farrowing ?

A. Don't feed too soon after farrowing. Give the sow nothing for 24 hours, and feed very sparingly for the first ten days of middlings or ground oats and water. This is a sure preventive of milk fever. Don't put the sow on strong food for several weeks.

Q. How about feeding the bacon hog ?

A. Mr John McMillan : There was much discussion at Institute meetings this year about feeding the bacon hog. The general belief is that it will not pay to feed all grain. The feeling with many is, and I share that feeling, that mangel wurzels are a good and healthy food. It is a long way cheaper that feeding all grain. The last Report of the Superintendent of Farmer's Institutes shows on page 22 that one pound of grain is equal to eight pounds of roots, and it is stated at Copenhagen, where mangels were fed raw, and even when one-fourth of the daily feed was given in the form of roots, no injurious effects were observed in the quality of the pork. Taking the average yield of mangels as given in the last Report of the Farm at Guelph, and

the average yield of peas, barley and oats,—say it takes eight pounds of grain to make one pound of pork, and one pound of grain is equal to eight pounds of roots—one acre of mangels will give 1443 pounds of pork ; one acre of peas will give 375 pounds of pork ; one acre of barley will give 600 pounds of pork ; and one acre of oats will give 510 pounds of pork.

Q. What is the best feed for hogs, turnips or mangels ?

A. Mr. W. C. Shearer : If to be fed raw. I prefer mangels, but if to be cooked turnips are the better.

Q. What cross bred hog makes the best bacon sides ?

A. Either the Yorkshire or Tamworth sow crossed with a Berkshire sire, or a Berkshire sow crossed with a Tamworth or Yorkshire sire.

Q. What kind of a hog do you prefer to feed for bacon ?

A. Mr. R. H. Harding, Thorndale : Select the best long thrifty sow that you can find of the breed you prefer. All breeds produce bacon hogs, therefore select from your favorite breed. Lay special stress on not feeding too fast when young ; feed moderately, growing muscle and bone, give plenty of exercise and market when about eight months of age.

A. Mr. Frank Hamilton, Cromarty : I prefer a medium Yorkshire mother and a Tamworth sire, the result being a model packer's hog, small, clean head, light neck and shoulders, great length and depth, with tapering ham. Such a hog is as economically fed as the short fat type, and markets at about 200 pounds.

A. Mr. J. C. Nicol, Hubrey : I find a cross between a Berkshire and a Tamworth the most profitable. For winter feeding I would prefer Tamworths or Yorkshires, as they stand confinement better, and are not liable to cripple. Should hogs get lame give them equal parts of Gentian and Nux Vomica ; dose—one teaspoonful to a full grown hog. For a tonic mixture feed—

Corn cob charcoal	5 bushels.
Sulphate Iron	1 pound.
Salt	5 pounds.
Shorts	1 bushel.

I find this mixture very profitable. If pigs are given all they will eat up clean, they will thrive exceedingly well on it. I strongly believe in feeding pigs to their full capacity for profitable results.

Q. Does feeding pigs to their full capacity not produce soft, immature pork ?

A. Mr. Nicol, Hubrey : I have not found such to be the case from the breeds I handle.

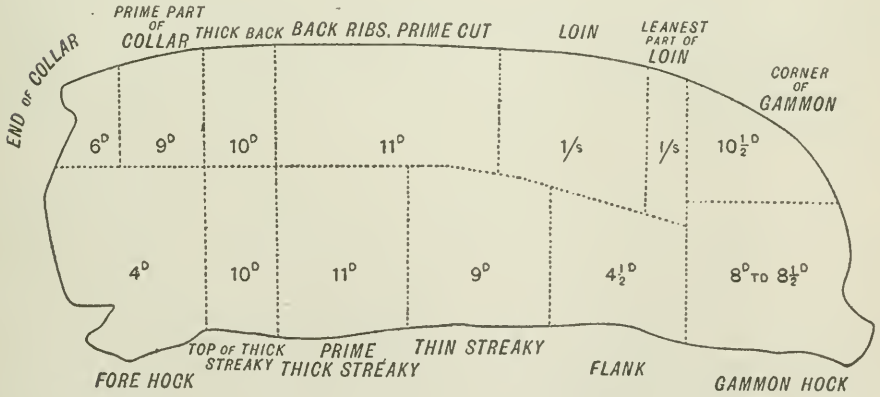


Diagram showing various cuts of a side of bacon, and the average prices realized for each during 1897 (Copied from R. A. S. Report for 1898.)

THE DAIRY.

BREEDING AND MANAGEMENT OF CALVES FOR THE DAIRY HERD.

By A. C. Hallman, New Dundee, Ont.

Before entering into discussion on this very important subject, some very essential points come to our notice, which should be well considered. First, we are well aware (and it is the case in every community where dairying is practised) that some men make a great success of the business; others appear to make a little money, and many are almost a complete failure under exactly the same circumstances. Now why such a great difference? We well know in every vocation in life there are some men who undertake a business that nature never intended them for, and the result is a failure. "The right man in the right place" is a very important phase in all occupations of life, and it is just as true in the breeding of live stock and successful dairying. However, a man may not be a natural born dairyman and yet make a success. Our country is full of successful men who have made a study of the business, and with patient perseverance and industry have made a financial success. It is our privilege to benefit by their experience and adopt their methods, and success is assured.

The profit of a dairy depends largely on the good quality of the cows and the way they are kept. Breeding is a very important factor, and very often determines the profit or ss in the business. What is breeding; is it merely a pertetuation of the species? Not by any means. We have no time to enter intelligently into this subject, but merely to make a passing note.

We must observe the laws of heredity—"like begets like"—and if we expect good results in the offspring we must find the same good qualities in the ancestors. We know that every cow has once been a calf, and that every calf has a dam and sire, and right here is where the important point begins. Every farmer need not be a breeder of thoroughbred cattle, but it is his privilege to use a pure bred registered bull. His pedigree should be linked with some distinguished females of deep milking strains rich in the production of both solids and fat. His points should indicate the possession of power to do credit to his breeding. "Blood and breed" stand for qualities which are of much value to the stock raiser. Too much stress cannot be placed in the importance of a good sire. A mistake made in this direction may take years to correct, and will always leave a blemish. If the parents are of mixed blood and mixed characteristics, so will the offspring, and in a greater degree, but always subject to the law that the stronger or more potent will predominate. If we want better cows they must be better bred. Breeding alone will not suffice. We must find the good characteristics we wish in our cows in the sire. Although we may have from 15 to 20 cows to breed we hesitate as much in the price of a bull as we would in a heifer and sometimes let a difference of $15 or $20 prevent us in getting a good bull. The loss of keeping a few cows is nothing to compare with the loss from a bull that is an inferior sire. He leaves his impress either for better or for worse, and it takes several years to find out the character of his impress. I would just like to emphasize the importance of keeping a bull that has proved himself a useful sire. Many a valuable bull is sold to the butcher when his value as a breeder has just commenced. Select your best cows, and breed to a good bull. We now suppose you have a calf from a good sire and your best cow. Good judgment should be made in selection; raise only strong, robust calves of good conformation.

Calves for the dairy should not suckle their dam for any length of time. It is of no material value to the calf and a great injury to the cow. We must remember that a cow is a mother, and has motherly attachments. If we do not remove the calf very soon this attachment is formed, and we are sure to upset her nervous system, which means a great shrinkage of milk and consequently a great loss to the owner. Remove the calf at once, or at the most do not allow more than one or two meals with its dam. We must be very careful with the calf at this tender age. The profit of an animal is often determined in its rearing. The function of the digestive organs is to get for the animal all possible good out of its food for maintenance, growth, milk or beef, and great care must be taken not to disturb the digestive organs. We always feed it on its mother's milk. The first milk (colostrum) is nature's intended food, and is required for the health of the calf. We feed three times a day for the first two weeks, giving whole milk fresh from the cow or warmed at noon, two quarts at a meal. We then make a gradual change from whole milk to sweet skim (separator milk) which is still warm and in the best possible form for feeding. Since we use a separator we have changed our system of feeding. Some people denounce separator milk, but we are delighted with the change. Our calves never did better. We feed three quarts of milk three times a day for the first two months, then reduce to two feeds per day, and give four quarts. This is a small ration for a calf several

months old. We like to continue this ration until six months old. It is very important to teach the calf to eat at a very early age. When a week old place a box within easy reach of the calf with a little meal in it. Bran is best to start with. We soon add a little fine ground oats and a little oil meal, giving it as much as it will eat up clean, and no more. Great care should be taken not to give more than they will eat up clean every meal. We feed pulped roots and ensilage in winter and green feed in summer. Clover hay is placed so that they can eat it any time. Care must be exercised to feed out of clean pails, and keep pens well bedded and dry. We formerly fed the oil cake scalded or mixed with milk, but like it much better fed dry with the meal, as the saliva secreted during mastication seems to put it in the best form for the calf to take it. The best indication to us that this is the best system is by the fact that the calves do well, and it certainly gives us much less labor. It will never pay to feed whole milk any length of time. The ration is too expensive and other substitutes can be used to replace the butter fat with much less expense, and which are much better for the future usefulness of the animal. After the age of six months feed on good nutritious bone and muscle-forming foods. A mixed ration of roots or ensilage with cut straw or chaff, and a few quarts of milk per day, and a little clover hay, if it can be spared, is quite sufficient to keep them in a healthy growing condition. If good judgment, regularity and care are exercised with liberal feeding, watering and strict attention given to all details, I venture to say that at fifteen months of age, calves raised in this way will be very little, if any, behind those that suckle their dam for a long time.

Early calves give the most profit—from October to March. They get the best chance and the dam gives the most profit. Give the males for breeding purposes a good chance. They are expected to be ready for service at from twelve to fifteen months old, and they must be pushed forward for early development. The heifer calves must also be kept growing to be ready for use at an early age, but can be fed on more bulky food. It will not hurt a calf to be of considerable dimensions in the body as long as it is done with nutritious, wholesome food. They must have room for digesting rough, bulky, food. We must get them to consume a certain amount of rough food to fit their digestive organs for their future usefulness. They may not be quite so attractive in appearance when young, but all the more admired when they show their beautiful wedge shape with a large digestive capacity, so valuable and necessary to a large performer. If the breeding is correct you can generally make out of your calves just what you like Take two calves, feed one for a dairy animal, develop her along these lines, have her milk at from twenty-four to thirty months old, give proper care afterwards, and she will develop into a useful dairy cow. Take the other calf, force it along, let it run with its dam till she is eight or ten months old, push her right along, have her drop her calf when three years old and nine chances out of ten she is a failure as a dairy cow.

Discussion.

Mrs. E. M. Jones, of Brockville, answered the following questions :

Q. How many times a day do you feed your calves ?

A. Three times.

Q. At what age do you start to feed your calves grain ?

A. When two months old I feed a little porridge made of three bowls Scotch oatmeal (I mean the common old fashioned oatmeal) to one bowl flax seed meal and a little salt to season. This is well boiled, and is made fresh every day. Give a very little to begin with in each feed, and increase as needed to one-half pint at a feed. The quantity of porridge made depends on the number of calves to be fed. The cold porridge is put into the warm milk and squeezed through it.

Q. What are the chief causes of scouring in young calves ?

A. (1) Dirty pails ; (2) too cold or too hot feed ; (3) too much at a feed ; (4) irregular feeding ; but the chief cause is in dirty pails.

Q. Do you use wooden pails for feeding calves ?

A. Never.

Q. Do you believe in keeping calves separate ?

A. Always.

Q. How do you treat scours in calves ?

A. Stop all feed for a day and give a little castor oil and laudanum. Keep warm, dry and clean with plenty of bedding and out of draughts. Then feed only a pint at a time of milk just drawn from the cow, and add a little rennet and some lime water. Feed at morning, noon, tea time and bed time, only one pint each time. If that disagrees, feed flax seed tea with a raw egg in each feed. I once kept a heifer calf on flax seed tea and eggs only, for three weeks, and afterwards sold for $500.

Q. Do let your young calves run on pasture ?

A. I let them out in the yard often for a run, and the large ones in a little lane where there is some short grass, but only for part of the day. They are always housed at night, each having its own little box.

Q. Do you give your young calves water to drink ?

A. Always—all they want of it.

Q. How long do you leave the calf with the mother after birth?

A. Only till the dam has licked it dry. If the cow is excited we fence off a corner of the box stall in which she calved, and put calf in there where she can lick it, but it cannot get to her. This quiets the dam.

Q. How do you get your calves to drink from a pail the first time?

A. Use a tin wash basin, as a pail is too deep and edge gets against calf's throat. The herdsman backs the calf into a corner and stands astride it, holds a basin in one hand, wets fingers of the other hand in milk and puts them in the calf's mouth. The great thing is not to let the calf's nostrils get below surface of milk so it is choked and frightened. The calf will drink better if the basin is held well up as it is natural for it to drink with its head raised, till it learns to stoop. If the calf really won't drink let it miss a meal or two, but never, never leave milk before it to get cold and sour. By following this plan we have no trouble.

SELECTING A COW.

Having decided what kind of a cow is wanted on the place, or what the cow is wanted for, the next thing is to select the individual cow for the purpose. The shape and style of the cow being the first thing to take the eye, fix in the mind the type of a good cow for milk.

General Conformation. Without going into the detail of points, as given by some writers, which might be varied also for different breeds, remember that the good milker is wedge-shaped when looked at directly in front, that is, with slim, flat neck, rather thin through the shoulders, thick and deep in the body, to give abundant room for her digestive organs and the food they contain and broad across the hips.

The Head. The head should be carried well up or not drooping when not feeding, broad between the eyes and rather long and narrow below them down to the nose, with the eyes large, full and clear looking, but not staring, as if scared. The wild looking eye denotes a wild cow, not always pleasant to handle, possibly cross, while the dull, watery eye is a sign of lack of vigor, if not of actual sickness at the time.

The Legs. The forelegs large above the knee and small below; the thighs thin and flat and well spread apart behind by the udder; the hoofs not too large and of a clean waxy look and well set on the ankles. Beware of a long ankle, particularly if not erect, lest it result in bone ail or "cripple ail," which disease has been variously attributed to in-breeding and to a lack of bone-forming material in the food, and, as I think, is the result of the latter cause, seldom occurring on a limestone soil or among herds where wheat bran is liberally used for food.

The Udder. The udder should be the main point of observation. This should be large and run well forward, as well as broad behind, with the teats well spread apart, and the latter should be of convenient size to grasp well in the hand. In the Jersey grade it is more apt to be too small than too large. The udder should be soft and skinny rather than fleshy when empty. Too much or too long hair on the udder is considered a defect, though some very good cows have more hair there than some poor ones. It is an indication of coarseness rather than of poor milking capacity, and such cows do not usually respond quickly to a change in feed, whether for the better or worse.

The Hair. A fine, soft and silky coat of hair on the body is usually an indication of what is called an easy feeder, that is, one which will quickly show by an increase in amount of milk or the thickness of the cream, or by taking on fat, when she is being fed well. Of course the harsh, wiry hair indicates the reverse under the same conditions, but it may be only proof that the animal has not been well fed or well cared for. Cold barns and exposure to cold storms may cause coarse, wiry hair, long and standing out, unlike the smooth, slick coat of the well-fed animal in a warm stable, and it may be a symptom of an unthrifty condition, if not actual sickness. Such a cow may improve greatly under an improvement of her care, but the novice would do well to pass them by, and let those more skilled in the care of cattle handle them.

Disposition. If the cow submits quietly to being handled, she is of a quiet disposition, and the udder should now be handled and the teats tried. If she is a bad kicker she will be apt to let you know it, and it is better that she should kick you once before you buy her than twice a day afterward. See that she milks easily. Some cows milk so hard or give so fine a stream that it is worth nearly the value of the milk to get it from them.

Habits. Look at pasture fences and see if they have been made extra high and strong to keep in the herd, or if they have been frequently broken down and mended. Even though she may not be the rogue that has done such mischief, one breaking cow in a herd soon teaches others to follow her example, and when they have once learned the trick of breaking bounds it is not easy for them to forget it.

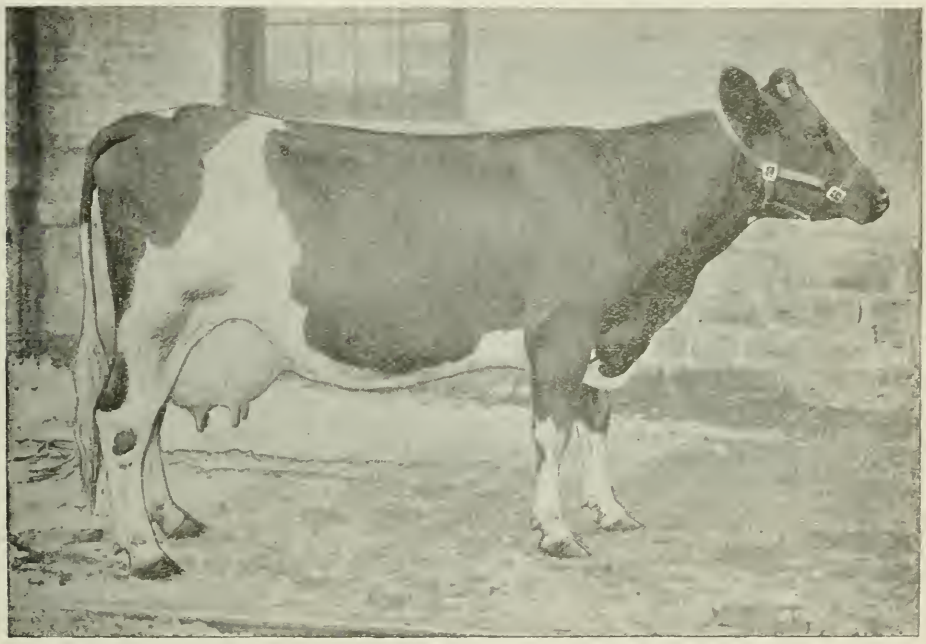
Home Life. It is seldom well to buy a cow of one who has pasture much better than yours, or who feeds more liberally of grain than you intend to. The old Quaker who sold the

cow that did not give as much milk as he claimed, said to the buyer, "Thee should have bought my pasture, too." A cow that has long been kept by a milkman is apt to have been grain-fed up to her full capacity, and will not do well on less liberal rations.

A cow from a large herd will often run more quietly alone than one which has been kept with only one companion. I never like to buy an animal of an ill-tempered man. He is apt to soon make them as ill-tempered and fractious as he is.

Age. The cow is in her prime when from six to nine years old if she has been well cared for, and if I were to buy a cow for family use I should prefer to buy her when fresh after her first calf, that by care I could establish the habit of keeping up her supply of milk until she was nearly ready to drop another. Then for three or four years she would be growing more valuable each season.

Buy and Sell. One not used to the care of cows may do better to buy an old cow that is fresh in milk, and after the calf is two or three weeks old, begin to feed grain, gradually increasing the amount given, so that in six or eight months the cow would be nearly ready to dry off and fat enough to sell to the butcher. It is true that old cow beef sells at a low price, and there might not be much profit in the transaction, but there need not be any loss. The milk should pay well for the feed, and the owner would be gaining in experience without fear of much loss, which might not be the case when he experierimented with a valuable young cow.



Calamity Jane, sweepstakes winner in the milk test at the Provincial Winter Fair, 1898. Owned by A & G. Rice, Curries, Ont.

Uniformity in Herd. If one desires to keep more than one cow for butter-making they should be as much alike as possible in two respects at least, the time which is required for the cream to rise on the milk, and that taken for churning the cream. If they differ there will be apt to be cream thrown out in the skim-milk or buttermilk, and perhaps in both.

I have never known a large record for butter made by a herd of cows unless they were all of one family, but when one cannot raise his own stock he should buy them as much alike as possible. Then the same feed and care will produce similar results in all, and the cream, all requiring the same amount of churning, will all be alike churned. Of course this may not be the case when one cow is fresh in milk and another far gone with calf, but even then their cream churns together better than if they are of breeds not alike.

These hints are intended for the new beginner rather than for the experienced farmer or farm hand, but there are some who have fed cows and milked them for years who really know but little more about selecting a good cow or herd of cows than the daily passenger on the railroad would know about selecting a locomotive. They have learned to do their part of the work each day, as they were directed, but know but little of the reason for doing the one way or some other way. They had imitated, but not learned.—*Ames in American Cultivator.*

Q. What do you look for in selecting a bull for the head of a dairy herd?

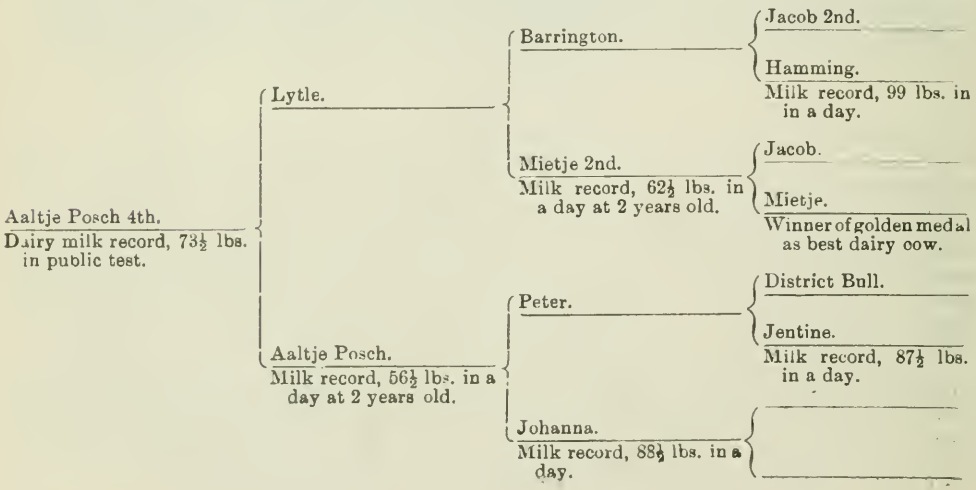
Mr. A. C. HALLMAN: The sire is the most important factor in the herd. His pedigree should be linked with some distinguished females of deep milking strains. His points should indicate the possession of power to do credit to his breeding. "Blood and breed" should be the watchword.

Prof. JOHN A. CRAIG: The most valuable characteristics of the breeding of a dairy bull are the number and merit of the performances that have been made by the cows that enter into his pedigree. The most important feature of this is the degree to which his dam was a good dairy cow, and then in lessening degree the merit of his grandam. Next to these facts is the number and performances of the cows that have been gotten by the sires that enter into a pedigree. A bull that has breeding of high order based on performance is as certain as things can be to get good calves, provided as an individual he is satifactory.

Q. In selecting a cow for the dairy, what stress do you lay on the record of the mother?

Mr. HALLMAN: The Hollanders, who are world famous for their superior dairy cattle, are guided solely by individual merit and large production In breeding or even line breeding are practically unknown. A glance at the pedigree of Aaltja Posch 4th, the Holstein cow that broke the world's record at the Provincial Fat Stock Show last December, will, I think, answer the question.

Aaltja Posch 4th, the phenomenal milker and sweepstakes winner in the Dairy Department of the Provincial Winter Fair, 1899. Owned by Rettie Bros., Norwich, Ont.



HOW TO IMPROVE OUR ORDINARY DAIRY COWS.

By Wm. Clark, Myersburg, Ont.

There are few farms in our country where there is not room for improvement in some branch of the work. If we look at the development of the cheese industry during the last 15 years, and the butter trade during the last five years, we shall readily notice that the ordinary dairy cow is a very important animal, as without her the cheese and butter business would be of little use. It is a well-known fact, and much to be regretted, that many of the cows of our country are a loss to their owners, who are often heard to say that there is no money in dairying, when the fault is not in the cow but in the treatment she receives. As it is winter now we will notice a few things in connection with her care at this season. She should be in a warm, well ventilated and well lighted stable, which shou'd be cleaned at least six times every week, and she herself will relish a little brushing just as often. She should not be allowed to root around the straw and manure heap and drink whatever she can find, and weather the winter storms, as her owner cannot expect to improve her condition under such treatment. She should be watered at least once every day, and the water may be heated a little if the best results are desired. Of course, with a large herd this would mean extra outlay, but, in my opinion, it would be an improvement in winter, as I notice daily that my cattle stand and lap in the trough quite a while before drinking, and in some cases go without water. I have used warm water to fresh cows in winter, and I am confident that it is necessary if the best results are desired.

Salting. Cows in this country should have free access to salt at all times. My system of salting is to have a small box made in the end of each manger which can be supplied weekly or oftener if required. My mangers are built with 3x4 scantling. Salt boxes are easily made by placing a piece of board three inches wide between the uprights ; this piece forms the bottom of the box, and another piece four inches wide forms the front of the box. The division between each cow forms the back of the box. You have then a box three inches wide, 14 or 16 inches long and three inches deep.

Feeding. In my opinion and in my experience I believe that regular feeding is one of the most important points in the business, as a cow or any animal to do good work must be well and regularly fed. The kind of feed depends on circumstances. At the present time corn ensilage takes the foremost place among dairymen as the bulky part of the ration, and *I think there is no crop of any kind that will produce as much good food per acre as the corn crop.* It is highly recommended by our best dairymen, and, as far as my own experience has taught me in the last 10 years, I desire nothing better than good corn ensilage. Of course like some roots it is best to feed it just after milking so as to get the best flavored milk, as I find that it will sometimes impart a bad flavor to the product. My plan is to mix the bran or whatever kind of mixture of chop I use with the ensilage in the manger. In feeding any sort of dry fodder it is the best plan to cut it with the straw cutter, moisten and mix the meal with the same before feeding, or at least moisten the straw or hay uncut and sprinkle the meal (which should be ground very fine) on it. The quantity of meal or bran fed will depend on the capacity of the animal, and also the time she is due to calve, as she must be brought to the calving time in thrifty, vigorous condition. It is necessary to watch her carefully all the time.

Advice on Pasturing. When the pasture has got a good start and the ground is warmed, and the cold spring rains are past the cows may be turned out for a little while in the afternoons for a week or so before turning out at night. The change of feed should be gradually made, even if the pasture be very good, and the grain part of the ration should be continued, if not all through the summer for at least 10 or 12 days, reducing the quantity daily. The prevailing custom of pasturing is a very uncertain way of running any number of cows to their fullest capacity, as it is only for a short time that the supply is to be depended on, and, when the pasture gets short, the cow is forced to take too much exercise seeking her feed, and soon shrinks in milk. If you will allow me I will quote you a portion of Stewart's book on feeding dairy cattle, as I think it suits here very nicely. "If dairymen could only be impressed with the fact and firmly believe, that whatsoever is produced in beef, milk or wool, must come from the food which the animal eats, what a great and salutatory change would at once take place all over the country. There is not a movement made by any creature that must not be compensated for by the food. How directly this bears upon the profits of the dairyman. If cows are allowed to go two miles, or even one mile, to pasture, or anyone is allowed to misuse them, it must be paid for in food. If cows are driven hurriedly, or chased by dogs, the quality of their milk is changed, it becomes poor—deficient in oil—the nervous excitement uses it up. How evident then it is that all exercise must be paid for in food, and that the dairyman should most judiciously regulate this exercise !"

Soiling Crops. I would therefore recommend that provision be made to supplement the pasture with soiling crops or green feed, as we farmers generally call them. The first I will mention is fall rye, this is followed by red clover, then peas and oats mixed, which may be sown as different times to keep up the supply ; then a second cutting of red clover or a small

patch of early sweet corn. By the use of these in their season you can easily keep up the supply till the ensilage corn is fit for using, which is, in my opinion, when the grain is in the milk, or the ears would be fit for cooking for table use. My manner of feeding these foods is in the mangers as we milk in the stable night and morning. I generally use bran alone in the summer as it is cheaper than any kind of chop, especially when its manurial value is taken into consideration, as our professors value it at over $12 per ton after the cow has use it. So by feeding the cow with it we either get the feed or the manure very cheap. I place the bran or chop in the mangers first, then tie up the cows, and as soon as the bran or chop is eaten I feed whatever green feed I am using in the mangers uncut, except corn, which I usually cut. Each cow then has her own share, there is no feed soiled or wasted, and you can then see that each animal gets as much as she will clean up.

The use of scales and a milk tester. The next step is to have a sett of scales of some kind handy near the stable. Beside them should hang a slate and pencil tied to a string so that it cannot get lost. The slate should be ruled and each cow's name placed opposite a line. The milk of every cow should be weighed separately, giving the cow credit for the amount less the weight of pail, which is nearly four pounds, if a large sized dairy pail is used. The weights can be copied from the slate to paper every three or four days and the slate cleaned. By this means you can tell ever day how every member of your herd is working and if any sudden change takes place seek the cause, and by careful observation endeavour to prevent its return, if it results in damage. The milking ought to be done at a regular hour, if possible, night and morning, especially when cows are fresh, or the consequence will be very likely the spoiling of teats and udders, which means the spoiling of the animal. It should also be done as quickly as possible and by the same person, who should be careful to wait for every drop as the length of the milking period depends on this very much in my opinion. If you are supplying milk to a cheese factory and quantity is your aim regardless of quality, then the scales will tell you by the aid of your weight sheets which cows you have improved and also which ones you would select to breed from. If you wish quality as well as quantity, I think the scales and a Babcock tester would be the surest guides to decide by.

Breeding and selecting the milk stock. In the next place I would breed those cows which suited my purpose best to a pure-bred registered sire of one of the leading dairy breeds. I would then raise all the heifer calves and breed them when fifteen or sixteen months old, and, after they calve, milk them till they are within six or eights weeks of calving again, if possible, as the old system of letting cows run dry four or six months must be improved on by teaching or training the heifer when she is young in the way she should go. Then keep on selecting the best and by following the system of feeding I have mentioned the members of your herd that would not produce milk would make beef for the drover or local butcher without any other fatting. In selecting I would prefer a cow with a large udder and four good sized teats well apart, and by all means large crooked milk veins, and an easy milker. Some of our best authors recommend udders that will "milk out to nothing" when empty, but I don't think I would cast out a good cow because her udder was full-looking after she had given 28 or 30 lbs. of milk at a mess or 55 lbs. in a day. I had such a cow; she and three others averaged over 1,000 lbs. each per month for six months—over two standards—one of them being only four years old.

In conclusion, I would say by all means feed well, as breed without feed is of little avail. Much depends on what goes into the mouth, and, by this method of feeding, the cow is not forced to travel for hours using up her food, being forced to take too much exercise searching for more feed, when she ought to be chewing her cud and making milk.

HOW TO IMPROVE A DAIRY HERD.

By W. C. Shearer, Bright, Ont.

It is very essential to have a good dairy herd when a person desires to make a success of the business.

No man is likely to succed in dairy work who has a herd of scrub cows.

A herd may be poor for various reasons, including inferior breeding or lack of suficient food when they were young growing animals. It is now a well known fact that many a cow has been spoiled through being kept on a starvation ration from her youth up.

First aim. The first aim should be to produce the right cow for the business. If you are supplying milk to a creamery or cheese factory where it is paid for according to its quality, then breed for quality as well as quantity.

For this work some of the shorthorn grades when large milkers, if crossed with a Guernsey or Jersey sire, will give you cows eminently fitted for your requirements.

The milk from the first cross is generally ½ per cent. to 1½ per cent. richer in butter fat than that of their dam, and the quantity given just as great. The animals from such a cross are also a little smaller in size, and consequently require less food. Every farmer probably knows it takes about two-thirds of the food a cow eats to support the life in her body. Consequently it is the amount of food we can get her to consume over and above this two-thirds from which we get our profit.

Right here it may be as well to warn you not to have in your mind's eye a general purpose cow—one that will divide her food in such a way that one part will go into the milk pail and the balance towards her body, keeping her sleek and fat. This stamp of a cow continues to milk fairly well for two or three months after calving, and then gradually gives less and less in the pail, until at the end of seven or eight months she becomes dry and boards on her owner for the remaining five months if he lets her, which I would not.

Special purpose cow. What we want is a special purpose cow. One that will put all her surplus food into milk without any intention of drying up.

If her owner will only let her have enough food, she will milk straight ahead to within two months of calving. Even then he will have to tie her up in the stable, and feed a very limited diet of dry fodder to stop the secretion of milk, and get her dry in time to give her two months' rest before calving again.

Test the cows. The next step to take is to test all the cows in the herd by weighing their milk every day or at least one day in every week. Then take a sample of each cows' milk and ascertain the percentage of butter fat it contains. You can either test it yourself, or get your butter or cheese maker to test all your samples at one time. Every week keep a correct account in this way of each cow through her milking season.

If you do, you will be astonished to find how near the head of the list old Brindle stands, and to see in how low a place some of the fat, sleek ones stand.

A Standard. Now we need to secure a standard amount of milk, butter and cheese to judge these cows by. Here is a very good one: 5,000 lbs, of milk, 260 lbs. butter or 600 lbs. of cheese.

If after giving them a fair trial you find some of your cows are not up to this standard, dispose of them as soon as possible. The butcher is the best person to sell them to, so they will not cheat anyone again.

Now choose a bull to improve your young heifers, for they are to be your future herd. Be sure he is descended from large and rich milkers on both sides of his parentage, for remember that his daughters will contain 50 per cent. of his blood. Cull out the poor heifers, retaining only the superior ones, and you will be surprised what a profitable herd you will soon possess.

When raising these heifers for dairy purposes feed them on an abundance of wholesome, nutritious bone and muscle food, such as well-cured clover hay or mixed hay and roots, with enough of ground oats and bran to keep them growing rapidly into large, strong heifers.

Always treat them with the greatest kindness until they become milkers at 2 or 2½ years old, then train them to be gentle, long and persistent milkers by milking them quietly and as fast as possible, and milk them perfectly clean. Milk for at least ten months in their first milking season.

Never on any account allow them to be chased by dogs or beaten and they will reward you liberally for kind care and good generous treatment.

Now granted we have a fine herd of profitable cows on hand, the next essential to their successful management is the dairyman. A man to handle such a herd and make a success of them needs to be an enthusastic fellow with enough of keen sighted judgment and energy to make everything that comes his way work to his advantage. He should keep himself thoroughly posted by subscribing for some good agricultural papers and reading them diligently.

Discussion.

Q. Do you believe in the silo?

A. Yes. It furnishes the cheapest food for succulence in winter and numbers of dairymen are building small ones to keep over against drouth in summer.

Q. Have you had any experience in feeding ensilage for fattening stock? Give your experience.

A. No, not as a business but have had ten years' experience with it fed to milk cows, and my experience is that you can keep one-third more stock on the farm by its use than without.

Q. Do you believe in a cream separator?

A. Yes. I have found by a fair trial that it will save from one to two pounds of butter per week from each cow, over any of the gravitation methods.

Q. What breed would you recommend for a typical dairy cow?

A. The Jersey or her grades for a family cow where quality and cheap productions are the main considerations, and the Ayrshire-Holstein and their grades for a large flow of average milk is desired.

Q. What feed would you recommend to improve the color of butter in winter.

A. Use a small amount of butter color. I find it to be the easiest, quickest and surest way to give satisfaction.

Q. What do you think of dehorning cows ?

A. I am in favor of dehorning all the farm stock. They are much more safe in each others company.

Q. Would you advise dehorning dairy cows ? A.—Yes.

Q. How much salt does an animal require per day ?

A. About two ounces.

Q. How do you kill lice on cattle ?

A. 1 gallon fish oil, 1 gallon coal oil, ½ gallon crude carbolic acid. Mix well and apply with a sprayer. This will also keep the horn-fly off.

Q. How would you put in ice without sawdust ?

A. Clean wheat chaff is the next best thing to use but not so good as sawdust.

Q. What is a good ration for producing milk in winter ?

A. Thirty pounds of well eared ensilage, seven pounds cut clover hay, three pounds cut oat straw, with four pounds ground oats, five pounds bran and one pound oil cake make a balanced ration for cows of 950 pounds in weight.

Q. How would you keep up the milk in summer ?

A. As long as plenty of good sweet grass is abundant nothing else is required ; but it is as well to prepare plots of one-half an acre, sown at three different times with a mixture of oats and peas, combined with one or two acres of early planted corn, which will keep up a good flow.

Q. What breeds or crosses would you advise for the best dairy cows ?

A. Holsteins and Ayrshires are considered the largest milkers, but Jersey grades of either Ayrshire or good native cows, make the best poor man's cow.

Q. At what age should a heifer have her first calf ?

A. If she has been well fed, at from two to two and one-half years old, then feed her well and milk her up to within two months of having her second calf to establish a long milking habit.

Q. Do dairy cows require exercise in the winter ?

A. Exercise is not entirely necessary but we prefer to turn them out in a sunny yard for an hour or so on moderate days during the winter.

Q. Would you feed the dairy calf on fat-forming materials ?

A. It is not well to feed calves too much fattening food. It tends to develop the beefing tendency. A good ration for dairy cows is well cured clover hay, ground oats and bran with a moderate quantity of roots and skim milk until they are five or six months old.

Q. How long can we milk a cow profitably ?

A. About 9½ or 10 months each year, and from 4 to 11 or 12 years old include her best years.

Q. Are sugar beets and mangels good feed for dairy cows ?

A. Yes, both are good foods for producing milk. I feed roots just after milking.

Q. What constitutes a good ration for cows from which the milk is sold ?

A. A good winter ration would be 30 to 40 pounds of ensilage, 8 to 10 pounds of good clover hay, 4 pounds ground oats, 3 pounds of bran and 2 pounds oil cake daily, with ½ a bushel of roots three times a week. And in summer feed all the fresh grass, green oats and peas or other soiling crop with about 5 pounds of bran a day, and do not forget to supply about two ounces of salt per day.

Mr. T. H. Mason answered the following questions :

Q. Which gives the most value as food for dairy cows, ensilage or roots ?

A. This is a hard question to answer. Some parts of the Province are so much better adapted for corn than roots that in those parts corn is a great deal more valuable than roots. Probably to get the very highest yield of milk from cows, a mixture of both would be desirable.

Q. Is there any food superior to a really first-class natural grass pasture for either milk or beef cattle ?

A. No, I do not think there is. Mr. McMillan says his beef steers eat natural grass pasture in preference to clover every time and in fact thinks natural pasture decidedly superior to clover. The quality of milk from a mixed grass pasture is also decidedly superior to that from a clover pasture.

Q. How much ensilage is profitable to feed dairy cows ?

A. From 20 to 40 pounds per head daily, according to the individual cow, along with oat straw and clover hay, and a suitable amount of bran and mixed grain.

Q. How much grain and bran should be fed to dairy cows along with ensilage and hay ?

A. Four pounds bran, three pounds pea-meal, two pounds cotton seed meal or ground oil cake, giving more or less according to the individual cow. In a winter like this, when bran is so very dear and oats are a moderate price, we are substituting one-half oats instead of bran, still we do not think we can do without bran even at the present prices.

Q. Does ensilage impart a bad flavor to milk and butter ?

A. No, most decidedly not. After six year's experience with ensilage, and part of the time supplying a fancy butter trade in Toronto and Hamilton, I can state most emphatically that there is not the slightest objection on that score.

Q. We hear a great deal about balanced rations. Is there anything in it?

A. Yes, there is a great deal in it, and I think if we are to feed profitably we must pay a great deal of attention to it. Of course in making up a ration for our animals we have to be guided very largely by the foods that we produce on our farms, and also by the market prices of the various foods that we wish to purchase.

Q. With clover hay as the main bulky fodder, what would be the most profitable foods for me to purchase to feed my dairy cows at present prices in Ontario?

A. Clover hay is a well balanced food, has a large amount of nitrogenous matter. Corn at present is cheaper than any of our native grains. It has an excess of carbonaceous or starchy matters. Mixed with some wheat bran and oil cake I think it would give very satisfactory results. Say bran 4 pounds, corn meal from 4 to 6 pounds, and oil cake one pound.

Q. Should dairy cows be milked right up to parturition? Some authorities advocate it?

A. No, I do not think so. Whenever I have done it I found that the cow did not do as well the following season and that the calf was weak. The evil effects were especially marked in the calf.

The following questions were answered by Prof. H. H. Dean, O. A. C., Guelph:

Q. What are the limits of variation in the fat contents of milk?

A. Ordinary herd milk will range from 3 to 5 per cent. fat. Individual cow's milk may go so low as 2 per cent. fat, and I have known one case where the percentage of fat in the milk from a single cow was as low as eight-tenths of one per cent. I have also known cases where the fat in one cow's milk tested as high as eight per cent. This occurred when the cow was nearly dry. One might say that it is difficult to set the limits to the variation in the fat of individual cow's milk while individual herd milk varies within comparatively narrow limits, say one or two per cent.

Q. Would pasteurizing milk before feeding to calves prevent tuberculosis?

A. Heating milk to a temperature of 160 degrees to 165 degrees will destroy the germ causing tuberculosis. Some recent investigations indicate that heating milk to 140 degrees to 145 degrees will destroy the germs, but it is usually considered safer to heat or pasteurize at 160 degrees to 170 degrees, especially for skim-milk at creameries. In Denmark all skim-milk must be pasteurized before it is returned to the farm from the creameries. The Danish Government has adopted that precaution to prevent the spread of tuberculosis. Some authorities think there is very little danger of spreading tuberculosis through milk, as milk very seldom contains the disease germ unless the udder of the cow is affected.

Q. Can a dairyman with ten cows profitably use the Babcock test?

A. Yes. By means of the Babcock test and weigh-scales he can find out the profitable and unprofitable servants. The latter he will send where hay, silage and meal are not consumed, and where the sound of the milkmaid's voice is not heard. Weighing and testing the milk of each cow separately is the only way to select cows for a profitable dairy herd. The milk from each cow should be weighed and sampled for two or three days each month during the milking period, and the result for the year may be based on these weights and tests.

Q. Will potatoes fed to milk cows injure either the milk or butter?

A. No, if fed in moderate quantities, say not over a peck per day to each cow. When fed in large quantities they are said to give butter a tallowy appearance, and to make it white in color. The white color may be overcome by using butter coloring judiciously. Any bad flavor, which is the result of food, may best be over come by pasteurizing the milk or cream, and by using a good flavored starter in the cream to secure proper ripening.

Q. Is it true that the separator cleanses and purifies milk, if so, how?

A. The centrifugal separator does cleanse and purify milk. Any person may easily be convinced of this fact by noting the "mud" or "slime" which collects in a separator bowl after separating what is apparently clean milk. The cleansing is effected as a result of the action of centrifugal force. "The "mud," "dirt" or "slime," etc., is the heaviest portion of the milk, and collects on the sides of the separator bowl and remains there, as no way is provided for it to escape. The skim-milk is second in weight and forms next to the "mud," but this is being continually drawn off through pipes arranged for the purpose. The cream is lightest and forms a wall in the centre of the bowl until it finds an outlet at a point near the top and centre. The substances in the milk arrange themselves in the revolving bowl in the order of their weight or specific gravity—the heaviest, or the dirt, being thrown to the outside.

Q. What is the relationship between the per cent. of the fat in the milk and the number of pounds required to make a pound of butter?

A. Butter consists of fat and other substances, chiefly water, salt and curd. Good butter contains on an average 84 pounds of fat and 16 pounds of water, curd and salt. The amount of butter made in excess of the fat is commonly known as the "overrun." The relation between fat in the milk, and the overrun is not always constant. It is affected by loss of fat in skim-milk and buttermilk, losses by spilling, sticking of cream to vats, cans, pails, etc., loss of butter

in churn and on worker, extra butter put in prints, boxes, tubs, etc., to make them mould out weight when they reach the consumer. Losses by evaporation and leakage also affect the overrun. The amount of curd, salt and water which is incorporated with the fat is also an important factor. Taking everything into consideration an overrun of 10 to 15 per cent. is good work in a creamery. In a private dairy with a separator it may be higher. If there was no loss whatever the overrun should be a little over 19 per cent., i.e., 100 pounds of fat in the milk would make 119 pounds of merchantable butter.

Q. Is there any difference in richness in solids and fats of night and morning milk

A. Under the same conditions of temperature, feeding, care, length of time between milkings, milkers, etc., there should be little or no difference in the richness of milk night and morning. In some experiments quoted in a British journal, it has been found that "the average of eight cows milk for six days was,—solids not fat, 9.2 per cent. in the morning. The evening milk tested 9 per cent. solids not fat, and 4.88 per cent. fat. The morning's milk was rich in non-fatty solids and poor in fats, while the evening's milk was rather poor in non-fatty solids and very rich in fats." (Ex. Station Record Vol. XI, No. 6, p. 578.) Our experience at the College is that the evening's milk is usually richer in fat. The chief cause of this difference is that there is a slightly shorter time between morning and evening milking than between evening and morning. The shorter the period between milkings the richer will be the milk as a general rule.

Q. What per cent. of fat should there be in skimmed milk ?

A. Skim-milk should not contain over one-tenth of one per cent.

Q. What are "cream starters" or "cream ripeners," and how are they used.

A. A "starter," as its name implies, is something added to the cream to start, hasten and control the ripening process. To make a starter, the common way is to allow the skim-milk from a fresh cow, or cows, to sour naturally. This, if it has a good flavor, is what may be called a natural starter. Buttermilk and sour cream are also natural starters if no culture has been used. A surer method of producing a good flavored starter is to pasteurize some skim-milk and then, after cooling, introduce what is known as a pure culture, which may be obtained from a laboratory or from firms who manufacture these cultures for sale. The culture once started may be propagated almost indefinitely with proper care. In using a starter, add from five to fifteen per cent. of the starter to the cream, according to the time in which it is needed for churning and the temperature at which the cream is held. For quick churning use ten to fifteen per cent., and keep at a temperature of about 70° until it thickens. In winter, for slower churning (forty-eight hours after setting to ripen), use five per cent., and hold at 60° to 65° until the cream thickens. Then cool to churning temperature in both cases.

Q. What shall we do at the factories with Saturday night's milk ?

A. Where patrons have proper facilities for cooling the milk, cool Saturday night's milk to a temperature below 60°, and send it to the factory on Monday morning. Where patrons cannot or will not attend to the milk on Saturday night it may be made into butter either on the farm or at the factory where there is a butter plant. We do not favor making cheese on Saturday nights and Sunday forenoons. Cheesemakers need the Sabbath rest as much as any other class. Sunday work is a growing evil in some cheese sections, and it is time to "either fill the pit or sell the asses that persist in tumbling into it."

Q. What is the best way to ventilate a dairy ?

A. For ordinary dairies sufficient ventilation may be obtained by means of doors and windows, where proper screens are placed to prevent the entrance of flies, etc. A more complete and expensive system is to have the fresh air brought to the dairy through underground pipes, placed at least six feet in the ground, and coming through a distance of 100 to 200 feet. This method insures a constant stream of cool air to the rooms of the dairy during the hottest weather. The warm and foul air may be removed through an ordinary ventilator placed in the roof. Both the inlet and outlet should have proper means for regulating the inflow and outflow of air. This is easily done by means of registers or slides.

Q. Can fat be fed into milk ?

A. If by this question is meant can the percentage of fat in milk be increased by food fed to the cow, we answer no. All the constituents of milk come from the food and drink of the cow. The fat of the milk comes from the food indirectly, and is thus "fed into the milk," but the ordinary meaning of this question requires us to say the results of numerous experiments indicate that ordinary foods have little or no influence on the percentage of fat in the milk. Experiments quoted in Ex. Station Record, Vol. XI, p. 485, say : "In regard to the fat, the results furnish no indication that the fat of the food affects the production of fat in the milk." The author concludes that neither the percentage nor the obsolute amount of milk fat is dependent upon the fat digested from the food. He believes that some feeding stuffs contain certain materials which stimulate the lacteal glands to greater activity in some cases, and in other cases so modify the cell activity of the glands that a milk richer in fat is produced.

Q Can anything be added to milk or cream to prevent souring during warm weather ?

A. Yes Substances may be added to milk and cream to prevent souring, but their use is not advisable, for the reason that nearly all substances which have the property of preventing

the milk from souring have an injurious effect upon the human system. Heating milk or cream to a temperature of 140° to 160°, and afterwards cooling it to 50° or below, is the best method of preventing souring. In ordinary cases simply cooling the milk or cream to a temperature of 50° or below will prevent souring for twenty-four to forty-eight hours. Where it is necessary to keep dairy products for a longer time pasteurization is recommended.

Q. Should milk supplied to cheese factories be paid for according to percentage of butter-fat?

A. There are three methods of dividing proceeds among patrons of cheese factories now in use in Ontario, viz., dividing according to weight of milk delivered, regardless of quality; dividing according to the percentage of fat in the milk, and according to the fat and casein of the milk, the casein being represented by the addenda two to the fat. Paying according to the percentage or weight of butter-fat is a great improvement over paying by bulk or weight, but we consider that adding two to the percentage of fat is more just, as it recognizes the curdy or caseous matter of the milk, does not place so great a premium on the fat and comes nearer to the actual cheese-producing value of the milk than any simple system yet devised. After five years' work in careful experimenting on this question we can confidently recommend the "per cent. fat plus two system" to patrons and owners of cheese factories as a simple and just plan for ascertaining the relative value of different kinds of milk for cheese making.

Q. What is the cause of mottled butter.

A. At many of the Institute meetings held during the past winter the question was asked, "What is the cause of mottled butter?" The Maryland Experiment Station has just issued a comprehensive bulletin on the subject, and the following are their conclusions :—

1. The uneven distribution of salt is the cause of unevenly colored butter spoken of as mottled butter.

2. Washing the butter with water below 40 degrees does not cause mottles. It does, however make a little more working necessary to thoroughly distribute the salt.

3. The light colored streaks or portions of mottled butter are not caused by an excess of casein, but mottles are evidently caused by some physical action of salt on the butter fat which causes it to admit more light.

4. *Mottles can be prevented by working the butter sufficiently to thoroughly distribute the salt.*

5. Butter washed with water at 40 degrees and under, and worked immediately, shows a better grain when sufficiently worked to insure its being evenly colored than with any other treatment.

6. Washing butter with water at 40 degrees does not injure its firmness when subjected to high temperature.

MILK PRODUCTION.

By Lt.-Col. D. B. McLennan, Lancaster, Ont.

The production of milk is a great question. How to produce a large quantity is to-day exercising the minds of a great many dairymen, but how to get the largest quantity from a given area is as yet a sealed book to the great mass of the people. It is known only to the progressive few.

The production of milk to the acre is a very important subject, as it is important to a person engaged in any business to know what dividend he is able to pay upon the capital he has invested. The farmer's acres are, generally speaking, his capital, and the best test of the measure of his prosperity is the return he is able to get from the acres he possesses. When dairying or milk production is the leading industry on the farm, it is well to note with the same accuracy how much per acre can be produced as if these acres were devoted to the growing of wheat or any other cereal, and also to strive year after year to increase the output, so that the product per acre may not only be greater but be obtained at smaller cost. It is not my purpose in this address to make any exact estimate of the quantity of milk that may be produced to the acre, but rather to show how the product of that acre may be increased to its greatest capacity.

Experimenters have made estimates of that kind, but owing to the variable character of different soils, their condition of fertility and adaptability to grass growing, such data is not of much service unless we have all the conditions before our minds, so as to be able to make a ready comparison between them and the conditions in which we ourselves are placed. Before proceeding with the discussion of the general question, I may observe that the authorities of Guelph Farm have reported through Prof. Brown, late of that establishment, that 7,000 pounds of milk were produced from one acre of grass upon which two cows were pastured. Also Mr. D. M. Macpherson, of Lancaster, has computed that the area of ground that will yield a ton of cured hay, will, if converted into pasture, produce the same weight of milk, and I believe Mr. Macpherson's estimate may be accepted as a standard.

To obtain the best returns from the acres of a dairy farm two things are essential, viz., a herd of good dairy cows and a sufficient supply of suitable food. The rest is a matter of detail. By a good dairy herd I mean a herd of any of the recognized milking breeds such as Shorthorn crosses, Ayrshires and Holsteins, and would include Jerseys and Guernseys if butter is made. A good herd further means that the animals shall be well selected, and that there shall be an annual weeding out, because there are individuals in every herd of even the best breeds that make indifferent milkers, and these must not be kept.

By suitable food I mean the best that can be procured. June grass or good sweet grass at any season makes a perfect food for a milk cow. The nearest approach to grass is a good substitute, when grass fails, or pastures become too bare.

Feeding. I will begin by saying that my present rule is to feed meal all the year round, or at least during the milking period, and I believe it is profitable to do so. Meal feeding with grass should of course be regulated according as the supply from the pasture is good or poor. When grass is plentiful, meal feeding is not necessary to complete the food supply, but I always believe it is better to continue its use, be the quantity ever so small, because the cost of it seems to be more than repaid in the help it affords the herdsman in bringing the cattle to the stalls to milk. And here it is proper to observe that the utmost gentleness should be observed in the handling of a dairy herd in bringing them to and from pasture and at all times, and this is best accomplished if dogs are not kept around. The habit of a little hand feeding at milking time tends to establish the best relations between the cow and the milk maid, and small though it may seem, the spirit of contentment that it imparts to the dumb animal at this particular time seems to swell the account through the milk pail. During the grazing season there are two periods when pastures are likely to be short, viz., during July and August, before after-grass comes in, and again in October when there is little grass of any kind. For the first period I recommond peas and oats, or tares and oats, sown as early as possible on rich soil convenient to the cow barn, to be cut and fed to the stock when required. Either of these mixtures do better than corn because they can be sown earlier, and are more likely to be ready for use when required. An acre or two of this stuff will go a long way with a herd of twenty or thirty cows, and it should always be provided, because great loss is suffered with a milking herd should they be pinched for food at this time, and, should it not be required, it may be cut and stored for future use.

In the month of October when pastures can no longer be relied upon, I prefer roots, fed morning and evening, to any other feed. They seem to maintain the milk flow better than anything I have tried. This being the season for housing or harvesting the root crop, it falls into the natural routine and is very convenient. I am of the opinion that there is no crop grown that will produce so much milk to the acre as roots, except grass, and there is no other crop that will produce it more cheaply. This makes it clear to my mind that root feeding during the late fall months can be recommended as an excellent means of keeping up the milk flow when ordinarily a serious shrinkage is likely to take place. A month's feeding of roots upon the plan I have outlined may be looked upon as a certain amount of saving, because the quantity so fed will not have to be housed or pitted, while the feeding of them will yield as good, if not better results, than if fed at any other season.

For winter feeding, corn and clover hay must be the main reliance for the bulky portion of the ration, and this with meal added, at the rate of four to eight pounds per day, will make a balanced ration, and sufficient for a cow giving milk. I believe that meal should always be fed, when possible, as a mixture with dampened fodders, and, to carry out this principle with the least possible labor, I always feed meal along with corn ensilage, and, if these could be mixed beforehand in a feeding room, I think it would be all the better. I have found since I have been feeding ensilage that a good deal of straw and chaff, if the straw be of good quality, can be profitably fed to milk cows. It gives greater variety, and it seems to answer better if they are fed together.

Milking period. From my experience, I am set in the opinion that a cow should milk for ten months in the year. Some will milk even longer, say ten months and a half, and I see no objection to it. If a milk cow with proper care and proper training from the start persists in drying up sooner than nine or ten months, she is not quite suited to the dairy.

In conclusion, I would say that a heifer should drop her first calf at two years old, at least there should be no means used to prevent it. I am a believer in the perfection of nature's law. She should have a calf every year afterwards while she remains in the herd. Success in this particular is more likely to follow if nature is allowed to take its course at the beginning. If the foregoing rules are observed as to the selection, feeding and care of a milking herd, there is little doubt but that an average of eight to ten thousand pounds of milk per head may be reached as the yearly output. If it be true that the present average for the Province is but little over 3,000 lbs., this amount being trebled should open up a new era of prosperity to the dairy business of Ontario.

CO-OPERATIVE DAIRYING.

By John Echlin, Carleton Place, Ont.

In speaking of co-operative dairying, we have to acknowledge the fact that it is among the first industries which have given prominence to the land in which we live, and we look upon it with a good deal of respect and pride. By the establishment of our system of dairying, it has given us an acquaintance with the outside world, without which we could never expect to compete with other countries. Although as a cheese producing country we are little better than a quarter of a century old, yet we have attained to a great height in that short space of time. To my mind, we have arrived at a very critical point in our career. It seems as though we have made very little progress in the last few years, as to-day we find our cheese on the British market severally criticised. We are told that we are making it too hard, which fact I have not the slightest reason to doubt. I suppose this criticism is due to the fact that other countries are putting up such a splendid article that Britain is beginning to ask herself—what is the matter with Canada? And I may tell you right here, that Canada is getting the chase of a lifetime with her cheese in the British market, and we should not by any means rest on our oars and fan ourselves with the idea that we cannot be beaten out of the market that is consuming almost the entire output of our country.

Co-operation of milk producers needed to secure high-class cheese. I want to ask just one question. By what means can we make a great stride, and get to the top of the ladder or out of the crowded place in the centre? The answer has shown itself to me in this way, and I think you will bear me out when I say that it can only be accomplished by the co-operation of every individual sending milk to a cheese or butter factory. We know that nothing else is so easily contaminated as milk. It is the best medium for the growth and development of bacteria, and, as cheese-making is nothing more or less than a process of fermentation, we should strive to send milk to our factories in the best possible condition. We are now able to pasteurize milk sent to creameries for butter-making in winter, to purify it and give the product better keeping qualities, but we cannot expect to be able to pasteurize milk as it comes to our cheese factories, for the reason that usually it has developed too much acid before it reaches the factory. It would not, therefore, stand the high temperature of pasteurization, nor could we allow the time required to do so. We appeal to the milk producers to strive to send a better article of milk by being scrupulously clean and careful in every detail. Some of you will ask the question, if our cheese is too dry and hard why do you make it so? Why not make it softer? Well, I think I will be able to answer and satisfy many of you, at least, when I say that in nine cases out of ten we have no control over the temperature of our curing-rooms. We find many very fine-looking cheese factories built throughout the country with make-rooms fairly well equipped, and for curing or store-rooms we find mere shells, the framework clapboarded on the outside and lined again on the inside. Now, if this is a sample of our best factories, what must our poorer factories be? This is the point at stake. How can makers make a soft, rich, close-bodied, meaty cheese having a perfect texture and flavor if forced to cure their goods in places where they cannot control the temperature.

Defects in Curing-rooms. I think the Government has been especially good to us inasmuch as they have given us such excellent shipping facilities for the preservation of perishable goods, but, to my mind, either they, or we, have begun at the wrong end, as I believe that the first two weeks of the life of a cheese is of the most importance. Therefore we should see to it that we can control the temperature and likewise the moisture in our curing-rooms, as we have to keep our cheese in store for about twelve to fifteen days, or until the curing or breaking down of the casein is fairly well developed. We have been told recently by our best and brightest cheese men, and the statement backed home by our eminent bacteriologists, that cheese cured in rooms where the temperature can be maintained at sixty to sixty five degrees F. is actually worth, on the market, three-quarters of a cent. per pound over cheese cured in rooms where the temperature will very from sixty to eight-six degrees F., as we very often find it. If this is so, and we are losing fifty to sixty cents. per box of cheese on the total output, it will figure up to a nice sum, considering the fact that we shipped fifteen million dollars worth of cheese last year, or 1,875 000 boxes.

Poor Economy. There is another deplorable state of affairs apart from our poor curing-rooms. That is the establishment of small cheese factories, and the persistent desire to cut down the wages of the makers. This evil is being largely felt throughout the Dominion, and we find that some of the best men are being crowded out of the business and forced to seek some other employment. This means poorer cheese, poorer prices and poorer service: I would advise patrons and factory owners not to engage the cheapest man who may apply, but to get the best and stick right to him, even if you have to pay him more money than the other fellow. A man, who is well paid, will take an interest in his factory and also in his work, and will strive to make money for his patrons by being careful of the utensils and furnishings and guarding against losses in every way. Such a man will be the cheapest man to his patrons when the end

of the season comes. One more word about the maker and I am through with him. The man who cannot be clean himself and keep his factory clean, and be able to set a good example to his patrons, is not the man to engage a second year. Do not keep him if he cannot afford to wear a clean apron in preference to the filthy, greasy overalls which so many men delight in wearing. Such men are usually the first to find fault with the patron because he does not strain the milk and send it in a clean can and a thousand and one things of like nature.

Winter Dairying. I think the system of co-operative dairying will not be complete until we find creameries established in convenient centres, owned and governed by the people, whereby they may turn their attention to winter dairying. This can be done by having a few of our best cows and heifers come in in the fall. Be kind and gentle, feed well and house properly, and the heifers will milk well during the winter, and when turned out to fresh grass in the spring, will respond freely to the green feed and continue to milk well for four or five months longer, thus encouraging the habit of milking for ten months in the year, which seems to be the only method to follow in order to increase the profits of the dairy. Besides this, the establishment of creameries would encourage the method of paying for milk according to the per cent. of fat it contains, which system has a great many good qualities, inasmuch as we would get a better article of milk, as people would soon realize that makers could not get a representative sample from milk improperly cared for, and by testing the milk from each cow in the herd we could soon find out the culls. These we could turn to beef, and have their places filled by cows that would yield us a profit instead of a loss. I would like to dwell longer on the points favoring the use of the Babcock test as against the old pooling system, but lack of space will not permit.

By the establishment of creameries we could also raise better calves than in the cheese season, and, with the present prices paid for cattle, it seems to commend itself to us. Then, by a liberal amount of skim milk along with coarse grains from the farm, we could finish a few bacon hogs and have them ready to ship at a time when the market is most active, whereas with nothing but whey from the cheese factories, and that coming in bulk during the summer, we have been in the habit of striving to get rid of our hogs by the end of September, or when there will be a shortage in whey, and at that time we very often find the price of bacon hogs very low, as the hogs sold at that time will not get to the British market until the game season is on, and then the people who have been buying our bacon have turned to game and do not want bacon. Buyers are forced to govern the prices to meet the state of affairs I have just mentioned. So, with the continuous system of dairying we would be able to produce hogs more steadily, and thereby lessen the output in the fall of the year.

Now, you may think this hog question is wandering from the subject of co-operative dairying, but I hold that without hogs to use up the whey and skim milk, our profits would be much smaller from our dairies than at present and we as farmers cannot afford to go out of any one branch of farming as there is just a little profit out of all these sources, and it is only by such profit that we live ourselves, give everybody else a living and pay 100 cents on the dollar.

Discussion.

Q. What loss in fat or butter do we usually have at home?

A. Under normal conditions in our best dairies we lose from 15 to 20 pounds of butter per 100 pounds, or .6 to .7 of one per cent. fat per 100 pounds of milk.

Q. What causes butter to be hard to gather and what is the remedy?

A. Churning thin cream, churning at too low a temperature, also churning from cows that have been long in milking. When the period of lactation is well advanced we find the fat globules much smaller than in fresh milk. The nature of the fats also change under these conditions, as the soft fat prevalent in fresh milk gradually diminishes as the season advances, and is replaced by the harder fats known as palmytin and stearin, consequently the butter is much harder to gather under the above named conditions. Raise the temperature by adding a little warm water, then revolve the churn a few times, and draw off a portion of the buttermilk. This will usually overcome the difficulty. If churning is continued for a few minutes great care should be taken at this point, as butter will come very rapidly under this treatment. The addition of a little salt has a good effect on butter, which is hard to gather or unite.

Q. What is the best method of raising cream?

A. Where ice can be had or an abundant supply of very cold water, I think deep setting creamers give best results, as from this method we get a smooth, velvety cream, whereas, from shallow pans we invariably get a thich, leathery cream, apt to contain white, curdy specks, which are hard to strain from a very thick cream, and will often show in butter if the cream is not strained.

Q. I think turnips can be fed to milch cows without any bad results, as I have fed turnips for many years and my customers do not complain of my butter.

(A Voice: People will get accustomed to anything in time.)

A. This has not been my experience where we put our cheese and butter on the market under expert judges. In eleven years I have seldom found buyers overlook a turnipy flavor in

butter or cheese, and even in Montreal and Toronto men would pass such cheese or butter. I think it is a bad practice to feed turnips to dairy cows, and put the product on the British market and expect to hold our reputation even at the standard of to-day, and I would ask the patrons of every creamery not to feed turnips to their milch cows, if Canada is to win a place in a tight race on the British market.

Q. What is the best diet for milch cows during winter?

A. I would recommend ensilage with mixed grains and sugar beets and mangels, or peas and oats cut green and clover hay fed with roots. This green feed and clover hay and roots can be grown in places where corn won't do very well.

Q. When we send cream to a creamery should we get credit for as much butter as we can make at home. For an eight inch crock we get credit for seven to eight pounds of butter, while at home we can make from ten to twelve pounds from the same sample of cream?

A. I would be inclined to think there was something wrong in the instance referred to. While there is liable to be a greater per cent. of casein and also moisture and salt found in dairy butter than in creamery, still there should not be such a difference in the same sample of cream made by two different makers. We have often found dairy butter to be deficient in moisture, actually containing 90 per cent. of fat with only 10 per cent. water, casein and salt.

Q. How can a man raise good calves and keep up the standard of his stock, and at the same time go into the dairying industry?

A. This can be done even in cheese making sections by connecting a creamery plant to the cheese plant. Have a few of your best cows together with the heifers come in in the fall, feed well and house properly, and feed calves with warm skim milk brought back from the creamery. I think it is essential that heifers come in in the fall, as with good care they will milk very well during the winter, and when turned on grass in the spring they will respond freely for four or five months longer, thus encouraging the habit of milking ten months in the year. Under such system we derive the greatest profit from our herds.

THE MILK PRODUCER'S RESPONSIBILITY.

By N. G. Somerville, Lanark, Ont.

You are all well aware that for many years our cheese stood second to none in the Old Country market, but I regret to say that during the past three years our cheese has been severely criticised. One reason of this is on account of the poor curing-rooms in which we keep the cheese, and another is because of the improper care of the milk and the improper food given to dairy cows. The dairy industry is a wonderful one, and every farmer should be deeply interested in it. The success of it depends upon him. Science, invention, capital and enterprise have done all they can, and we have come to the point where the future fate of Canadian and American dairying is in the greatest peril. Competition from every side, and the rapid developing of the industry in other countries, all point to an increased supply of dairy food in one form or another. In the meantime the foreign demand is along old lines, and mostly confined to England. Most of this progress applies to the dairy product after it leaves the farm, not before. There are farmers who are producing milk as expensively as they ever did. Beyond the farm a wonderful reduction in expense has taken place in the last few years. Every farmer should study how to reduce the cost of producing milk so that he can defy foreign competition, or if this is not done he will be forced to quit the business. If he quits the business and enters some other branch, whether producing meat or grain for the export market, he will meet the same competition. Can he keep on and produce milk at cost, and down to ten and even twenty per cent. less than cost, and make it up by reducing the comforts of modern civilization in his own family?

Cheaper Production. A large percentage of distress and complaint among farmers is not because of hard times, but because they have not learned the great lesson of the age—cheaper production. The moment the milk leaves the farm it goes out on a new road where a careful watch is kept over every cent to see that each one does its largest work. Is the farmer doing this with his milk before it leaves the farm? You may have the best cows in the world, but if you do not manage them properly you will fail. You may have good cows and be a skilful feeder, but if you are not a good soil manager, and do not grow the milk food crops wisely, you will fail again. How much does your milk cost per hundred pounds! Every poor cow makes it cost more. The market for butter and cheese does not care what it costs you. The market is only concerned about two things—the amount offered, and the quality. Nine out of ten farmers are looking at the market instead of looking at the cost. Just as soon as the farmer produces milk by the cow by the acre, will he attain the goal of true profit—a low cost of milk per hundred pounds. Then you will see him looking around for a good cow. He will study

scientific feeding, soil enrichment, and the production of the largest amount of the best food possible. Then he need not care for foreign competitors, for he can produce milk cheaper than the cheapest. Pay no attention to the cheese factory or the creamery. They are not causes but results. The great question is not what shall we pay for making cheese and butter, nor what shall we get per lb. for it, for we cannot raise the great market price a penny.

As I have wandered a little from my subject I will turn your attention to the milk producer's responsibility in caring for milk for cheese factories—the good cow and the proper handling of that cow. One of the most important changes that could be made in connection with the cheese factory would be a change in the system of paying for milk. The present system, known as the pooling system, encourages the farmer to supply his factory with as many pounds of milk as possible, regardless of butter fat or casein, which are the chief composing compounds of cheese. By adopting the system of paying for milk by the amount of butter fat it contains, we encourage the farmer to improve his dairy herd and to produce as much butter fat as possible. At a factory in the season 1898 the milk delivered for the first three months varied in fat from 2 8 to 3.8, and during the last three months the milk varied in fat from 2.8 to 4.9. One hundred pounds 2.8 milk will make about eight and a half pounds of cheese, while one hundred pounds of 4.9 milk make eleven and a half pounds of cheese. It is plainly seen that the patron supplying 4.9 milk is not being paid full value for it.

The richer the Milk the better the Cheese. While we can make fairly good cheese from three per cent. milk, we can make a great deal better cheese out of four per cent. milk, so we want to encourage the farmer to improve the quality of his milk. We have made wonderful improvement in the system of cheesemaking in the last ten or fifteen years, but we cannot be satisfied with what we have done. We must keep on improving. Other countries are reaching for our markets and are coming into Canada and taking away our very best makers and paying them large salaries to go and teach them how to make cheese, and then this cheese comes into competition with ours on the British market. What we want to do is to send cheese to the British market that will give the British consumer entire satisfaction. One thing that is neglected at the cheese factories is the whey tanks. There are whey tanks that are never cleaned out from one end of the season to the other, and they are so dirty and filthy they are just a breeding place for all sorts of bacteria, and then these are returned home to the farmer in the same can as the milk is delivered to the factory in. It is the duty of cheesemakers to see that their whey vats are cleaned out once every week, and in this way the whey is returned to the farmer in a much better condition for feeding.

Aeration. During the past number of years the subject of aeration of milk has received a good deal of attention. According to the old system of caring for milk the patrons of a cheese factory were instructed to cool the milk as quickly as possible. Very often the milk was not properly cooled and would arrive at the factory sour. We now hear cheesemakers instructing their patrons to aerate their milk and not cool it, and many devices have been invented for this purpose. By aeration we mean that the milk is thoroughly exposed to the air. This may be done by pouring the milk into a large dipper, or allowing it to trickle slowly through small holes in a vessel, the fine streams of milk falling through the air into the milk can. By aerating the milk, animal odors and bad flavors escape. Of course the operation must be done in a sweet, clean place, or the milk will be inoculated with foul germs. This cannot be impressed too firmly in the minds of the farmers. As a rule, milk that has been aired will keep sweet longer than milk that has not been aired, the conditions of the temperature being the same; but the main advantage claimed for aeration is that the gases and bad odors escape and the milk is better flavored. In factories where patrons have practised this it has not been necessary to cool the milk, excepting in a few of the real hot nights in summer. It is a safe rule to have the milk a little too sweet than too sour. The great cause of bad milk is dirt. Keep the stables clean, the cow clean, the milk pails clean, and any utensil that is used clean, and keep the milker clean. Milk cans that have become rusty and cracked should be discarded, for they often spoil more milk than ten new cans would cost. Wooden milking pails should not be used. The milk gets into the cells and joints of the wood and ferments, and no matter what precautions are taken, such pails cannot be kept clean. Patrons of cheese factories should be educated, and this must be done largely by the cheesemakers. The patron has his share of the work in producing good cheese by properly caring for the milk until it arrives at the factory, and while his intentions may be good, he is oftentimes unconscious of his errors, and the cheesemaker should endeavor to instruct him in the proper care of his milk. If a cheesemaker returns a can of milk, I think it is his duty to send word to the owner why it has been returned and how to remedy the defect. I often think that cheesemakers are too careless in this way, as they do not take the interest they should in their patrons. Patrons should subscribe for one or two dairy papers. The flavor of cheese and butter largely determines the price. The flavor of the cheese depends, with a competent maker, upon the flavor of the milk. Therefore the price depends largely upon the milk producer. The aim of every patron of a cheese factory should be first-class milk, and great care should be taken that no other kind is sent. Proper aeration will get rid of many objectionable odors that may have come from the cow or food. An aerator properly used is a help, but abused it is a hindrance. Simply running milk through an aerator once after milking, with-

out any further stirring, is not sufficient. It should be stirred two or three times at intervals of ten or fifteen minutes after being put through one of these aerators, and again before going to bed. Not only to improve the flavor should this be done, but also to prevent loss of cream in the vats, especially in the fall when milk frequently has to stand some time being set. The morning's milk needs aerating as well as the night's.

Straining. Having considered the airing of milk let us consider another important part, namely, the straining of milk. Now, this is one part, which in a great many cases is overlooked, and is a great mistake. The proper time to commence straining is before commencing to milk, by brushing off all dirt, hairs, straw, etc., from the udder, teats and body of the cow. Then milk the cow with clean, dry hands. All milk strainers should be kept scrupulously clean. Scald thoroughly each time after using. Why should milk be strained? Because cheese and butter are articles to be eaten by men and women. Some patrons seem to think it does not make any difference what kind of milk is sent to the factory, judging from what may be seen on the milk strainers at cheese factories.

Weed out the Culls There are other points to be observed. Keep none but cows that give at least 6,000 pounds of milk, or 250 pounds of butter, a year. Weed out the poor cows and replenish the herd by raising calves from good cows. Send milk to the factory from none but good, healthy animals. When a cow is not in good health, her milk should be kept at home. Colostrum, or the first milk after calving, should not be used to make either cheese or butter. Not until the fifth day after calving does the milk become normal. Previous to this it contains a high percentage of albumen, which is of no use to either the cheese or butter market, but is a decided hindrance.

Keeping the Stable Clean. In the spring and fall, when cows are in the stable, it should be kept clean. Clean all dust, cobwebs and other filth from the walls and ceiling, and then give it a good coat of whitewash. The health of men and women depend largely on the health of the cow. Her health depends on the cleanliness of the place she is kept in. Keep the stable clean, but do not clean it too near milking time. Feed nothing but pure, sweet, clean, wholesome food. If a taint or flavor in the milk is caused by the food, it will be worst when it is drawn from the cow. If caused by some fermentation, it will grow worse as the milk is kept. The remedy for the latter is cleanliness. Use scalding water in all the utensils. Such foods as brewers' grains, distillery slops, Swede turnips and tops, rape sour, mouldy silage, musty meal, cleanings from the horse stable and hay or grass having bad smelling weeds, are prohibited from being used. Allow cows access to plenty of good pure water and salt at all times. In every 100 pounds of normal milk there are about 87½ pounds of water, so you will readily see that the condition of the milk depends largely upon the kind of water the animal gets to drink.

After milking, set the milk in a place where the air is pure, and in cold weather where it will not freeze. Milk should be protected from the sun and rain. It should be 100 yards from the barnyard, or from where pigs are kept. It should have a covering that will admit of free circulation of air, at the same time preventing it from being heated, or allowing rain water to get into the milk. Some insist on the whey being returned in the cans, (and I do not object to this, but let it stand in the cans until just before milking, empty, and rinse with warm (not hot) water; put the evening's milk at once into this can without aerating or straining it, and if it gets to the factory before souring, go in there about noon. You will hear the cheesemaker complain of gassy curds and whey flavors. Call around again in a month and see the buyer look at the cheese made from the vat into which but one can of this milk was emptied. He will lay the cheese aside for a further inspection or a lower price. He may refuse it altogether for export. It will do for home use, and will have a great tendency to develop home consumption. If the patron who sent such milk were the only one to suffer, it would not be so bad, but every patron of the factory has to bear the consequence.

The Cheesemaker's Part. A cheesemaker with intelligence, tact and good judgment will build up a business where one lacking these qualities would fail. Thus you see that the success or failure of a factory depends largely on the manager. A cheesemaker should be a bit of an engineer; he should understand how to manage and care for his boiler and engine so as to get the most out of them for the fuel consumed, and also to have them last a long time. I believe there is a vast amount of money squandered in this way. Factory men will purchase a very cheap quality of wood. They really think they are saving money, but in many cases they are making a great mistake. When you have to put in too sticks of good wood to help burn one of bad, that is not economy. I would recommend cheesemakers to have a damper in the smoke-stack, and always turn it off when they have done firing, and also close the draft door of the boiler. Have good valves so that you can keep the steam from wasting. After the factory has been fully equipped with the weighing can and a good set of scales, a nice clean strainer, on well balanced scales, and all is ready for the milk, the manager should take his place on the weigh stand, examine each can, and refuse those that will not make first-class cheese. Always pay for milk according to quality.

Discussion.

Q. At what temperature should a curing-room be kept ?

A. Sixty to seventy degrees.

Q. How should the temperature be controlled ?

A. By use of air ducts or ice. I used ice in my curing-room last season with good results.

Q. Can turnips be fed to cows without injury to the milk ?

A. Turnips have no place with the dairy cow at all in my opinion. Some farmers think they can feed turnips without injury to the milk, but if we are going to keep up the good name of Canadian cheese and butter we must stop feeding turnips to dairy cows. Great interest was taken at the meetings in the subject of paying for milk according to quality. A great many are in favor of it. I consider it a step in the right direction. By adopting this system we encourage the farmers to pay more attention to breeding, and they will weed out their poor cows and take better care of their herds and thus lower the cost of production. Every poor cow a farmer keeps makes his milk cost more per 100 pounds. The question for the farmer to study is—How can I make as much money with milk at 70c. per hundred as I once did at $1.00 per hundred ? This can be done by lowering the cost of production.

Splendid discussions took place at a great many meetings about returning whey in the cans that the milk is delivered in. Some factories return the whey, others do not. If cans are properly washed immediately after they are returned with the whey, and left to air during the afternoon, I believe whey can be returned without bad results. The great trouble is that farmers, sometimes, do not empty the whey from the cans until evening, and then the cans are washed in a hurry and they cannot expect good results in this way. I believe the most neglected thing around many cheese factories is the whey tanks, many of them never being cleaned out from the beginning of the season to the end of it. Now I think all whey should be taken out of the tank each day, and the tank thoroughly washed out with Gillett's lye at least once every week. If this is not done the whey tank becomes a breeding place for all sorts of bacteria, and then these forms of bacteria are returned to the farmer in the same can as he delivered his milk in, and very often the results are not very satisfactory. When whey is returned it is very important that the tanks be thoroughly cleaned, at the very least once a week. All cheese should be sold subject to inspection at the factory, and subject to re-weighing at shipping points. This system would be more satisfactory than shipping cheese to Montreal subject to inspection there.

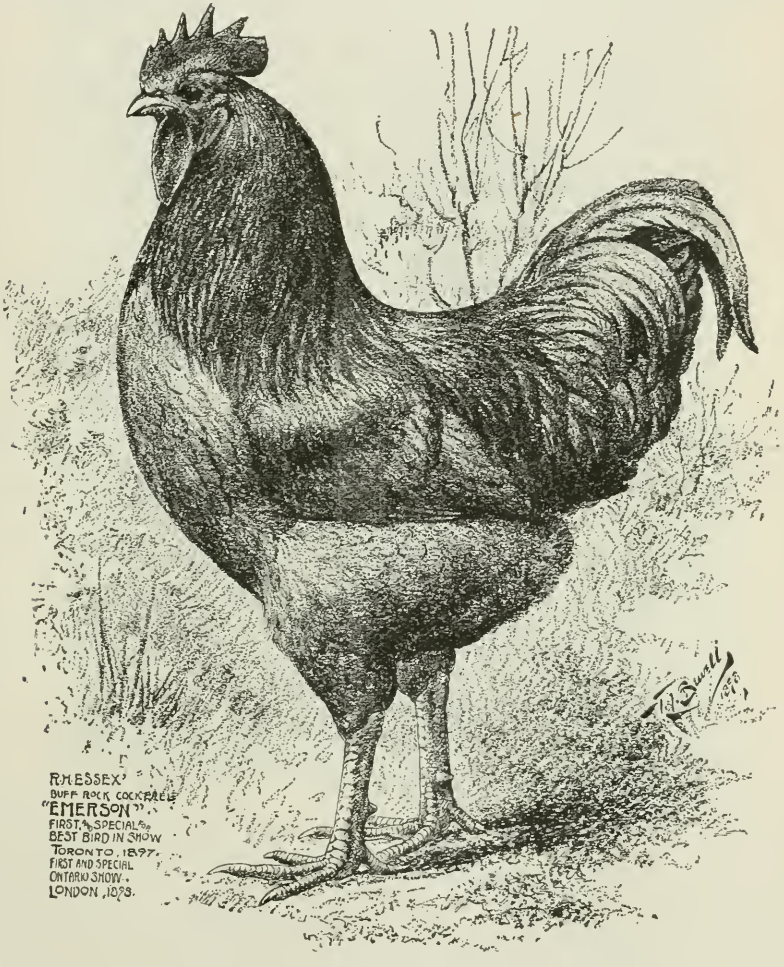
A Trio of Dorkings. A great table fowl.

POULTRY.

PRODUCING EGGS.

By W. R. Graham, O.A.C., Guelph, Ont.

In order to attain the highest possible results in egg production, the details, as in many other lines of farm work, must be closely observed. It is not the purpose of the writer to go into the many rations for egg production, but rather to consider the hen or what might be termed, the machine that is to do the work.

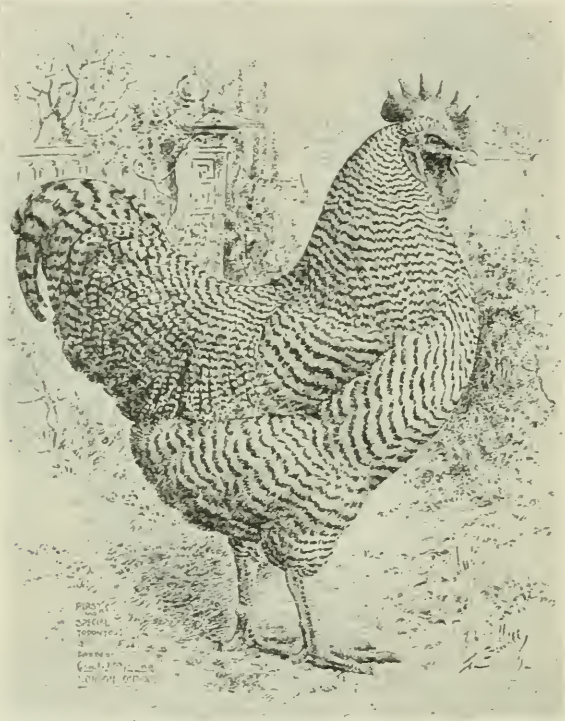


A good Buff Plymouth Rock.

Selection of Laying Stock. Many people believe that, if they get a certain breed of fowls they then have the very best layers; but, upon investigation, it is found that while undoubtedly some breeds will, on the average, lay more eggs per hen than some other breed, yet it is also found there is as great a difference between individual fowls of the same breed as there is between the different breeds. All are aware of the value of keeping individual milk records of the various animals that go to make up the dairy herd, and of the immense value of these records in the way of weeding out the poor cows, or, in other words, the animals that are

constantly consuming a portion of the profits made by the good producers. We find dairymen rearing only the offspring of the good producers. All agree that to a certain extent "like produces like," and that, by breeding only from the best, the quality of any herd may be greatly improved in a few years' time.

Find out which Hens Lay. It has long been known that the same conditions exist with the poultry, and that is why we have the laying breed, the meat-producing breed, and the general purpose fowl. And yet good and bad layers are found among all, and it is only of late years that the poultrymen have been in a position to know positively *which hen lays.* There are now offered for sale numerous devices in the form of trap nest boxes which distinctly show which hens are laying. These nest boxes are so arranged that the hen can easily enter the box but cannot get out until the attendant allows her to do so. We find by using these boxes that some hens lay early in winter while others, under exactly the same treatment, never lay any eggs until spring. Some will lay two days out of three, others one day out of four, and so on. One hen may lay twenty or more eggs per month, others will lay only a dozen before they become broody, while some of the breed will lay four or five times as many.



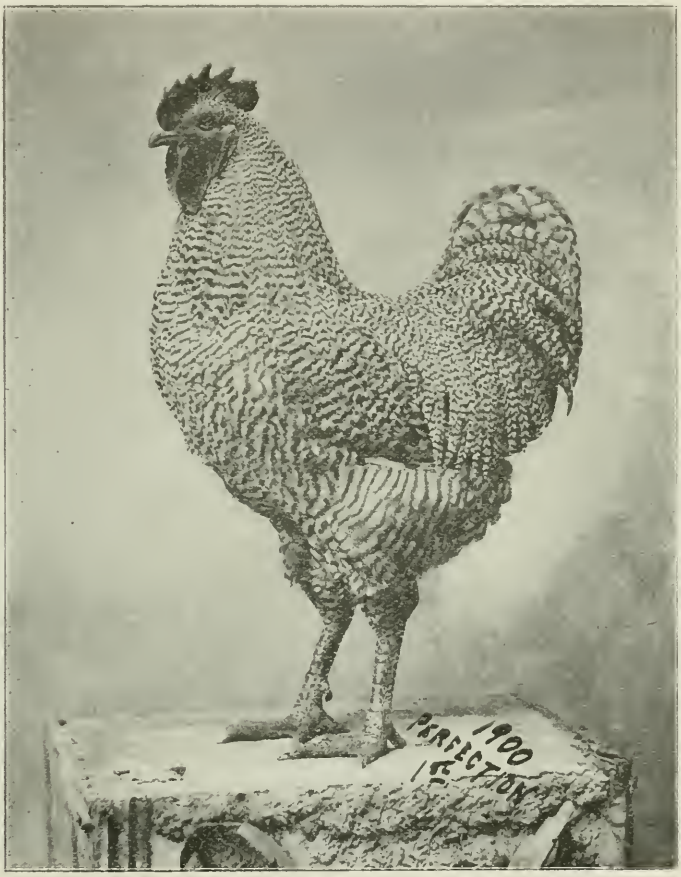
A Splendid Barred Plymouth Rock Male bird, the property of G. W. Miller, London, Ont.

Good and Bad Layers in all Breeds. We have in our pens at the present time one Plymouth Rock hen that has laid as many eggs as four other hens of the same breed, but of a different strain or line of blood. It has been frequently demonstrated that a good laying strain can be built up in a few years' time from almost any breed. All that is necessary is to know the layers, and to breed from them only. I have in mind a gentleman who in five or six years built up a strain of light Brahmas that last year made an average record of over one hundred and ninety eggs each. By adopting the use of these nests we can breed a strain of birds that will lay large eggs of even color, or we can breed for quantity alone

Eggs in Winter. Some people meet with disappointment in endeavoring to produce eggs in winter. The poultry houses appear to be comfortable, the fowl are not old, nor yet very late hatched pullets, they are fed on what might be termed a well balanced ration, yet, with apparently every essential for the purpose, they do not produce many eggs in winter. In a number of instances it appears quite evident that the parent stock were never encouraged to lay except a few months in spring time, and as the stock have been fed year after year along these lines, it is naturally a difficult task to make such a flock show a satisfactory egg record ; but, by using only those hens for breeding purposes that have shown an inclination to lay in winter, and by mating these to some pure-bred male bird of a good laying strain, one can soon build up a laying strain of fowls that will give excellent results under fair treatment. Coming in touch as

we do with so many breeders and farmers, some of whom have been struggling along these lines, I am more and more convinced that the production of eggs in winter lies, to a far greater extent than is now supposed, in the records of the parent stock. Flocks of hens need as careful weeding as do any other stock on the farm, and when one considers that in some cases one hen produces as many eggs as four others, it must be impressed upon one's mind that, in order to make the most of one's surroundings, it is advisable to breed only from the best.

Requires time and attention. Some people object to the time and attention that is required to look after the nests, and, to a certain extent, this objection is well taken, for it certainly does take close attention, but it is amply repaid by the results obtained. The general farmer, who is very busy in summer, but who has some leisure time in winter, will while caring



"Perfection," Barred Plymouth Rock Cockerel. A good stamp of bird for the Ontario farmer to use for building up a general utility flock. Bred and owned by D. T. Heimlich, Jacksonville, Ill.

for other farm stock, find it not only profitable but interesting to use some arrangements for a few weeks in winter until he finds which hens are laying; mark these in some way, such as by punching a hole in the web of the foot, cutting off a portion of the wing or tail feathers or by using numbered bag bands on each hen. In this way he knows his winter layers, and, upon the approach of the hatching season, these winter layers may be placed in a coop by themselves and mated to a pure bred male. All the eggs used for hatching should be taken from this pen. In this manner good results can be obtained at little expense.

Discussion.—Poultry.

Q. How many times a day do you feed?

A. We feed five times a day. Once as early in the morning as possible, again about midway between this and noon, then at noon, and again about 3.30 in the afternoon, the last feed being given late at night.

Q. What do you feed little chicks the first week?

A. My choice of feeds for young chicks is the yolks of eggs boiled hard and finely crumbled, raw onions, chopped fine, and bread, all in nearly equal proportions. Give this for the first few days, then give a little cracked wheat or corn, and perhaps two or three feeds of a mixture of equal proportions of bran, cornmeal and oatmeal. I have also used with good results crumbled cake made by taking three eggs, one and one half quarts of a mixture of bran, corn-meal and oat-meal, and the whole moistened with skim milk and baked. Baking powder may be added if desired.

Q. At what temperature should a farmer keep his hen house during the winter.

A. It should be warm enough to keep the combs of the fowls from getting frozen. Perhaps a temperature between 35° and 40° degrees will give best results, but, so long as their combs remain unfrozen, and they have plenty of exercise, they should thrive.

Q. How many hens can you keep in one pen?

A. It is seldom advisable to put more than 20 or 25 fowls in one flock.

Q. Do infertile eggs keep better than fertile ones?

A. Yes. There being no germ present, there is no chance for growth and decay.

Imported Silver Laced Wyandotte Hen and Cockerel owned by Mr. P. H. Gossard, Missouri Valley, Iowa, who breeds for utility and beauty. From the fancier's standpoint these birds are No. 1, while their utility lies in the fact that the female is an excellent egg producer, having laid twenty-three eggs in as many consecutive days. The cockerel weighs 10¾ pounds.

Q. Do you think the product of eggs or chickens the more profitable for the average farmer?

A. One has to raise chickens in order to replenish their stock. I think the two should go together.

Q. What is the estimated cost of keeping a fowl a year?

A. Most authorities estimate the cost of keeping a hen at $1.00 per annum. I believe the cost to the average farmer is not above 70c.

Q. Is not the Barred Plymouth Rock the best general purpose fowl?

A. It is one of the best. Any variety of Plymouth Rocks or Wyandottes gives good satisfaction.

Q. Is the flesh of poultry of better quality if put on quickly than if put on slowly?

A. Yes. The meat is more tender and juicy.

Q. Is barley a good chicken food?

A. It is not so good as wheat, but I know of several breeders who are using it with good results.

Q. Do you salt the food for your fowls?

A. Very little, not over 1 ounce to 150 hens. This is usually given once or twice a week.

Q. Are many chicks killed by lice?

A. Yes. Perhaps more than are killed in any other way.

Q. How do you kill lice on chickens?

A. It is easier to prevent them getting on the chicks that it is to kill them. If a hen is thoroughly dusted with insect powder two or three times during the hatching period, and if, in addition, one or two moth balls are placed in the nest, very little trouble will be experienced. If a cloth is dipped in coal oil, and then rung as dry as can be done conveniently, and the hen's breast and feathers wiped with this, it will usually kill all vermin. Care must be taken not to get on too much oil. Some prefer greasing the chicks' heads with fresh lard or unsalted butter.

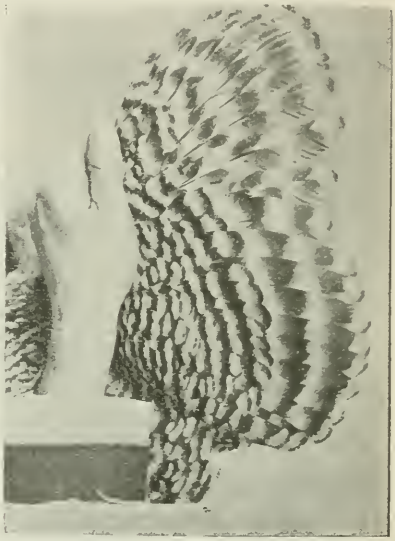
Q. How many fowl can one man take care of?

A. One man cannot take care of many more than 600 grown fowls.

Q. Which is better, a free range or keeping fowl in closed pens?

A. The best results can be secured in the line of egg production from hens confined in medium-sized runs, that is those having at least 100 square feet of run per hen. Then everything is under the control of the feeder. More and stronger fertile eggs will be secured from hens on a free range.

Barred Plymouth Rock wing showing the markings required in the Standard by which these birds are judged. The property of Geo. W. Miller, London, Ont.



A good Barred Rock wing showing markings according to Standard. The bird is owned by Mr. Geo. W. Miller, London, Ont.

Q. At what age do hens cease to be profitable layers?

A. Breeds of the American class such as the Rocks and the Wyandottes are usually not profitable after reaching two years of age.

Q. Do you prefer hatching eggs from pullets or old hens?

A. I prefer hatching from mature hens. Pullets hatched early, that have laid well during the winter, usually give fairly good results.

Q. How many eggs should a hen lay in a year?

A. A hen should lay 10 dozen. The hen that is forced to lay during the long winter months may not reach this mark, but then the eggs are laid at a season when they are high in price and the profits are greater.

Q. Do dark colored eggs bring any better price than light ones?

A. In some cases they do. I am informed that in New York the opposite is the case.

Q. Does the kind of food have any influence on the color of the egg?

A. No.

Q. What ought a proper building cost to accommodate 100 hens?

A. I cannot say exactly. Each hen requires at least five or six square feet of floor space. I am in favor of a house say 4′ 6″ high at the north and 7′ at the south, with a flat roof. It is seldom advisable to build a poultry house over 13′ wide. A walk through the ordinary poultry house is an expensive luxury. Have double acting swinging doors from pen to pen. If these doors are placed near the south side of the pen, the north side may be much lower and thus warmer. Double board the outside, using paper between. The inside may be sheeted with a single ply of matched lumber. It is usually advisable to sheet the ceiling also.

Q. Would you advise the farmer to try to supply artificial heat in his hen house?

A. I would prefer to use no artificial heat. If the house is very cold it might be necessary to use artificial heat.

Q. How do you make nests?

A. Nests should be made moveable so that they can be taken out and thoroughly aired and cleaned. Stationary nests are usually a hot-bed for mites. They require to be from ten to twelve inches square, and placed a little way above the floor, usually immediately beneath the dropping board, or at the side of the perches. They should have a slanted cover so as to prevent the hens roosting upon them.

Q. Would you advise the farmer's wife to keep chickens, turkeys, ducks and guineas, or only one kind?

A. If she has a suitable run for all, I see no objection to keeping them all.

Q. Do you advocate thoroughbred fowls for every one?

A. Yes. One cross is often a first class market bird or egg producer, but, as a rule, good hardy pure-breds are more satisfactory.

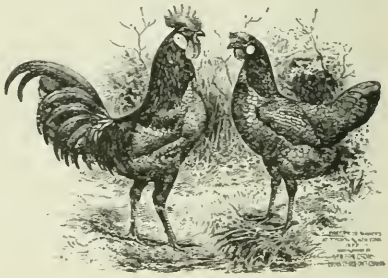
Q. I have heard poultrymen say, "Never give a chicken anything to drink until it is three weeks old." Is that right?

A. I like to give them all they want to drink from the first day. Of course they will frequently live for three weeks without water, but I feel quite sure that they would thrive better with water.

Q. Do you think caponizing profitable?

A. I have not had enough experience to say that it is. Mr. Ruddin, of Liverpool, informs me that there is little or no market there for them. A good local trade might be developed in time.

A Black Minorca, the property of J. H. Minshall, Brantford.



A pair of Andalusians, the property of Newton Cosh, Brantford.

Q. What is the best method of preserving eggs?

A. The best method for preserving eggs for home use, or even for selling locally, is to preserve them in a solution of water-glass. Take one part water-glass (sodium silicate) and to this add eight parts water that has been previously boiled. Place this solution in a wooden tub or an earthen vessel, and it is then ready for the eggs. Be sure that the liquid covers every egg.

Q. What breeds do you consider best to raise for broilers?

A. Wyandottes, Plymouth Rocks, and crosses of these two breeds and Leghorns.

Q. Do you send chickens to market undrawn?

A. Most of the large city markets prefer stock undrawn. Some of the Christmas markets prefer drawn stock.

Q. What do you consider the best ration for laying hens?

A. *Morning ration.* Whole grain (wheat, barley and oats but chiefly wheat,) scattered in the litter on the floor of the pens, care being taken that it is well mixed with the litter. The quantity fed is usually in the proportion of about one-half handful to each bird.

Noon ration. Roots, such as mangels sugar beets, turnips or carrots. About once a week cook them by way of variety.

Afternoon ration. About 3.30, a mash composed of equal parts bran, barley meal, ground oats, refuse bread and cut clover hay. During cold weather give corn meal in addition. The

clover hay is prepared by placing the amount thought sufficient in a vessel containing boiling water the morning previous, covering and allowing it to steam all day. Allow the fowls what mash they will eat readily, which is about one quart to every twelve hens. If all the food is not readily eaten it must be removed. Whole grain boiled with vegetables and refuse meat, can be fed as a change in the place of mash. After the mash, feed a small quantity of whole grain in the litter to secure exercise and maintain good health. Feed cut bone two or three times a week in the proportion of one pound to every fifteen birds. This is usually fed in the evening instead of the mash or the whole grain.

It is necessary to study the surrounding conditions as to convenience, expense, results aimed at, etc., before deciding what method of feeding will give best results.

Q. Is skim milk preferable to water for laying hens?

A. It is during warm weather, but apparently decreases in value as cold weather approaches. It is not advisable to give them water to drink during the summer, but, when possible, give both milk and water.

Q. What is wrong when hens lose their feathers from the underside of the neck?

A. It is due either to a lack of meat food or exercise. I should judge from the question that the fowls would be eating the feathers on account of the above mentioned causes.

Q. Is corn a good feed for hens?

A. If fed sparingly in winter it gives good results; diminish the amount on the approach of spring.

Q. What part does grit play in the digestion of a chicken's food.

A. It grinds or masticates the food, rendering it fine so that the juice of the stomach may act thereon.

Q. Would you advise a farmer to keep thoroughbred or grade chickens?

A. There is not much choice between pure bred and high grade chickens, although a flock of the former would be more uniform.

Q. Would you advise a farmer to keep more than one breed?

A. One breed is enough under ordinary circumstances.

Q. Can the farmer handle an incubator, and if so of what size?

A. When more than 100 chickens are to be raised, an incubator can be used to advantage. I would not care for a machine that held less than 125 eggs, although many 60 and 70 egg machines are giving satisfaction.

Q. Are not incubator chickens weak?

A. No, they are not. Personally I prefer raising incubator to hen hatched chicks, if for no other reason than there is no battle against lice.

Q. How long can a gobbler be safely kept for breeding purposes?

A. Always breed from a young bird. After it is two years old the eggs are apt to be infertile.

Q. What is the best food for young ducks?

A. We get good results from feeding young ducks a mixture composed of equal parts of corn meal, bran and shorts, slightly dampened with skim-milk either sweet or sour. If skim-milk can not be had it would be advisable to add at least five per cent. of animal meal or cut bone. Never fail to add a little grit to a young duck's food. Mix it in with the mash.

Q. What breed of ducks do you recommend for the farmer?

A. The Pekin mature more quickly than do the other breeds. It is generally conceded that they lay earlier in the season than do the other breeds, and that they lay more eggs. Some find them not so hardy as the Rouen.

Q. Is not a flock of ducks as profitable as a flock of hens?

A. Generally speaking I think they are not. When kept in flocks of say ten they will perhaps yield more clear profit than will ten hens.

Q. In order to raise ducks for the market is it necessary to have a pond or stream for them to swim in?

A. No, it is not. The pond or stream is helpful in securing a large percentage of fertile eggs.

Q. It it true that ducks if not killed when about ten weeks old will "go off in quality and bring a smaller price?"

A. The duck is at its best at that age if well fed. I have known dealers to object to ducks weighing over five pounds each when plucked; that is undrawn. The more quickly a bird can be forced to reach this weight the better will be the quality of the meat, provided only good sweet foods are used.

Q. Can an incubator be used profitably for hatching ducks?

A. Yes. Many prefer hens, but on the large duck farms the incubator is used exclusively.

THE SUPERIOR QUALITY OF POULTRY—HOW TO FATTEN, KILL AND PLUCK THEM—FARMERS WHO ARE SUCCESSFUL—BREED A SUPERIOR QUALITY.

By A. G. Gilbert, Manager Poultry Department, Experimental Farm, Ottawa.

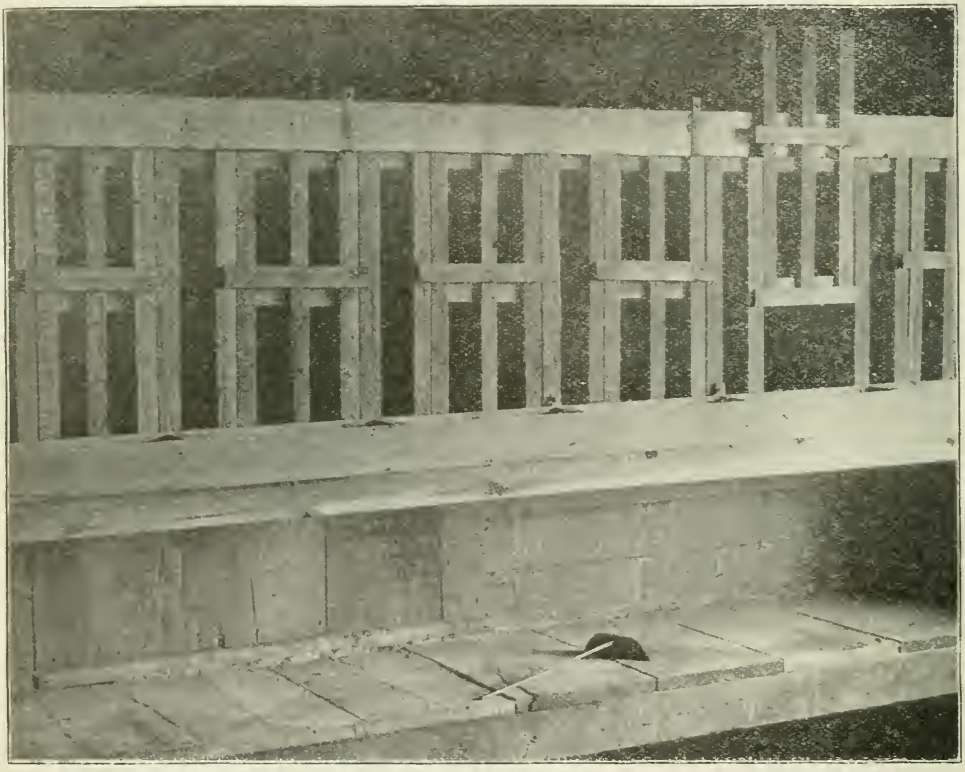
The demand for a superior quality of poultry for home consumption, or for shipment to the great English market, is rapidly assuming large proportions. It makes a new and important era in poultry development. Many of our farmers are to the fore in improved methods of management and production. Others have much to learn. Proofs of the marked development in the production of the "Early and superior quality," are to be found in the numerous letters received by me. The following are two or three samples. The first is as follows :—

"Engleside Farm. Brockville, 21st May, 1900.

Dear Sir—I have about 50 February chicks now weighing over two pounds each, and 700 others closely following. Could you name me some reliable firm in Montreal or Ottawa who would handle them satisfactorily for me?

T. W. Newman."

Chicks of such size at this season were probably hatched out by incubators and reared in brooders. Under any circumstances it shows that Mr. Newman thoroughly understands how to handle the parent stock so as to have early and robust progeny.



Fattening pen as used at Experimental Farm, Ottawa, showing trough for feeding rations, and platform to hold droppings which come through slotted bottoms of pens above.

Another letter came from Mr. Laidlaw, a well known farmer of Guelph, who wrote last fall that he had raised a large number of Buff and Barred Rocks and Silver Laced Wyandottes, which without any special fattening, weighed 5½ pounds each. They were sold to advantage to a dealer from British Columbia, who, no doubt, was glad to get such fine specimens.

Another and striking instance is that of Mr. A. McPhadden, a farmer of Dominionville, Glengarry County, who in October last sent to this city for sale to private parties, a number of Barred Plymouth Rock cockerels which weighed on an average 5½ pounds each. They realized ten cents per pound, and were well worth the price.

Such birds as the foregoing would simply have been snapped up on the English market. It is hardly necessary to say that "scrubs" could not have given such results.

Breed only Thoroughbreds. The obvious lesson, then, to the farmers is to have nothing but thoroughbreds, and that brings us to consider the first and most important requisite, viz., that of the best breeds wherewith to have the best results.

Plymouth Rocks or Wyandottes. The first essential to success is to have the proper breeds. The farmers can make no mistake in choosing either Plymouth Rocks or Wyandottes. There are, no doubt, other breeds as good, but there are none better nor easier to procure. Either breed are good winter layers and rapid flesh formers. Both are important requisites, whether the eggs are used for sale on the winter market, or converted into early broilers by means of the incubator and brooding house, or hatched out and reared, later on, by hens. See that the stock are constitutionally robust.

Care of the young chickens. From the time of hatching, whether by hens or incubators, the chicks must be carefully looked after and fed. It must be borne in mind that the first five weeks of the chicken's life is the critical part of its existence. Why? Because during that period there is a drain on the system, not only for bone, sinew and muscle, but also for the rapidly growing feathers.

Stunted from being stinted. It is a well known saying among poultry raisers in England, that a chicken allowed to become "stunted" from being "stinted" in the first five weeks of its existence, will never afterwards completely recover from the effect of such neglect. How to care for and feed the chickens in the most approved manner, will be found in the Experimental Farm Reports, both Dominion and Provincial. With proper care and management, Plymouth Rock and Wyandotte chickens should weigh, at the end of four months, eight pounds per pair.

The following is an illustration of a cramming machine :

Cramming machine.

How to fatten. Having got the cockerels to 4, 4½ and 5 months of age, the birds should be penned up and fed regularly three times a day on the following :

2 parts finely ground oatmeal.
1 part finely ground barley meal.
1 part finely ground corn meal.

If a cramming machine is used, the food should be mixed to the consistency of thin porridge. If the birds are fed by hand, the rations should be more solid.

The birds should be fed from a V shaped trough, and at regular intervals. Coops or pens must be kept scrupulously clean. Skim-milk will be found best wherewith to mix up the rations. At the end of, or during the second week, beef suet or tallow, in the proportion of

one ounce to every four birds, should be added to the rations. Water and grit should be regularly supplied. It is claimed that the crammer will do the fattening in less time than feeding by hand.

Mr. McPhadden, of Domirionville, Ont., already spoken of, simply placed his birds in crates and fed them regularly by hand, with the following results :

Gain first week, $\frac{7}{8}$ lb. per chick.
Gain second week, $\frac{1}{2}$ pound per chick.
Gain third week, $\frac{1}{3}$ lb. per chick.

The cost of production per pound of flesh was calculated at $5\frac{2}{3}$ cents.
Mr. McPhadden's rations were :

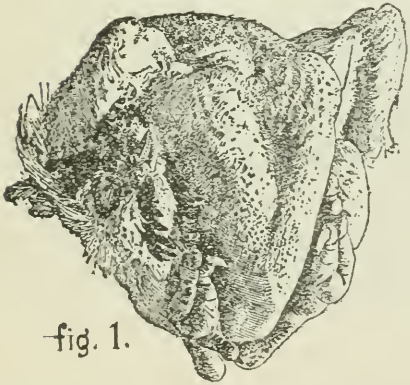
1st week.—3 parts finely ground oatmeal ; 1 part peas.
2nd week —Cornmeal was added.
3rd week.—Cornmeal was increased.

Mr. McPhadden's methods are mentioned as an incentive to others. What one farmer can do, another should accomplish.

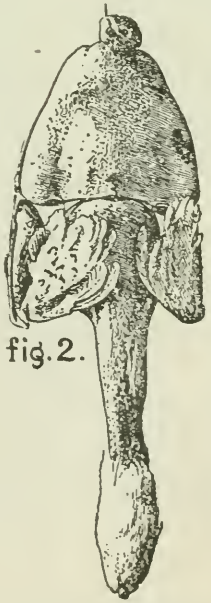
How to kill, pluck and dress. Birds intended for the English market should be killed by dislocating the neck. After killing, the bird should be held so as to permit of the blood draining into and coagulating in the neck. This can be best done by allowing the head to hang downwards. For the home market the birds may be killed in the same manner, or by cutting the roof of the mouth, at the base of the skull, with the long blade of a penknife, lengthways and across.

When to pluck. Immediately after the neck of the bird has been dislocated, the plucking should commence. This is much easier done if performed at this time. The larger feathers of wings and tail should first be removed, and then the smaller feathers of head and body. Carefully remove the pin feathers. On no account should the body of the fowl be dipped into boiling water, as is frequently done, to facilitate plucking. In no way should the skin be broken or bruised. For two or three inches from the head, feathers may be left on the neck and a few feathers on the wing tips. Previous to killing, the birds should be starved for twenty-four or thirty-six hours, so as to ensure the crop being entirely empty of food, which, if left, would ferment or decompose and ruin the carcass. This is an important point to remember.

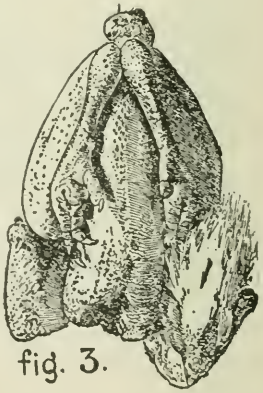
Drawing and Trussing. Should it be necessary to draw the bird, this may be done by making an incision in the right side. The cut should be so neatly done that the skin will



White Plymouth Rock Cockerel dressed for sale on the English market, plucked but not drawn. Feathers on wing tips and head placed under wing.



Shows the back of a cockerel ready to be packed for shipment. The bird is plucked but not drawn.



Front view of same bird, the head is put under the wing.

not be severed, but turned over so that it may be returned to its former position after the entrails have been removed. In drawing the entrails, care must be taken not to rupture the

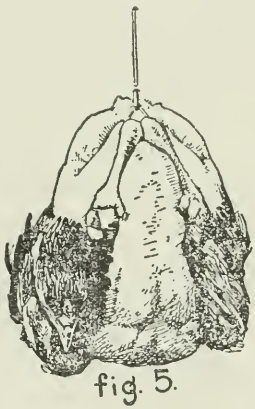
gall, or the carcass will be so embittered as to be unfit for food. The heart, gizzard and liver, after being cleaned, may be put back into the fowl. To complete the dressing, the wings should be twisted under the back of the fowl and the legs tucked, as shown in the cut farther on.

The shaping board. After plucking, the appearance of the birds will be greatly improved by placing them in a V-shaped trough and submitting them to a gentle pressure. By so doing, the carcass will be given a compact shape. A shaping board may be easily made by placing a board against the wall, which with the wall should make an angle of 65 degrees. The birds are placed breast downwards, with their hind quarters pressing against the wall, and their heads hanging downwards. This will give further opportunity for the blood to drain towards the neck. A board should be placed on the backs of the chickens with enough weight on it to press the breast bones into shape.

Before packing for shipment, the birds should be quite cold.

An Inviting Appearance Necessary. The birds should be so gotten up that they will present an inviting and toothsome appearance. Our farmers may not at first be able to be so particular in every detail, but the day is not far distant when fowls for our home markets will have to be similarly gotten up.

Back view of three year old hen, plucked but not drawn. It also shows how a bird should look when packed for shipment.



Front view of hen in Fig. 4.

Who Buy Superior Birds for Shipment. Frequent enquiries are made by farmers who have the superior quality of poultry to sell, where such birds may be sold for shipment to the English market. The following firms buy poultry for shipment:—

The King Darrell Produce Co.	Toronto.
Ingersoll Packing Co.	Ingersoll.
H. J. Colwell	Arthur.
Booth & Co.	Trenton.
J. E. Hawcroft	London, Ont.
R. Umber	Seaforth.
M. & W. Schell	Woodstock.
T. L. Turnbull	Clanbrassil.
Dundas & Flavelle Bros.	Lindsay.
D. Gunn Bros. & Co.	Toronto.

POULTRY ON THE FARM.

By G. R. Cottrell, Milton, Ont.

Although it is over seventy years since Mr. Knox, of New York, purchased the first pair of fowls off a ship from India, poultry raising is yet a new industry for the farmer. It is a well known fact that poultry in general are something that is looked on by the farmer as coming

under the duties of the house, and that there is not enough profit for him to take hold of it and place it on an equality with the other stock connected with the Canadian farm. Now the poultry demand is increasing and is likely to remain so, not only for the British market but for home consumption as well. The British market is almost limitless, and offers remunerative prices for the very best quality of poultry. A recent shipment made by the Commissioner of Agriculture and Dairying, Prof. J. W. Robertson, realized 16 cents per pound wholesale After paying all expenses, including the purchase price of the birds, a profit of 50 cents a pair remained. Last year a still better shipment was made by the Minister to Liverpool. The chickens weighed, on an average, five and a half pounds each, and the wholesale price equalled $1.76 a pair. Allowing 50 cents for the chicks when put up to fat, food consumed by each pair cost 31 cents, the packing cases cost 3 cents per pair and transportation charges cost 22 cents, making a total of $1.60 and leaving 70 cents per pair for labor and profit.

But let us come nearer home—take Montreal for instance. Mr. Gatehouse, Lamb of Lamb's market, and others, say that they are prepared to pay 10 cents per pound for poultry of a superior quality and that their customers are continually asking for such poultry, but that "it is mighty hard to get it." Now, then, does the farmer realize 10 cents per pound for other meats fed on the farm? Far from it, but we must remember that to raise poultry like this or for profit we have to use judgment, for poultry are liable to more drawbacks than any other stock, and most of these drawbacks have to be overcome by the housing of the poultry. One of the greatest is the mite or parasite which can only be destroyed by cleanliness, tight walls and whitewash. Then, again, if your house is damp or full of cracks your fowls will get the roup and so on, till we find that the profit must first commence with the house. When a house is built too high it takes more animal heat to warm it. The building should always be at a temperature of 45°. A good plan is to have the building divided into two parts by a board partition about three feet high, having the roosts in one end, which should be floored. In this end keep about six inches of cut straw, while in the other have a fine gravel floor. Scatter the grain over both ends; the straw gives the exercise, and when eating the grain among the gravel they pick some up. Have a drop board under the roosts. Have everything made, even the nests, so that they can be lifted out and cleaned at least once a week. If you make the nests two together and hang them by straps here and there around the hen house they will be handy and easily cleaned.

Selecting the Fowls. After we have the house we then select our fowls. First of all, are we going to keep hens for eggs, or hens to raise broilers, or both? For eggs we have to select from the Leghorn, Andalusian, Minorca and Houdan families, and for broilers from the Plymouth Rock, Wyandottes, Langshans and Brahmas. Never keep a fowl you don't like the look of, for they won't pay. It is not necessary to keep mongrels, for there are dozens of kinds or fowls and no two alike, so surely we can find some one breed to suit our taste without mixing them up, and it has been proven over and over that a purebred is more profitable than a mongrel. If you cross, the first cross may be all right, but what are you going to do with the second. It has proved very satisfactory to keep two breeds in this manner. Supposing you are going to keep forty hens altogether, and twenty of them are Wyandottes or Rocks and the other twenty Leghorns or Minorcas. Keep no Leghorn male, but keep a male of the other breed, and set eggs only from the Rocks or Wyandottes, and as the one breed lays a brown egg and the other a white, you can easily tell them apart. Then about every two years, or every one year if you wish, secure a few settings of Leghorn eggs from some reliable breeder to keep up your laying strain. By this scheme you will have a flock for eggs and also a flock for broilers. When you try to breed two breeds you are apt to confine them in two small enclosures, and hens never do well when crowded. We should never undertake what we cannot do and do well, and, to keep poultry for profit, we must have a great amount of patience and we must not be afraid of work. It will not do to let Cochins or Brahmas run with any other breed, as the lighter fowl crowd the heavy breed out, because they are so much more active, and thus the heavier do not get a sufficient supply of food.

Barnyard fowls, like all animals gregarious in their habits (that is going in herd and flocks, as wild horses buffaloes, sheep, etc.) are polygamous. The strongest males are the sires while their successful fighting powers last. In domestication all fowls are partially or fully polygamous—the duck, however, least so of all. Hence, in breeding operations, fowls of a given species, but of different breeds, must be kept strictly separated from each other: if not, you will get a breed of mongrels. In breeding up common barnyard fowls, the male must always be of a given breed and no other males must be allowed with the flock. Hence whether the cross be a Plymouth Rock, Wyandotte, or Cochin of the large breed, or of the so-called "everlasting layers" as the Leghorn, for instance, stick to that breed and allow no other. Thus, by careful selection of the progeny, in five years you will have a flock practically as good for eggs or meat as a purebred fowl. If the eggs are to be sold direct for the table the males are not necessary in the flock and in fact eggs not fertilized will remain fresh much longer than those fertilized.

Crossing. In breeding crosses of any farm stock a purebred male with common stock produces a half-bred, that is, half the characteristics of the sire and dam. The second cross of purebred sire on the half-bred progeny of the preceding cross gives a three-quarter bred

animal or bird ; the third cross seven-eights bred and the fourth cross fifteen-sixteenth bred. As the purebred animal or bird is prepotent, he will stamp his characteristics on his progeny to a greater degree than the female of a mixed blood. In fowls they will become truer and truer to color as they are better bred, though this is not so noticeable in the spangled, barred and pencilled fowls as in those of self colors. If you buy two sittings of eggs the first of May of the breed you want, next year you may have males enough and at the same time enough young hens to start yourself in the pure breed you select. Thereafter a sitting of eggs each year of the same variety will give you a selection of males so that you need not breed too close.

When the Male is Unnecessary and an Expense. If you ask the general run of farmers whether they give any of their time to poultry the answer usually is, "Well, no they don't pay." No, of course they don't pay when not looked after. Care is really the most important part of the routine and management of poultry. Farmers keeping hens for eggs make a great mistake to let a number of male birds run with the hens. Mr. Wheeler, of the New York Experimental Station, Geneva, N. Y., has proved by several experiments that a flock of hens will lay 30 per cent. more eggs when no male bird is in the flock. And under the subheading "Keep the laying stock active," he has stated that the male bird is a nuisance in a pen of layers. He not only monopolizes a great deal of food but teaches the hens to break eggs and so learn to eat them ; besides the stimulating diet is too fattening for him, and will ruin him as a breeder. If the farmer desires fertile eggs and vigorous chickens from them, he will keep the male bird separate during the winter, and mate him with his selected breeding stock at the proper season.

Feeding for Egg Production. The feeding of the hen to make her lay has caused more study by the poultry farmer than any other part of the business. Nearly every one who has had experience in the business advocates a warm mash in the morning. Some say two meals a day and others say, keep her at work. It depends a great deal on the kind of bird you are trying to make lay. What would make one breed in the right condition would make another breed too fat. An eminent writer has this to say of the value of green bone and clover in an article on "Aids to Egg Production." "There are two articles of food at least that are not so generally used by poultry keepers to stimulate laying in the winter season, as they should be. I refer to flesh, raw meat and clover. Animal and vegetable food are furnished by this combination in the very best possible shape. The meat being raw and full of nutritious juice, promotes vigor and egg production much more perfectly than cooked meat, that loses considerable of its virtue by the process of cooking. To be sure, if the soup that boils out of meat is well utilized, much of the loss through stewing is saved. Nevertheless, we prefer the raw article to anything else in the meat line. Of course, it should be fed in moderate quantities only, two or three times a week. Never go to extremes and overdo a matter. Hens that were meat hungry would doubtless engorge themselves, if allowed flesh without restriction, to the serious derangement of their digestive organs. But we have found raw meat, reasonably fed, to set the egg producing machinery to work better than any other one food substance. The clover is grand for food for many reasons—it is bulky, it contains the nitrogenous elements and the carbo hydrates in excellent proportions for the nourishment of the animal. It is also rich in mineral constituents. Compounds of lime are abundant such as are required for shell formation. The poultry relish it at all seasons. It is especially appetizing to them in winter, when there is a dearth of green food. Chop it finely, steam and feed it mixed with ground wheat bran and cornmeal."

The composition of Eggs. Mr. Warrington, an English chemist of note, tell us in an article in the Agricultural Gazette, of London, England, that the white of an egg is rich in the alkalies, potash and soda, a part of the latter being present as common salt, and that the yolk is extraordinarily rich in phosphoric acid, and contains much more lime than the white. "The fundamental principles to be borne in mind," continues Mr. Warrington, "in arranging the diet of a hen, are that the largest ingredients in eggs are lime, nitrogen and phosphoric acid."

We have thus found from one chemist of what the egg is composed, and we learn from another that green bones, which have been heretofore thrown away or given away by the butchers, when cut up, not ground up, are the best and cheapest egg-making material extant. Green bones are rich in albumen, phosphate of lime and phosphoric acid which go to make egg and shell. The result has been a revolution in the ecomony of egg production in winter. An important result has been the invention and manufacture of mills to cut up bones, and so we have what has heretofore been actual waste, converted into eggs commanding a high price. Surely this a step in the right direction. A bone-mill can easily be procured, and will in a short time pay for itself.

Mr. A. W. Kinney, of Yarmouth, N. S., is considered an authority on the subject of egg production, and he has this to say of the value of meat and bone : "I have over and over again proved the new plan, and know exactly that what I say is correct. It can be shown that a flock of fowls is very similar to a machine ; turn on the steam and power comes. With a hen fed her proper feed eggs will come every time without fail. Having had an experience of seven years in the feeding and management of poultry, and seeing the effects with the results, of all kinds of foods now used, I may be excused for having a most decided opinion of these matters. I find that there is nothing that will equal the exclusive use of meat and bone, pure water and very little of anything else. The fowls should be supplied with grit as an aid to digestion and also

with lime for the formation of the shell. Plenty of fresh water should always be before them. A serious mistake the farmer makes is in not gathering his eggs with regularity. The shell of an egg is porous, and is very susceptible to smells. If the trade and public generally could depend upon obtaining absolutely fresh eggs during the winter, the consumption of them would be enormously increased. At present, what are sold as fresh eggs are not fresh, because the farmer only receives a few eggs a day and he keeps them until he has enough to sell.

Three rules for getting eggs in winter. The whole story of getting eggs in winter can be solved in three simple rules. (1) hatch the chickens early ; (2) keep them growing so that the pullets will come to laying maturity by November 1st ; (3) keep them laying by feeding good food and giving them good care. When I say have the chickens hatched early, I do not mean too early, because if they are hatched too early and begin to lay in August or September, they will usually moult in December, just as the weather is becoming very cold, and then good-bye to eggs from then till April. For the heavier varieties, such as Brahmas and Cochins, the last of March is none too early, but as regards the Langshans, Plymouth Rocks and Wyandottes, I would like them hatched during the first half of April, if possible. The Spanish varieties, the Minorcas, Leghorns, Hamburgs, etc., should be hatched in May for best results.

There is nothing on the farm that will so quickly mature and become productive as the hen, and after she becomes productive there is nothing that will give such a large return for the amount of capital expended. There are three elements in profitable poultry keeping that cannot be neglected. They are, (1) facilities ; (2) feed and water ; (3) the man. What are the facilities ? Warm houses, good sized runs, convenient for both the fowls and the keeper, good stock, and brains. Then comes good feed—the right kind of feed—egg food for laying hens and fattening food for market fowls. You must depend on one and two year old for success in both branches. Do not keep a fowl after she is two years old. Make out of the hen all you can the first two winters, and then cap the climax by marketing her. Keep the premises clean. Fight the lice the whole year round ; nip these pests in the bud ; have regular hours for the performance of the work. So much depends on the man. He must have brains and energy. He must each year try to improve on the one just past.

RAISING TURKEYS.

1. Never let the young turkeys get wet. The slightest dampness is fatal.
2. Feed nothing the first 24 hours after they are hatched.
3. Before putting them in the coop, see that it is perfectly clean and free from lice, and dust them three times a week with insect powder.
4. Be sure the hen is free from lice. Dust her, too.
5. Look out for mites and the large lice on the heads, necks and vents. Grease heads, necks and vents with lard, but avoid kerosene.
6. Nine-tenths of the young turkeys die from lice. Remember that.
7. Filth will soon make short work of them. Feed on clean surfaces. Give water in a manner so that they can only wet their beaks.
8. The first week feed a mixture of one egg (beaten) and sifted ground oats, mixed, with salt to taste, and cooked as bread ; then crumble for them, with milk or curds, so that they can drink all they want. Feed every two hours early and late.
9. Give a little raw meat every day ; also, finely chopped onions or other tender green food.
10. After the first week, keep wheat and ground bone in boxes before them all the time, but feed three times a day, on a mixture of cornmeal, wheat middlings, ground oats, all cooked, and to which chopped green food is added.
11. Mashed potatoes cooked turnips, cold rice and such, will always be in order.
12. Too many hard boiled eggs will cause bowel disease.
13. Remove coop to fresh ground often in order to avoid filth.
14. Ground bone, fine gravel, ground shells and a dust bath must be provided.
15. Finely-cut fresh bones, from the butcher's, with the adhering meat, is excellent.
16. They must be carefully attended to until well feathered.
17. Give them liberty on dry, warm days.
18. A high roost, in an open shed, which faces the south, is better than a closed house for grown turkeys.
19. A single union of a male and female fertilizes all the eggs the hen will lay for the season ; hence, one gobbler will suffice for 20 or more hens.
20. Two-year-old gobblers with pullets or a yearling gobbler with two-year-old hens is good mating. Gobblers and hens of the same age may be mated, but it is better to have a difference in the age.

21. Turkeys can be hatched in an incubator and raised to the age of three months in a brooder, but only in lots of 25, as they require constant care.

22. Capons make excellent nurses for turkeys and chicks.

23. It is not advisable to mate a 40 pound gobbler with common hens, as the result will be injury. A medium-sized gobbler is better.

24. Young gobblers may be distinguished from the females by being heavier, more masculine in appearance, more carunculated on the head, and by a development of the "tassels" on the breast. A little experience may be required at first.

25. Adult turkeys cannot be kept in confinement, as they will pine away. By feeding them in the barnyard a little, night and morning, they will not stray off very far, but they cannot be entirely prevented from roaming, and the hen prefers to make her own nest.—*Poultry Keeper.*

COST OF RAISING BROILER CHICKS.

By. W. R. Graham, Manager Poultry Department, O. A. C., Guelph.

I herewith inclose a statement of the sale and cost of the early broiler chicks raised at the College. I regret to say that owing to circumstances it was impossible to keep an exact account of the food fed. We are experimenting with later broods of chicks in this particular. I think our estimate is, if anything, in excess of the actual cost. We estimate on the food that is being consumed daily by the young chicks we now have. It is as follows :

Jan. 16—158 eggs at 2 cts. each	$3 16
2½ gals. oil used in incubator at 20 cts	50
Oil for brooder for 6 weeks	1 10
May 4 — Food consumed to date	5 00
Estimated total cost	$9 76

On May 4th one dozen of the chicks were dressed and sent to Toronto. They sold for $6 per dozen, netting us $5.70, thirty cents being for charges. Had the whole flock been dressed (49 in number) at these prices they would have brought $23.27. Deduct the cost of raising, which was $9.76, and a balance is left of $13.51. Nothing has been charged for labor and no credit given to the manure. The thirty-seven chicks unsold, some of which have already been disposed of to fanciers at prices ranging from $1 to $3 each, according to the breed and quality, are being held for breeding purposes. Most of the chickens were Plymouth Rocks and Wyandottes. The twelve dressed weighed 19 lbs.

It will be noticed that it took over three eggs to produce one chick. This is one of the difficulties in connection with the broiler trade in our climate. The percentage of fertile eggs is not large, and the vitality of the germs is anything but satisfactory. During the season the fowls are closely confined to the houses, and the eggs are usually inferior in fertilization.

How the Chicks were Fed. No food was given until the chicks were 36 hours old. Care was taken to keep the brooder at a temperature of 90 degrees during the first week, after which it was gradually lowered to normal heat at the end of the sixth week.

Their first feed consisted of hard-boiled eggs chopped fine, bread crumbs and raw onions finely chopped, in about equal proportions. This was fed for the first few days, after which they were gradually weaned from hard-boiled eggs to cooked liver, chopped, and, to a certain extent, from the bread crumbs to a mixture of grain in equal proportions, of bran, oatmeal and cornmeal. This was slightly moistened with skim-milk, care being taken to avoid sloppiness, a little grit being added occasionally. By way of variety, the onions were at times omitted, and in their place roots, sprouts or sprouted grains were used. Throughout the whole period it was our aim to feed a food of nearly equal proportions of animal, vegetable and grain foods.

After the chicks were ten days old they were induced to take exercise, by feeding cracked wheat or millet seed scattered in cut straw over the floor. Good, pure water was always before them. They were fed five times each day, in just such quantities as were readily consumed.

The chicks were occasionally driven into the open air. I firmly believe that the short time required to shovel away the small amount of snow from in front of the house is amply repaid in the healthy condition of the stock.

Note.—A charge of $1 should probably be made for heating the air in the brooder house.

WOMEN'S INSTITUTES.

THE FORMATION OF WOMEN'S INSTITUTES.

At the beginning of this year two thriving Institutes, organized and conducted by women, were found to be in a thriving and prosperous condition. I refer to the Women's Institute of Saltfleet, in South Wentworth, and the Women's Institute of South Ontario. Later in the season other Institutes wrote to the Superintendent asking for information about the work, and particularly as to what conditions must be fulfilled in order to start an Institute of this kind. The Superintendent then issued the following circular, which was sent to all enquirers in the Province :

TORONTO, June, 1900.

DEAR MADAM,—Your name has been sent to us by the officers of the Farmer's Institutes in your district as one who might be interested in the formation of a Women's Institute.

As you know, improved machinery, better live stock, more butter and cheese factories, and a change from constant cropping of grains to a diversification of crops, have made a vast difference in farm work and management. In fact, changed conditions of agriculture have practically revolutionized the work on the farm. Since the organization of Farmers' Institutes a great deal has been done towards helping the farmers solve problems which they had not the opportunity or means of solving for themselves. Since the Travelling Dairies passed through Ontario, there has been a vast improvement in the quality of butter made in the country ; since spraying has been generally adopted by our fruit men, the quantity of good fruit has vastly increased ; since our live stock men have joined hands and formed Dominion Associations, a great impetus has been given to our stock interests, and the Dairymen's Associations of Eastern and Western Ontario, the Dairy School, and the men in the cheese factories and creameries, by their skilful labor have built up for us at home and abroad an enviable reputation for our milk products. The Ontario Agricultural College has been filled to overflowing during the past year with bright boys from the farms. They are preparing themselves well for their life work, and are learning principles and methods which should enable them to secure a goodly share of the pleasures and profits of a country life. While all of these changes and improvements have been taking place on the farm and in the barns and stables, very little progress has been made in that part of the homestead presided over by the wife and daughters. It is true that some houses are planned along modern lines. Many kitchens are supplied with splendid ranges and furnished with granite ware utensils of many shapes and sizes. Some places have cool, clean, and comfortable dairies with running water and power supplied to turn the separator and the churn. A few have homes with bath-rooms and stationary wash-tubs, and equipped throughout like the residences of their town and city friends.

As you know, however, there are many farm homes in this Province where none of these things exist. Even among the well-to-do, those who owe no man a cent and have comfortable bank accounts, are to be found badly planned and poorly equipped dwellings. Many of them

do not know how to remedy matters. They have a horror of employing an architect, and never stop to think that a talk with a carpenter and a consultation with the mistress of the home would go a long way towards improving present conditions. They have attended the Farmers' Institute each season, and carried away and put into practice many good ideas received there, but they feel helpless when called upon to assist in the dairy, the poultry yard, or the home.

What Farmers' Institutes have done for the farmers and the farms, Women's Institutes can do for the homes through the instrumentality of the wives and daughters. In Ontario we have been so busy cleaning up land and growing out of the log cabin period, that we have had little time to attend to the development of the beautiful about our homes. Now we are free from the long grind, wood piles are relegated to the rear. Vines now clamber over the porches, lawns are cut and trees are planted along the lanes. Flowers are grown in front instead of vegetables, and such homes become an expression of the culture of their inhabitants and preach a sermon to the passer-by. From such homes the boys do not rush away and choose some other profession in life ; the girls do not yearn for the attractions of the towns and cities.

The Government will give a grant of $10 each year to assist you in holding your meetings, and the Department of Agriculture will send you such literature as will be interesting to your members. I suggest that you speak to some of your lady friends, and discuss the advisability of starting an Institute in affiliation with the Farmers Institute now established in your riding.

The rules and regulations are very simple. The following are the most important :

"The organization meeting may be called by the Superintendent of the Farmers' Institute, by the head of a municipality, by the President and Secretary of the local Farmers' Institute, or by five ladies of the district."

"Each Women's Institute shall be in affiliation with the Farmers' Institute in the district."

"The object of Women's Institutes shall be the dissemination of knowledge relating to domestic economy, including household architecture, with special attention to home sanitation ; a better understanding of the economic and hygienic value of foods, clothing and fuel, and a more scientific care and training of children with a view to raising the general standing of the health and morals of our people."

"Each Women's Institute shall receive a grant of $10 annually from the Department, on condition that an equal sum be granted by the county council or municipality in which the institute is organized, or from the local farmers' institute, and on such further conditions as are imposed by the 'Act and rules governing Farmers' Institutes.'"

After your institute has been organized and has elected officers, a date will be set for the next meeting. Ladies will be invited from different parts of the riding, and when they have seen how an institute is conducted they will form a branch at their own home. Branches will in this way spring up all over the county, authorized by the original organization, but controlled by local officers. Some public meetings will be held. The farmers' institutes will be especially benefited by such help as you can give them in their evening meetings. The most profit, however, will result from your meetings in your own homes, where practical subjects are informally discussed and illustrated. For example, Mrs. A. invites the members to meet at her home. She has a reputation for making good butter, and has no desire to "hide her light under a bushel." At the meeting, "butter" is the subject for discussion. Mrs. A. explains her process, and the members ask questions. Then the dairy is inspected and a profitable afternoon has been spent. Mrs. B. sells more eggs in winter than any of her neighbors, and she has always a few chickens to sell when they command the highest price. The next meeting is held at her home. Mrs. C. makes good bread. Miss D. has flowers in bloom all winter. Mrs. E. has been successful in hatching chickens with an incubator, etc , etc. An organization that will enable each lady in the neighborhood to get all such information in a practical and systematic form cannot fail to assist in the general upbuilding and improving of women's work on the farm. Some districts have already organized, and twelve others have signified their intention of doing so during the coming season.

We have now a number of estimable lady delegates on our staff, and their services may be secured at any time to assist any proposed institute in organizing or in carrying out any practical schemes of the organization.

Trusting you will give this matter your personal attention, I am,

Yours very truly,

G. C. Creelman,
Superintendent of Farmers' Institutes.

REPORT OF SALTFLEET WOMEN'S INSTITUTE.

Another year of prosperity has crowned the labors of the Women's Institute of Saltfleet. During the year fifteen meetings have been held. At several of these meetings excellent addresses have been given by foreign talent. Miss Laura Rose, of O.A.C., Guelph, delighted the

audience by giving them a talk on the "Properties and Care of Milk." Miss Lilian Staples, M.L.A., gave an instructive address on "The Nervous System." A literary talk by Inspector Smith was much appreciated.

Mrs. A. Kinney, of Grand View, addressed the institute on "Domestic Science and the Modern Home," and gave many practical hints of value to the members. Miss Hope, Principal of the Technical School, Hamilton, in her address on "Domestic Science," told of many instances where much good had been accomplished as the result of the science being taught in the schools. She also explained the work of the technical school in Hamilton. Besides these excellent addresses many good papers have been given by members of the institute on subjects as follows: "Drinking Water," "Manners," "Character, or Backbone," "Possibilities," "Cheerfulness," "Our Beautiful Home," "Food and its Adulteration," "Pure Air," "Bulb Culture," "Influence," "The Love of Mother," "Mothers and Daughters," "Habits," "Food Value in Whole Wheat," "The Baneful Cigarette."

After the paper on the cigarette was read by Mrs. Parson Smith, she presented a petition from the W.C.T.U. to prohibit the manufacture of cigarettes. It was unanimously carried that the institute sign the petition. Several readings, recitations, etc., have been given by members during the year.

At the "open meeting" held May 31, Capt. J. E. Orr addressed the audience, urging them to make the home-coming of the volunteers a pleasant one by tendering them a reception. Several expressed themselves interested in the undertaking, and willing to assist. As a result, the institute took action in the matter, and gave a reception and luncheon to the volunteers on June 23.

Several good books have been added to the reading course of the Institute, from which the members expect to glean considerable knowledge to be of benefit during the coming year.

At the annual meeting, Mrs. J. Hoodless, honorary president, presided during the election of officers. During the meeting Mrs. Hoodless gave a short address, and expressed a wish that the institute beg the Ontario Government to make provision for the scientific education of women by establishing a women's department at the O.A.C., Guelph, where women may be qualified as instructors in subjects directly connected with the development of agriculture as related to women's life and work. Also that provisions be made for special courses in any subject or subjects, as may be desired by any young woman who may wish to qualify for home duties or as a specialist in any department. The matter was laid before the meeting, and it was carried unanimously that the institute send a resolution to the Government on these lines.

The election of officers resulted as follows: Honorary president, Mrs. J. Hoodless; president, Mrs. S. Melson; first vice, Mrs. F. M. Carpenter: second vice, Mrs. J. H. McNeily; secretary, Miss M. E. Nash; treasurer, Miss L. King; press representative, Mrs. E. Lee.

M. E. NASH,
Secretary.

PRESIDENT'S ADDRESS.

To the Ladies of the Saltfleet Women's Institute:

As I find I cannot be present with you at our annual meeting, which I regret very much, I beg to ask the Vice-president to kindly read on my behalf these few remarks and suggestions.

First, I wish to thank you for your kind consideration in the past year. I feel that I have not filled the position with the activity and thoughtfulness it required to make the institute a complete success.

We have the material in our institute to make it thoroughly successful, if tact and ability could stir up the latent talent into working order.

We have had goodly success in our membership list, attendance and programmes of interest, until spring work and sickness prevented many from coming out. Our speakers from outside were well appreciated, and altogether those who have attended regularly feel, I think, that the meetings have been a pleasant spot in their winter life. However, we must not think of being at all satisfied with the past. We should try to make our meetings so attractive that no member would feel that she could carelessly miss one.

I feel that we have not received the benefit we should have from our little store of books, as our first purchase has been lying almost perfectly idle this last winter. Now that we are adding an interesting list to our number, no member has an excuse for not assisting with the programme, but should get one of these and prepare an essay for our next winter meetings. We have had none of the interesting papers on physiology this last term, either, and our past discussions on health in regard to the food we use might be profitably resumed. This is one of the important objects in our organization, "the better understanding of the economic and hygenic value of foods." No meeting should pass without some paper or reference to the subject coming before the meeting. The books we have on this subject would give us reliable

information, if some member would only get it into a short practical form for the meetings. We might also have papers and discussions on economy of home work, ways and means of lessening our labors, so as to have more of the leisure of life, time for more reading and general companionship with our families.

If we do not make our institute a means to further the broadening and enlightening of our lives it is useless to carry it on. Let us show by our work and attention that there are no doubts as to its going forward or backward, but let there be a general movement forward.

The superintendent, Prof. Creelman, has given us excellent encouragement by his desire to aid in the work, also by favoring the organization of women's institutes in other localities. We should give him every encouragement to go on with the work.

Most of us appreciate the benefit our meetings are to us. I say "most" as there are usually a number in a large membership who do not value the work, and are dissatisfied. There are few of such in our membership, and, as we feel the benefits we derive, we should interest ourselves for the benefit of our sisters in the rural districts.

I hope the officers will be elected to represent the different portions of our district, and I would suggest that they at once arrange with every member to have a paper or something for one meeting next winter, have the secretary take their names, or officers hand them to her, and let the members send the name or subject of paper before a month to the secretary. Then the members will have time to jot down pointers for good papers, and will understand what is expected of them. We have over sixty members. If each gives something what full programmes we shall have, with our outside help! The secretary could mark those who have assisted with the programme after the meeting, and then officers could know at any meeting who to solicit for the future meetings.

Many members have spoken of decreasing our meetings from two to one month. Would it not be wise to do so the coming year and to hold them the second Thursday in the month? We could, if necessary, arrange for special meetings. Also, could we not consider the point of remunerating our secretary for her future services. I hope our past secretary will be retained, and I think we would feel that if a portion of our grant were given for her duties (which often call her on trips from home), it would only be carrying our institute on in a business way.

I would like to suggest also, that if it is desired that the one addressing the meeting speak louder, for the members not to hesitate in asking for the same. No member should be offended on being asked to read louder. It would only show appreciation in desiring to hear her.

I hope my successor in office will have the pleasure of carrying through a very interesting year, and that institutes in general may be organized for the same good cause in many other sections of the Province, so as to begin the new century in the line of progress.

Mrs. E. D. Smith, President.

REPORT OF WOMEN'S INSTITUTE OF SOUTH ONTARIO.

At Whitby on the 29th of June last a meeting of the ladies of South Ontario was convened by Mrs. J. L. Smith for the purpose of organizing a Women's Institute. There was a fair attendance, considerable interest was manifested and a partial organization was effected. A short time later another meeting was called, officers were elected, and the Women's Institute of South Ontario was fairly launched.

On October 12th the first regular meeting of the Institute was held in the Council Chamber at Whitby. The officers and nearly every person interested in this new venture were very anxious that everything should go off well, and they spent much time and energy in preparation for the meeting. Their efforts were splendidly rewarded. The room was already well filled when Dr. Hare, President of the Ontario Ladies' College, arrived with a bevy of young ladies, and extra chairs had to be provided. The President, Mrs. S. L. Brown, after explaining the objects of the association, proceeded to carry out the programme which had been provided. Mrs. W. Ayres, organist of the Methodist Tabernacle, rendered most successfully two instrumental solos, and Mrs. T. J. Jackson's vocal solo was appreciated by all. The President then called upon Miss Meen, of Whitby, who read an excellent paper on "Winter Window Gardening." The subject was well treated, and many useful hints were gathered by the ladies present. In this country, where our winters are so long, and where so much of our time is spent in the house, we are eager to learn how to keep plants and flowers, and have them thrive well in our rooms. Miss Meen helped us by her paper, and we hope to hear from her again.

Miss Laura Rose, Instructor at the Ontario Agricultural College, Guelph, was then called on for an address on "Bread Making." This lady has such a pleasing manner, and was so thoroughly in earnest, that her remarks were listened to with the the closest attention. She discussed the kind of flour to select for family use, the making of yeast, the setting, kneading and baking of bread, also the care of bread after it is baked. This was followed by a lively discussion, in which many of the ladies took part.

Miss Blanche Maddock, a graduate of the dairy department of the Ontario Agricultural College, was also a delegate to the meeting. She spoke on "Bacteria as They Affect the Home, the Soil and the Dairy." Miss Maddock's address was well received, and all were sorry that time did not permit of a longer discussion on this very important subject.

Miss Rose again came forward and took up the second part of her subject, namely, "Butter Making." The care of milk, the different methods of setting, and skimming, airing and churning were all explained. Throughout her entire address she was listened to with the closest attention. The Secretary of the Institute writes: "The delegates you sent us were most helpful to us, and the ladies will be heartily welcomed when they come to Whitby again." At the business meeting the list of officers was completed, and the places of holding local meetings were discussed. Pickering, Port Perry, Greenbank and other places were mentioned, and the Executive is likely to hold other meetings in the near future. It was also proposed to confer with the officers of the local Farmers' Institute, which holds a meeting in Columbus in December, to see if arrangements could not be made to hold a joint meeting at that place. The following is a list of the officers of South Ontario Women's Institute: Honorary president, Mrs. J. L. Smith; president, Mrs. S. L. Brown; vice-president, Mrs. Purvis; secretary, Mrs. Wm. Anderson; treasurer, Mrs. J. B. Mitchell.

In closing her report, the Secretary says: "Judging from this, our first meeting, I think we may safely say that the Women's Institute of South Ontario is likely to become, at an early date, a very successful and useful organization."

The Year's Work.

The success of the work has gone beyond our expectations. The members have found the meetings both interesting and instructive, and the Institute promises to become a most useful organization for the bettering of our homes, and the spreading of knowledge pertaining to domestic science.

At our first meeting twenty-three names were handed in for membership, and the list has steadily increased until now we have a paid up membership of seventy-three. During the past year six regular meetings have been held as follows: Two at Whitby, one at Pickering, one at Kinsale, one at Brooklin and one at Columbus. At one of our Whitby meetings we were favored by a visit from Miss Rose and Miss Maddock of Guelph, who gave addresses on "The Making of Prize Bread and Butter," and "Bacteria as it affects the Home, the Soil and the Dai y"

The following papers and addresses have been read by our members: "Winter Window Gardening," Miss Meen; "The Care of Poultry in the Winter," Mrs. Higgins; Kitchen Gardening," Mrs. A. Annis; "Domestic Economy," Mrs. J. L. Smith; "Social improvement in Rural Districts," Miss M. Brown; Address to young men on "Perseverance," Mrs. R. R. Mowbray; "Sweet Pea Culture," Mrs. J. B. Mitchell; "Labor," Mrs. W. Purvis; "Food and Its Functions," Mrs. R. Rogers. In addition to papers and addresses the meetings have been varied by songs and recitations.

For the better carrying on of the work, Branch Institutes have been organized at Kinsale and Columbus, Mrs. Rogers having charge at Kinsale, and Mrs. Purvis at Columbus.

In view of the fact that this is our first year, and that the work has been new both to officers and directors, we feel pleased with the results, and are encouraged to look forward to greater success in the future.

Annual Meeting.

You will be pleased to learn that the annual meeting of our Institute, held in Brooklin yesterday afternoon, was decidedly successful. I have not made up a report of it yet, but will do so in a few days, using the blank forms in the minute book.

Our meeting was well attended. The ladies are gradually becoming more interested in Institute work, so we feel quite encouraged. We elected a few new directors, striking off some of the old names. The old officers are all re-elected. I really did not intend to be the secretary this year. I had quite made up my mind not to be, but it seemed as if I could not get out of the work without being very disobliging, so I have taken it up for another year.

After the business was over there was still a little time left for sociability. We had refreshments, and we invited the Farmers' Institute to luncheon, and I think that part of the programme was very much appreciated. Everybody seemed to have a good time. I think you would have enjoyed it yourself, if you had been here. I do not think it is too much to say that we helped to make the Farmers' Institute a little more interesting than it would otherwise have been.

Whitby, June 6, 1900.

Sincerely yours,
Mrs. W. Anderson,
Secretary.

REPORT OF WOMEN'S INSTITUTE OF NORTH GREY.

At Kemble, in the County of Grey, a public meeting was held on September 15, for the purpose of organizing a Women's Institute. More than twenty ladies were present and a lively interest was manifested. Mrs. J. L. Smith, of Whitby, explained the nature of the work and then proceeded with the organization according to the rules and regulations governing Institute work. The Institute will be known as the Women's Institute of North Grey. The following officers and directors were elected: Hon. president, Mrs. J. L. Smith, Whitby; president, Mrs. James Gardner, Kemble; vice-president, Mrs. D. Davidson, Kemble; secretary, Mrs. F. J. Willcox, Kemble; treasurer, Mrs. G. Beckett, Kemble; directors, Mrs. J. Gardner, Kemble; Mrs. W. McGregor, Kemble; Mrs. W. J. Saunders, Owen Sound; Miss J. Muir, Kemble; Mrs. J. Smith, Inglis Falls; Mrs. Alex. McDonald, Kilsyth; Mrs. Josiah Tolten, Owen Sound; Mrs. G. McLeod, Owen Sound; Mrs. A. J. Taylor, Annan; Mrs. T. J. Harkness, Annan; Mrs. J. Cleland, Meaford; Mrs. Wm. Gardner, Meaford; Mrs. Jno. Clark, Meaford; Mrs. A. Gifford, Meaford; Mrs. J. Beattie, Desboro'; Mrs. Alex. Pringle, Chatsworth.

Mrs. Smith, writing to the Superintendent, says of the meeting: "From the hearty manner in which all seemed to take hold of the work I am sanguine that this will prove a successful Institute."

MISS ROSE AND WM. RENNIE ON WOMEN'S INSTITUTES.

At the close of her lecture on dairying at Uxbridge, Miss Rose gave a few minutes' talk on the organization of Women's Institutes. "I have had the pleasure," she said "of attending three meetings of the Women's Institute at Stoney Creek. At first the members were diffident about taking part in these meetings, but now excellent papers are prepared and most interesting discussions take place.

"The trouble with women on the farm," she said, "is that they spend altogether too much time on work. It is a fact proved by statistics that more farmers' wives go insane than any other class in the community. This is due to the fact that they have not enough variety in their lives. By organizing institutes they will not neglect their homes, but will learn how to make these homes pleasanter. The towns are as much interested in this matter as the country. There should, in fact, be no country or town in the matter, but all one.

"They have a good Women's Institute in South Ontario also. This was started in Whitby, but now there are four or five branches in neighboring localities. At one meeting which I attended in Whitby the place was so full that I could not find a chair to sit down on when my address was finished."

"Domestic Science," added Mr. Wm. Rennie, who spoke later, "is one of the most important studies that can be taken up. We have learned how to feed our animals at one-half the cost which was formerly involved, but we have made no progress in the feeding of the human animal. One result is that we find children almost without a tooth in their heads. A better table could be set for one-third the sum now spent, and with better results in the health of our people. Above all things, we should learn the value of letting sunlight into our homes, particularly in the spare bedroom. Experiments in this line were made at the College. Disease germs were placed on a glass in a dark room. A strong light was turned upon a portion of these germs and it was discovered that where the germs were in the light they were completely destroyed, while others were left fully alive. Sunlight is the best preventive of disease known."

DRINKING WATER.*

By Miss Fanny Pettit, Tapleytown, Ont.

There are a good many fancies and beliefs about drinking water which are founded on ignorance, perpetuated by indifference, and culminate in serious physical disorders. In the primitive newly-settled countries people get water for personal use, as a rule, wherever they happen to find it, in lakes and streams or springs, and the presence of these water sources has, as everybody knows, been very important factors in determining where communities should settle and form centres of growth. But, as time has gone on, men and communities have learned in a measure to restrain nature. So it has come about that anywhere and everywhere the standard of residence may be planted at the dictates of every possible motive, and in one way or another, for better or for worse, water for man's personal use is made to be forthcoming.

Amount of Water required by each Individual. How much water on an average an individual needs in civilized life for personal and domestic uses depends a good deal, of course, upon his habits and occupation as well as upon the character of his residence. In gen-

*Paper read at the Women's Institute, Stoney Creek.

eral, it is estimated that from fifteen to twenty gallons per day for each person is a reasonable amount. But when to these more limited uses of water we add the amounts needed for street cleaning, for extinguishing fires, for fountains, etc., a much larger quantity will be required. About sixty gallons per day per person has been regarded as sufficient by competent authorities for all these various purposes.

Sources of Water Supply. When we try to group the varied sources of water supply for domestic and general use, we find that they may be conveniently arranged as follows: (1) Rain water, collected in cisterns; (2) surface water, such as streams, lakes and ponds; (3) shallow wells of the ordinary form and the common springs of superficial origin; and (4) water which comes from a considerable depth in the earth, as from very deep wells, so-called artesian wells, and deep springs. The water which falls as rain may, when it comes down upon rocky surfaces, either sink in part into cracks and fissures, and so, sometimes, go down to great depths in the earth, or it may run directly off into streams and ponds and lakes, or stay in puddles until it evaporates. If we could run a pipe far up into the air, and draw our water from the clouds, we should be spared a world of trouble and annoyance. Up there is water distilled by the sun itself, and while it stays there it is pure enough to satisfy the atomic soul-longings of the chemist himself. But the moment it gets fairly condensed into available form, and begins to fall through the air, especially in inhabited regions, it draws into solution more or less of the atmospheric gases—oxygen, nitrogen and carbonic acid.

We live in a Water Bath all the time. Solid and dry as the human body appears, water constitutes more than one-fourth of its bulk, and all the functions of life are really carried on in a water bath, and although the sense of thirst may be trusted to call for a draught of water when required, the fluid can be imbibed most advantageously for many reasons besides merely satisfying the thirst. In the latter stage of digestion, when comminution of the mass is incomplete, it is much facilitated by a moderate draught of water, which disintegrates and dissolves the contents of the stomach, fitting it for emulgence and preparing it for assimilation. Hence the habit of drinking water in moderate quantities between meals contributes to health, and indicates the fact that those who visit health resorts for the purpose of imbibing the water of mineral springs, might profit by staying at home and drinking more water and less whisky.

Water is the universal solvent of nature, and the chief agent in all transformations of matter. When taken into an empty stomach, it soon begins to pass out through the tissues into circulation to liquefy effete solids, whose excretion from the system is thus facilitated. Very few people think of the necessity of washing the inside as well as the outside of the body, and he who would be perfectly healthy should be as careful about the cleanliness of his stomach as that of his skin.

WHEAT FLOUR AND ITS RELATION TO BREAD-MAKING.

By Robert Harcourt, O. A. C., Guelph.

The common things about us often attract the least attention, although they teem with intense interest. From time immemorial bread has been the staff of life, yet it is surprising how little science has revealed to us about this important food which is the basis of human nutrition. Not only is it the most important, but at the same time it is the cheapest; for, measured by actual nutritive power, there is no other complete ration which in economy can compare with bread.

Bread as a complete ration. By this is meant a ration which in itself contains all the essential elements of nutrition in a proportion that will satisfy the wants of the human system. Bread contains proteids, or albuminoid matter, which may be viewed as the vegetable analogy of the lean or muscle of meat, and starch, which is the vegetable counterpart of the fat of the meat. Besides these, bread contains small quantities of fat, cellulose and mineral matter, the latter of which is essential for the formation of bone. In speaking of bread as a complete ration it is not meant to imply that no other food is necessary. In man not only are the tissues to be nourished and replenished but the taste must be pleased.

Material for making bread may be supplied from many sources. Wheat, rye, barley, oats, corn, buckwheat and potatoes have all been used for this purpose. In fact nearly every plant furnishing a product rich in starch had been utilized for making bread. So far as has been determined, the starches of cereal grains are chemically identical; consequently, there is nothing, from a chemical standpoint, in this the largest constituent of flour, to make one grain superior to another for bread making. The protein, or flesh-forming substance, is the next largest constituent of flour. This is the most nutritious part of the grain, and pound for pound the proteids of one cereal have as high a nutritive value as another, yet the difference in the constituents of these proteids makes it possible to prepare a far better quality of bread from one of the cereals than from the others. Nearly 90 per cent. of the nitrogenous substance of wheat is composed of an insoluble form known as gluten, which is lacking in all the other cereals with the exception of rye. Many of us are familiar with gluten in the form of gum made from chewing wheat. The amount of nitrogenous substance in a grain is an indication of its food value,

but it is the gluten content that determines its value for the production of flour of a good bread-making quality. Millers want a variety of wheat that contains a high percentage of gluten, because a better quality of flour can be made from it. Farmers, on the other hand, grow wheat for the yield in bushels, regardless of the amount of gluten it may contain. So long as the millers pay as much for one variety as for another so long will farmers grow the varieties that give the best yields.

Milling. The wheat grain is essentially an embryo, composed of the germ, together with a supply of food, and the endosperm, or floury matter, surrounded by several membranes or coats. In preparing the wheat for grinding, the outer coats are removed by friction; those lying immediately under these form the greater part of the bran. The endosperm, which consists of large cells containing the granules of starch and the constituents of gluten, is by far the most important portion of the grain, and it is the object of all milling processes to separate this from the rest of the wheat and grind it to flour. The exterior of the endosperm is much harder

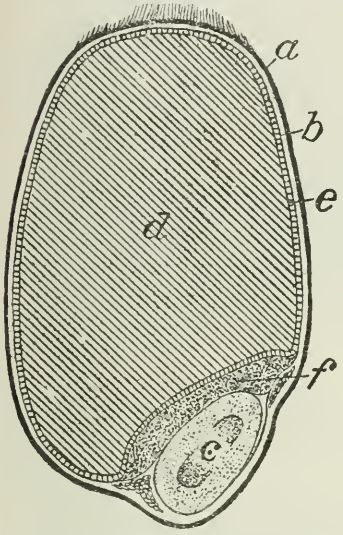


Fig. 1—Section of grain of wheat: *a*, skins and testa; *b*, membrane; *c*, embryo; *d*, endosperm; *e*, cereal or aleurone layer; *f*, scutellum.

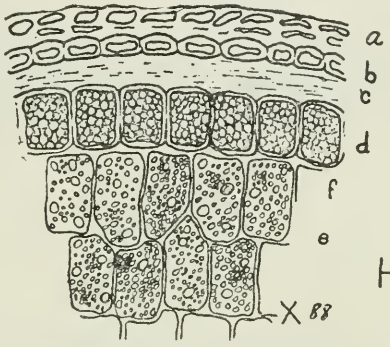


Fig. 3—Highly magnified section of portion of grain of wheat, as at X in Fig. 2; a, b and c, outer coats or bran of the grain; d, aleurone layer; e and f, floury interior starch cells of the grain.

Fig. 2.—Transverse section of grain of wheat.

than its interior, and contains more gluten. In all methods of gradual reduction the centre is reduced first, and being very starchy makes flour a little low in gluten, but very white. This is is the grade of flour known as the "patent." The richest part of the endosperm being hard, and closely attached to the tough bran coats, is, to a certain extent, lost or so mixed with small pieces of bran that it injures the color of the flour, thus furnishing what is known as the "bakers' grades." The flour obtained by still closer grinding of the bran forms the "low grade" flour of commerce. Generally speaking, the more bran particles there are in flour the lower it is graded. The outer coats of the wheat contain a much larger proportion of mineral matter, proteids, fats, and fibre than the inner portion or endosperm. It therefore follows that the more bran there is in the flour the richer it will be in these constituents, although at the same time it is lower in gluten. This difference in composition of the various grades of flour made from the same wheat is well illustrated in the following table which has been compiled from those of analyses in "Foods and Food Adulterations,"* by Dr. H. W. Wiley, of the United States Department of Agriculture.

Composition of wheat and three grades of flour made from it.

—	Moisture.	Proteids.	Gluten.		Ether extract or fat.	Crude fibre.	Ash.	Carbohydrates (starch).
			Wet.	Dry.				
Wheat	6.66	14.18	.....	.....	2.61	1.70	1.91	69.94
Patent	11.46	12.95	36.14	10.85	1.45	.18	.39	73.55
Bakers' grade	12.46	14.88	51.21	16.97	2 00	.33	.62	70.00
Low grade	12.01	17.95	10.01	4.26	3.86	.93	1.99	63.26

NOTE.—Fig. 1 is taken from Farmers' Bulletin No. 112, U. S. Dept. of Agriculture. Figs. 2 and 3 are taken from Bulletin No. 62, Minnesota Agricultural Experimental Station.

* Bulletin No. 13, part 9, Division of Chemistry, Department of Agriculture, Washington.

At first glance it might be said that the "low grade" flour is the best as it contains the most proteids, but while high in proteids it possesses a small amount of gluten, and the increased amount of fat, fibre and ash tend to make the flour darker in color. The gluten of the "patent" flour is of a better quality than that in the lower grades. It therefore makes a dough that rises better and retains a larger amount of water. A "straight" flour is usually obtained from custom mills where all the flour made from the wheat is left together.

The yield of flour depends largely on the quality of wheat, the mill and the skill of the miller. Good authorities say that an average wheat under the best conditions will yield about 60 per cent. of high grade flour, about 8 per cent. of a good inferior article, and a small quantity of very low grade. Some millers claim to be able to turn out 75 per cent. of the weight of the wheat used as a marketable flour.

An examination in a flour for commercial purposes should deal with three things, viz., strength, yield, and color. Flavor is so much affected by the fermentation used and by the methods of working that it can hardly be considered in estimating the commercial value of flour. The strength largely depends on the quantity and quality of the gluten; the yield of bread on the amount of water the flour is capable of absorbing; and the color on the amount of bran particles it contains, on the amount of germ that has escaped separation, and on the amount of smut on the wheat.

Strength of flour. It is difficult to get at what is really meant by strength in flour. The miller usually judges strength by mixing a definite weight of flour with a measured quantity of water, and comparing the consistency of the dough thus produced with that from a standard flour. The results can only be used for purposes of comparison. Bakers often judge of the strength of a flour by the amount of fermentation it will stand. He knows that if two different flours are set with equal quantities of yeast and at the same temperature, one will come to what is spoken of as the "drop," or a time when the tenacious nature of the gluten is exhausted in less time than the other. Flours will, however, differ greatly in the rapidity of the fermentation, so that the one with the higher percentage of gluten may run its course of fermentation in the shorter time, and baker and miller not agree as to which is the stronger flour. The most reliable method of determining the strength is by actual baking tests, but these to be at all accurate must be made by an experienced baker, who can judge when the different doughs have had their proper amount of fermentation, and are ready for the next step in the process. By this method the actual yield of bread is obtained, and the strength of the flour thus determined.

The color of course does not affect strength of flour or yield of bread, yet in the great majority of cases more value is placed on color than on anything else.

Experiments. The strength of the flour made from a number of our fall and spring varieties of wheat was clearly brought out by F. W. Goble, one of our present graduating class, who worked out an interesting thesis on this subject. The following is an extract from one of Mr. Goble's tables:

Yield of bread from Three Varieties of Wheat.

Name of wheat from which the flour was made.	Gluten		Pounds of bread make from 100 lbs. of flour
	Wet	Dry	
Manitoba, straight flour.....	30.17	10.86	154.9
Wild Goose, straight flour.....	26.53	10.00	151.9
Michigan Amber, straight flour.....	18.95	6.48	148.5

The bread from the Manitoba flour had a good color, and made a large loaf very fine in texture. That from the Wild Goose flour make almost equally as large a loaf, a little more open in the texture, but very dark. Because of its dark color the flour from the Wild Goose wheat cannot be used by bakers for bread-making, yet there are few, if any, of our Ontario grown wheats that will make as strong a flour. The bread from the Michigan Amber, a fall variety of wheat, which was a little dark in color, did not rise as well, and dried out more quickly than the others. Fig. 4 shows a single loaf of each variety.

The quantity of gluten in a flour is a good indication of its strength, yet the character of the gluten varies greatly in different varieties of wheat, and in wheat, grown in different localities. The gluten of the hard spring wheats appears to have the best properties for making a good light loaf of bread, but it cannot be denied that good bread is made from the soft wtiner wheats.

The ideal flour for bread-making is one that contains a sufficient quantity of gluten to produce a spongy loaf, without retaining an excessive amount of moisture. Bakers prefer a flour with a high percentage of tenacious gluten, because, owing to its absorptive power, the bread retains a large amount of water. With a flour rich in gluten of good quality it is possible to get a good palatable loaf, that will contain as high as 40 per cent. of water, without any evidence of an excess; while another flour poor in gluten or of a poor quality, may make a sticky doughy bread, and contain only 35 per cent. of moisture.

Quality of Gluten. A number of attempts have been made to determine what makes quality in gluten. With experience a fair judgment of the quality can be formed from the feel and appearance of the gluten when wet. Some are soft, sticky, and have but little or no tough-

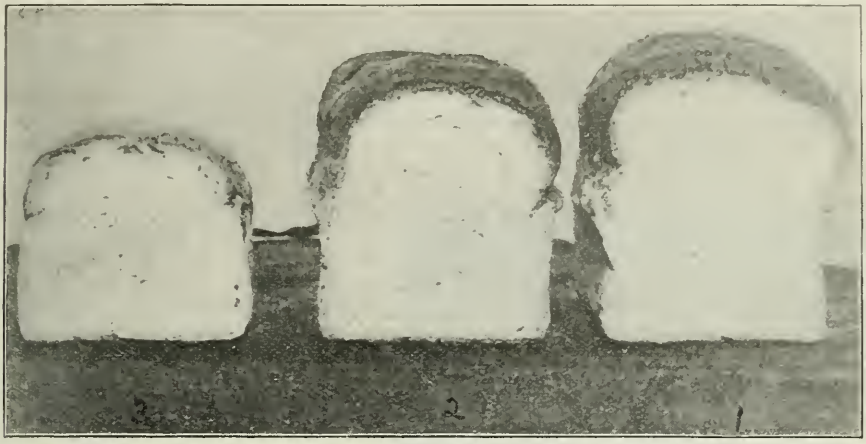


Fig. 4.—Loaves of bread made from equal weights of "straight" flour from 1. Manitoba wheat; 2. Wild Goose wheat; 3. Michigan Amber.

ness, while others are highly elastic, firm and springy to the touch. These latter are special qualities which render flour of value for bread-making purposes. To illustrate the quality of gluten, its percentage in three grades of flour made from the same mixture of wheats was determined, and some of the flour baked, results of which are given in the table below. Fig. 5 shows the bread from 9 pounds of each grade.

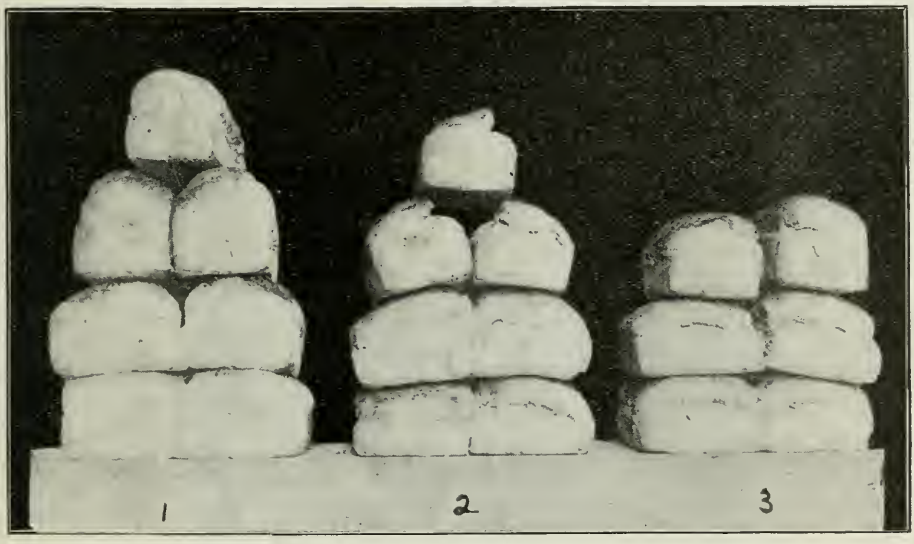


Fig. 5.—Showing bread made from (1) a patent; (2) a middle grade, and (3) a low grade of flour; 9 lbs. of flour were used in each case.

Yield of Bread from Three Grades of Flour.

Grade.	Gluten.		Pounds of bread from 100 lbs. of flour.
	Wet.	Dry.	
No. 1	25.7	8 2	142.2
No. 2	24.7	8.9	136 6
No. 3	22.9	8.1	132.2

The gluten of No. 1 grade was firm and elastic. Nos. 2 and 3 were much softer and more sticky, especially the latter. It is very evident that the *quality* of gluten has considerable to do with the yield of bread, for although the weight decreases with the grade, the gluten in No. 2 grade is much higher.

The most exhaustive and reliable work on the gluten of wheat was done by T. B. Osborne and C. G. Voorhees, of the Connecticut Experiment Station. According to these authorities, gluten is composed of two substances, gliadin and glutenin. When flour is moistened and worked into a dough these two constituents unite mechanically forming the gluten. Gluten as such does not exist in the dry flour, but is formed after the water is added. The gliadin has been called plant gelatine, and when separated it is very much like animal glue. It is this substance which gives the sticky adhesive property to the dough from wheat flour, and, it is because of the lack of this constituent that the flour from corn and barley will not make good bread.

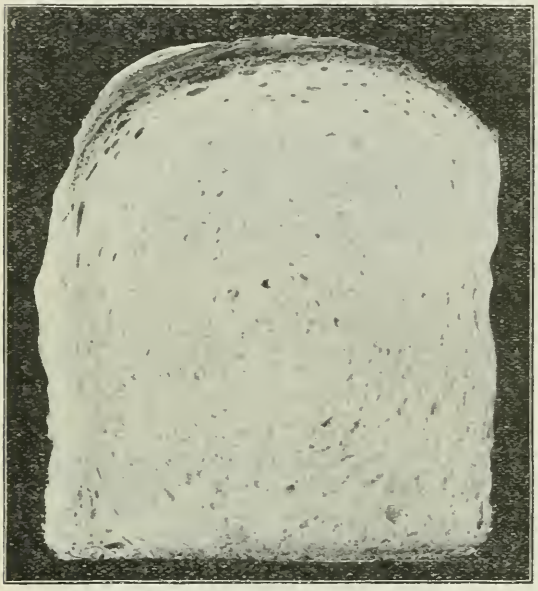


Fig. 6.—Loaf of bread made from normal flour.

The gases formed through the action of yeast, in attempting to force their way out through the dough, come in contact with this elastic substance, which spreads out and retains the gas in little bubbles, thus causing it to rise. The walls of these bubbles retain their form when the bread is baked, giving the loaf its light porous appearance. If this constituent be removed from the flour the gases formed by fermentation escape from the dough, and leaves the bread solid. Figures 6 and 7 show the difference between a loaf of bread made from normal flour, and one from flour which had been treated with alcohol to remove the gliadin.

Glutenin, the other constituent of gluten, serves as a nucleus to which the gliadin adheres, and prevents the dough from becoming soft and sticky. The indications are that quality in gluten depends, in a measure, on the presence of these two constituents in certain proportions. Prof. Snyder, Chemist of the Minnesota Experiment Station, finds, as a result of his work, that in good patent flour made from spring wheats, the gluten is made up of 60 per cent. gliadin and 40 per cent. glutenin, and that the gliadin decreases with the grade until in the low grade it is not over 25 per cent. of the gluten. This will no doubt partially account for the poor quality of bread got from low grade flour.

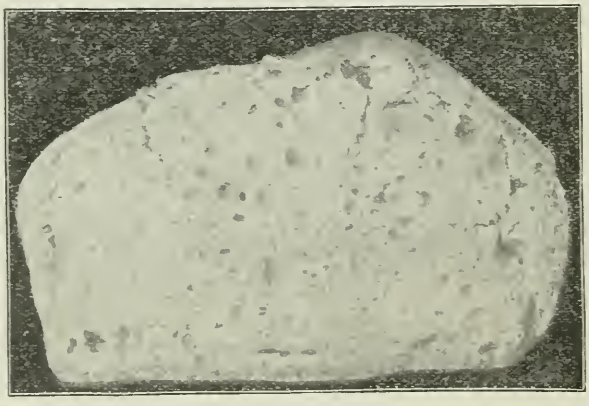


Fig. 7.—Loaf of bread made from normal flour from which the greater part of the gliadin had been removed. Note the big cracks up through the loaf from which the gases escaped without causing the dough to rise.

Object of Baking. "The miller's art is directed to the task of separating that part of the wheat most suitable for human food from the bran and other substances whose presence is

deemed undesirable. The flour thus produced requires to be submitted to some cooking operation, or some process which will separate the fine particles of flour that the digestive fluids of the body may act upon it, before it is fit for ordinary consumption. Given the flour, it is the baker's object to so cook it that the result may be an article agreeable to the taste, nutritious and easy of digestion. It is generally admitted that these ends are best accomplished by mixing a flour with water, so as to make a dough, which dough is charged in some way with a gas to distend it and then baked. The result is a loaf the interior of which has a delicate, spongy structure, which causes good bread to be, of all wheat foods, the one most easily digested when eaten. This charging with gas is most commonly effected by fermentation, but other methods are also used. Fermentation has one great advantage over other bread-making processes in that it not only produces gas but also effects other important changes in certain of the constituents of the flour."

Object of using Yeast. There are several forms of fermentation. The changing of cider into vinegar is one, the souring of milk is another. The development of the rancid smell in butter is another, and the action of yeast in the making of beer is another. The latter form of fermentation is similar to the one we have in bread-making, and is known as alcoholic fermentation. The yeast, which is really a mass of one-celled tiny plants, keeps reproducing itself at a proper temperature, 77° to 95° F., and in this growth feeds upon the sugar of the flour, converting it into alcohol and carbon dioxide gas. The theories as to the exact physiological processes involved have been many, and are probably not yet wholly understood. Sufficient for the present article is to say that the rising of bread by means of yeast is not a simple process, but involves the action of a considerable number of organisms; and because of the very complexity of its action, yeast may be the cause of more trouble and annoyance than bad flour or even poor workmanship. The flavor of the bread is influenced more by the yeast used than by any other one thing. It must not be forgotten that yeast is a living organism, and as such grows in the dough; therefore, if poor yeast is used poor bread will be the result.

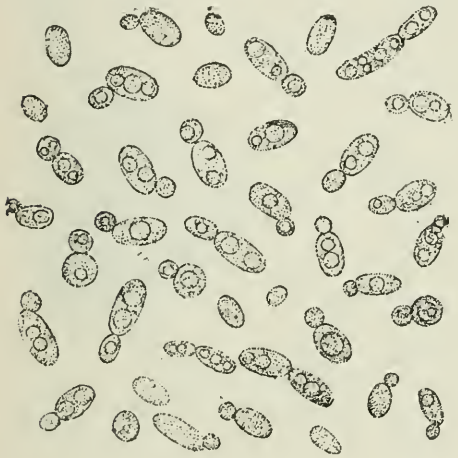


Fig. 8.—Yeast plant highly magnified, showing the growth by budding.

"Several methods have been devised for effecting an evolution of gas without recourse to fermentation. None of these methods, however, produce as digestible or palatable a loaf as where ferments of some kind are used, nor will the bread retain the moisture as well."

Changes in digestibility effected by baking. The action of the various ferments is stopped by the heat of the baking, but the heat again causes a great number of changes. Very little is on record as to the temperature attained in the oven during baking. William Jago, F.I.C., F.C.S., in his book on "The Science and Art of Bread-making," says that the temperature of the oven should be from 430° to 500° F. Probably the ordinary temperature of the oven is somewhat over 400° F. The exterior of the loaf is fully exposed to this degree of heat, but the interior, owing to the large amount of moisture present, can scarcely be heated beyond the boiling point of water. Therefore, in different parts of the loaf the starch is exposed in a moist condition to a temperature ranging from 212° to 480° F. Under these conditions, particularly at the higher temperature, great changes would be produced in the starch. When suspended in boiling water all varieties of starch are converted into soluble forms. The action becomes less marked when the starch is nearly moist, and requires a temperature of fully 400° F. to change it when dry. It has been demonstrated that not more than 10 per cent. of the total starch originally present is changed in the process of baking. Undoubtedly this change is produced in those parts of the loaf most exposed to the full heat of the oven, and not in the interior of the loaf. This variation in temperature produces the difference between the crust and the crumb of the ordinary bread. The high temperature on the exterior is continually converting starch into dextrin, a gummy substance allied to the sugars, and to some extent into caramel, a sugar. In the lightly baked loaf, with a uniform pale colored crust, the gummy character of the dextrin coating is seen. The harder the loaf is baked the darker the color through the changing of this dextrin into caramel. Many bakers moisten the top of the loaf with water, or water containing a little sugar to develop more caramel, and to give it a darker color. Both dextrin and caramel are soluble in water and, therefore, readily digested. In the centre of the loaf, practically no changes have taken place beyond those caused by the natural ferments of the flour and yeast. This explains why the crust of bread and toast is sweeter than the soft white interior, and also why it is so much easier digested. The fermentation and heat have a beneficial effect on the

NOTE.—Fig. 8 is taken from Farmers' Bulletin No. 112, U. S. Dept. of Agriculture.

digestibility of the proteids of the flour, probably changing them to some extent into peptones, a soluble form. These changes are, however, not at all well understood.

Digestibility of different kinds of bread. Reference to the table of composition of different grades of flour on page 141, shows that the "patent" flour contains less of all the food constituents, with the single exception of starch, than the lower grades. But the mere chemical composition of any material used as a food does not indicate its true nutritive value, for it is only that part which is digested that can in any way act as a nutrient. Bran contains considerable cellulose, a very indigestible substance. Not only is the cellulose very indigestible itself, but owing to its thick coatings around the cells in the bran layers, it prevents other constituents from being digested. In addition to this, cellulose exerts mechanically an irritant action upon the intestines which with some may have an injurious effect, but with others may be decidedly beneficial.

Too much importance should not be attached to the extra amount of ash, or mineral matter, in the outer coats of the wheat. Fine flour also contains these, and possibly in a far more available form. Of this, however, we have no definite information. There is little doubt that the lightness or porosity of the bread has a great influence on its digestibility. Heavy, badly-raised bread is very indigestible.

William Jago, the greatest English authority on the subject of bread-making, recently gave the result of his investigation on the digestibility of bread. In his work he compared the finest white bread obtainable with the bread made from the old stone process flour, and with entire wheat flour, and gives his results as follows : "It is a well known fact that the public demand white bread, and that in consequence of this the efforts of both millers and bakers have been devoted to its production. In these experiments bakers' best white bread has been compared with bread from the darker flours, and with that from whole wheat. It is gratifying to observe that, not only from the point of view of composition, but also from the standpoint of nutritive value and actual digestibility, white bread more than holds its own above all others."

Lawes and Gilbert, of the Rothamsted Institution, England, in an article on Bread Reform, thus sum up the comparative values of different kinds of bread : "All experience tends to show that the state of division, as well as the chemical composition of our food, must be considered ; in other words, that its digestibility and aptitude for assimilation are not less important qualities than its ultimate composition. But to suppose that whole wheat meal as ordinarily prepared is, as has been generally assumed, weight for weight more nutrition than ordinary bread flour, is an utter fallacy, founded on theoretical text-book dicta, not only entirely unsupported by experience but inconsistent with it."

Sometime ago a series of tests were made by a committee of London physicians of St. Bartholomew's Hospital, London, to determine, if possible, the relative nutriment and digestibility of white and brown bread. From these tests they came to the following conclusions :

1. White bread is, weight for weight, more nutritious than brown.
2. In case of people with irritable intestines white bread is preferable to brown.
3. In case of people with sluggish intestines brown bread is preferable to white.
4. In cases where the proportion of mineral ingredients, and especially lime salts, in other articles of food or drink is insufficient, brown bread is preferable to white.
5. If the dietary is insufficient in fat, or if the patient is unable to readily digest fat in other forms, brown bread may possibly be preferable to white.

Recent investigations conducted at the Maine Experiment Station place the nutritive value of white bread, graham bread and entire-wheat bread in the order mentioned.

The commonly accepted theory that the fine white bread is not so nutritious as the brown bread is unwarranted, because it is contrary to the most recent and able investigations.

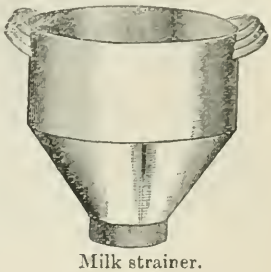
A PLEA FOR BETTER DAIRY EQUIPMENTS ON THE FARM.

By Miss Laura Rose, O. A. C., Guelph.

In my travels through the country I find women working and endeavoring to get along with the oldest and most unhandy appliances, while the men have the latest and most improved machinery. I have come to the conclusion that it is largely the women's own fault, that they have not better equipped kitchens and dairies. They are more saving of the pennies and less saving of themselves than the men. A man gets it in into his head that his seeder or binder is not doing good work, and soon convinces himself, and his wife also, that he can save the cost of a new one by the increased returns it would bring. A woman will keep on with the old dash churn, and all the time contend that she cannot afford a barrel one. Proper utensils not only give better results but they add pride and pleasure to the work. You may not have the means to get everything you would like or need, at once, but try to occasionally add some new utensil to your dairy, and in buying be sure to get a well made article. It seldom pays to buy a cheap thing. In buying tinware get it heavy with as few seams as possible, and well and evenly soldered.

I can in this paper draw attention to only a few of the most important appliances every dairy should have. They have already been much written and talked about. I write of them to again emphasize their importance, and also in the hope that many farmers' wives may be benefited, if only slightly by my suggestions.

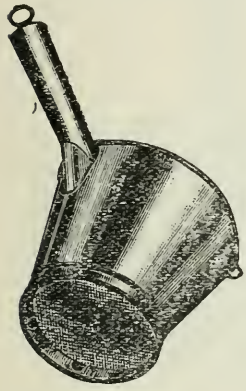
The milk strainer. If a person is using deep cans the strainer here shown is a good one. Have it 12 inches wide at the top and 5 inches wide at the bottom. The finest brass wire should be used for the strainer part, and should be 3½ inches in diameter. Have a tin band just large enought to slip over two thicknesses of cheese cloth placed over the botton of the strainer. The milk first passing through the wire, then through the cheese cloth, becomes thoroughly strained. The cloth must be taken off and washed each time of using.



Milk strainer.

A box or barrel churn. Either a box or barrel churn may be used. I prefer the barrel shape. Be sure to have it large enough. A quicker, more exhaustive churning at a lower temperature may be had when the churn is sufficiently large so as to be never over one-third full of cream in starting to churn.

Strainer dipper. One of the very handiest things in a dairy is a large strainer dipper. Use it to strain the cream into the churn, the butter-milk from the butter, with a couple of thicknesses of cheese cloth over it, strain the wash water through it into the churn. If it be washed and dried it does to sift the salt over the butter. A person once accustomed to using such a dipper is lost without one. Give the following dimensions to any tinsmith, and he should make one for 50c : 9 inches across the top, 7 inches across the bottom, 6 inches deep. The bottom should be of perforated tin, 9 or 10 perforations to the inch. A good handle 10 inches long and a piece of double tin at the opposite side to act as a lip to keep the dipper from sliding into the churn or pail, makes it complete.

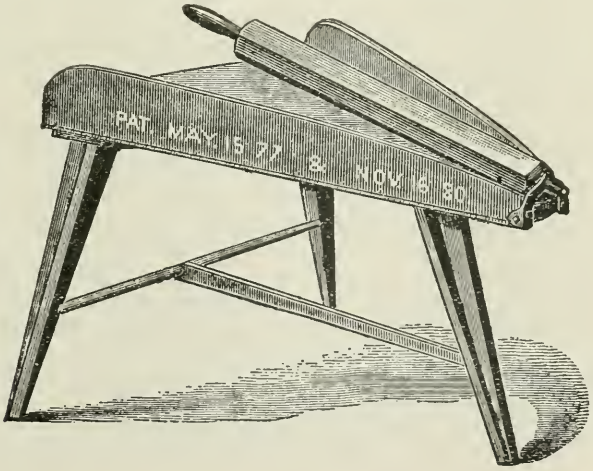


Dairy strainer dipper.

A dipper the same size as the above, but with tin or copper bottom, is the ideal thing for either the kitchen or dairy. It is a great saver of time. If you have not one do not delay in getting one.

Thermometer. Every dairy should have a tested thermometer. When buying it is a good plan to try several in water, and take one that registers the same as the majority of them. Occasionally a thermometer will be out several degrees.

Lever butter-worker. If there is one thing about the dairy that I like to bring before the public, more than any other, it is the lever butter-worker, and why? Because it saves both time and strength, and does not injure the texture of the butter. I have used the butter bowl and ladle, and know exactly the labor involved in doing so, especially if the butter be a little too hard. The lever



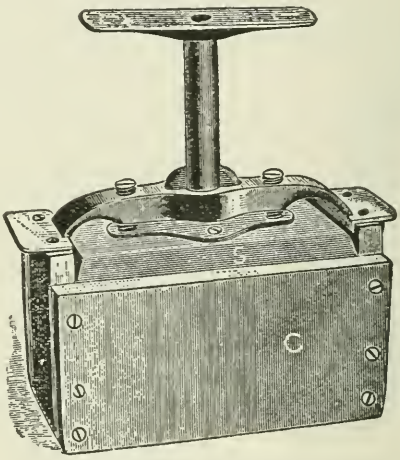
Lever butter worker.

butter-worker is not expensive, $3 or $4 at the most if bought, but anyone handy with tool could easily make one. Have it large enough. One made from the following dimensions wil

work from a few to fifteen pounds nicely at a time : 3 feet long, 3 feet wide at one end, and tapering to 4 inches wide at the other end, with sides 6 inches at the highest point. The two back legs should be long enough to make the worker 24 inches from the floor, and the front leg should be 3 inches shorter so as to give slope sufficient to allow the water to drain off while working the butter. The lever or roller should be 3 feet, 6 inches long, 8 sided and 3 inches in diameter at large end, tapering to 2 inches at small end. In using this worker do not use a sliding or rolling motion, but merely press the lever down on the butter. In this way the salt is soon evenly distributed, and the excessive moisture expelled, while the grain of the butter is not destroyed. One needs a butter spade instead of a ladle with this worker in order to turn the butter over.

Butter mould. The brick shaped butter mould is one of the neatest and most convenient forms in which to marked butter. Fill by pressing the mould down on the butter, then use the ladle to scrape off the surplus butter at the bottom. When properly adjusted the moulds weigh accurately, but it is well to frequenty weigh a print, as different lots of butter vary in weight, bulk for bulk. Have the mould hold 16½ ounces to allow for evaporation *Use the best parchment paper to wrap the prints in, and learn to put it on neatly.*

Butter Spade.



Brick-shaped Butter mould.

Scrub brush. A fine fibre scrub brush is most useful in scouring out the churn with salt, preparing the worker, etc., and one should be kept on hand solely for such purposes.

Babcock tester. When there is a large dairy herd I strongly recommend investing in a Babcock tester. It enables one to ascertain the butter producing ability of each cow, and the loss of butter fat in the skim-milk and butter-milk. It is only by looking after the small details that the dairy can be made profitable.

The Separator. I must not close this article without a plea for cream separators. Hardly have you caught sight of the word before you say, well I can afford to get the above mentioned appliances but a *separator*—that is quite beyond me. You may think so when the agent tells you one will cost from $75 to $100. It does seem a lot of money to invest, but I come in contact with very many people engaged in dairying, and I have yet to meet the person who has bought a separator and regrets it. I am frequently told that a separator will make the butter returns from ¾ to 1 pound more a week per cow. If this be true then with a herd of 12 cows, a separator will pay for itself in a year's time. A separator means less labor, especially for the women folk, more butter fat received from the milk, cream in a sweeter and purer condition than when obtained by any other method, and consequently a finer quality of butter. The skim-milk is warm and fresh for the young stock, making better calves. The problem of cooling and caring for such a large bulk of milk is solved. If you have many cows invest in a spectator, especially if water is scarce and ice hard to procure.

I thought a price list might be of interest to those not living near a dairy supply store. I give the average cost, but it may vary slightly in different localities.

No. 3 Daisy Churn	$ 4.50
Lever Butter Worker	3.50
Butter Spade	.15
Butter Print	.45

Dairy Theremometer	$0.15
Large Strainer Dipper	.45
One Gallon Dipper	.40
Four Gallon Cream Can	.75
Fibre Dairy Scrub Brush	.15
100 pound bag Best Dairy Salt	1.00
One-half gallon Can Butter Color	1.50
1000 sheets Printed Parchment Paper	1.90
4 Bottle Babcock Tester (complete)	6.75
Cream Separator (350 pounds capacity)	75.00

Discussion.

Q. What kind of deep setting is best?

A. Miss B. Hollingworth, Beatrice: The creamer with a zinc box in a wooden frame, the zinc being made to form two cylinders, through which the moveable milk cylinders with glass and taps at the bottom are slid, and can be taken out when repairs are necessary.

Q. When should starter be added to the cream?

A. Twenty-four hours before churning.

Q. How long should milk be kept in deep setting in winter?

A. Twenty-four to thirty-six hours.

Q. How long will it take a herd of 8 or ten cows to pay for a separator?

A. We realized $5 per month extra profit over what we had done without the separator. If I remember rightly we had eight cows milking at the time.

Q. What is the cause of butter being like granulated sugar, and will not collect?

A. The cream was poor in butter fat, and perhaps too cold. Have a richer cream.

Q. What is the cost of a Babcock tester?

A. $4 and upwards.

Q. Will not buttermilk do as well as a starter?

A. Yes, if it is perfectly good. Too often it has developed injurious bacteria.

Q. Does freezing injure cream?

A. I think not. Prof. Dean says he has enquired among creamery men who receive frozen cream, and they say it makes no difference.

Q. Why is there considerable butter left in the buttermilk sometimes?

A. This is the result if the temperature is too high, if sweet and sour cream are mixed just before churning, or if the churn is filled too full. A churn should not be filled more than one-third its capacity.

Q. Would you recommend pasteurizing on the farm?

A. For winter butter, yes, if properly done; if not, it is better let alone.

Q. Would it be worth while having a butter-worker for three or four cows?

A. Yes. If you have only one cow, have a butter-worker.

Q. Would you recommend investing money in modern appliances if there is a creamery near.

A. No; send the milk to the creamery; the farmer's wife has plenty of work without it."

Q. Can pure cream be obtained without the use of a separator?

A. I think so; but the chances are against it.

A. Mr. Woolley. I say not. Examine the dirt in a separator bowl after using, to prove it.

Q. How should cream be warmed for churning?

A. Miss A. Hollingworth. By setting cream can in hot water and stirring.

Q. What about butter color?

A. It depends on where the butter is to be consumed. Canadians want it colored while the English want it white. They use coloring at the Ontario Agricultural College dairy.

Q Is not whole milk better than skim-milk for starter?

A. Not if the skim milk is fresh from the separator. The fat in the whole milk is no help to the starter, and is wasted if you don't use all your starter.

Q. What do you think of using soap on dairy utensils?

A. It should never be done; you may use soda for wooden utensils. The best thing is to dip a wet brush in salt and scrub well.

Q. What are the main points to observe in putting up a dairy building?

A. Construct it so that the temperature can be controlled; have good drainage, a perfectly tight floor, so that no milk can get under, and every part of the building so that it can be easily cleaned.

DOMESTIC SCIENCE.

By Miss Blanche Maddock, Guelph.

Domestic Science means a study of nature's laws as they affect the home. A course in Domestic Science means giving our girls a thorough practical as well as theoretical knowledge of the requirements of the home.

We sometimes hear the remark that the girls in the home have advantages over the boys. While the girls are allowed the use of the best rooms and the freedom of the house generally, the boys are kept in the kitchen in the evenings until bed time, then sent up a back stairs to a bare room or attic. There is I believe a certain amount of truth in this. Are the girls as particular as they might be to make the home life pleasant for their brothers—or as particular to see that their brother's room is as dainty and pretty as their own?

On the other hand, if the girls have had some advantages in the home, when we come to educational privileges the boys have certainly had first place. Trace history back as far as we like, and we find that education institutions along every line were first opened to the boy, and the girl has only been allowed to enter after a great deal of earnest effort and determination.

We have at the present time Mechanics' Institutes and Technical Schools for boys. We also have an Agricultural College, where our boys and young men are taught the science and practice of agriculture in all its departments.

Then, if it is necessary to have a college for the purpose of teaching young men how to till the soil and care for live stock, is it not still more necessary that there should be some such college where our girls may be taught how to care for the home and for the loved ones in the home?

In the past, while it has taken years for our boys to learn a trade or fit themselves for a profession, our girls have been supposed to know how to do their life work by instinct. Perhaps this may be considered as an acknowledgment that girls are better fitted to take hold of any work and make a success of it. Or the idea may have been that anyone could do housework. However this may be, I think that in the past the mothers of our country have taken hold of the work with which they were intrusted—the care of the children and the making and management of the home—and have done their best with the chances they have had. Until now, we are all willing to acknowledge that there is no dearer place on earth to each of us than home. The home is the centre of the universe. Around the home all other interests circle. The Hon. Mr. Gladstone has said that the home was the foundation of the nation. Then do we not owe it to the mothers and daughters of our country to do everything we can to lessen the drudgery of their work, to make it easier and more pleasant, thus giving them more time for thought and self-improvement, so that they may be better able, as the home-makers of the country, to lay a safe and sure foundation for this great nation to rest upon

An American statesman has also said that "The hand that rocks the cradle, rules the world." Then is it not of primary importance that "the hand that rocks the cradle" should be strengthened and upheld in order that there may be given to the world a nation of boys and girls strong physically, morally, and intellectually. It is wonderful the effect which the physical nature has upon the moral and intellectual natures. For instance if we feed a child solely on one kind of food it tends to make him dull and stupid. While if we feed him solely on another kind—such as strong meats, especially when not properly cooked—it tends to make him cruel and vicious.

We know that this is also true in regard to the feeding of animals. If beef cattle are required they are fed along one line, while if it is desirable to increase the quantity of milk they are fed along another line. Practical farmers know that they can do almost anything with their live stock, if properly cared for while young. In the past, in a great many cases, more attention has been paid to the young stock in the barn than to the young children in the home. This is not because of carelessness on the part of the mothers, but because, in the past, women have not had the opportunity of studying economic feeding and proper ventilation for the home, from a scientific standpoint, as men have had the opportunity of studying these subjects for the farm.

Now however, schools for this purpose are being established in many parts of the world. In Great Britain, Germany, Belgium and in parts of the United States, Domestic Science Schools have been established with very gratifying results. The subject is also being introduced into Canada, and it only remains for our people to awaken to the need of such teaching and demand that it be taught in our schools and colleges.

As to the best method of introducing Domestic Science, there is a difference of opinion. But the main thing is to look into the subject and be prepared to act intelligently when the time comes. Let us not be satisfied with second class work in the home any more than on the farm or in the factory. Generally speaking there are three main principles taught in these schools: first, Cleanliness; second, Method; and third, Economy. Perhaps some gentlemen may say, "Surely the mothers who have been housekeepers all their lives are able to teach their daughters these things at home without going to a school or college to learn them." Of such I would like to ask, why do you send your son to college to study farming; you have been a farmer all your

life, why not teach him at home? Is it not because you realize that farming has become a science; that it is necessary to send your son to college to study different methods of farming, methods which you cannot teach him because you have not had the opportunity of learning them yourself? It is just the same with the mothers in the home. Housekeeping, too, has become a science.

Cleanliness is studied in its relation to health, and to these bacteria or micro-organisms which we hear so much about at the present day. Then the different *methods* of ventilation for the house and preparation of foods, and the reason why these methods are best, are carefully studied. In regard to economy students are taught not only how to carry on the home as economically as possible, and the art of making a little go a long way, but they are also taught how to spend money wisely. Economy does not merely mean the saving of money wherever possible—it certainly does mean this—but it also means the wise expenditure of money, or the procuring of the largest equivilent for the money spent.

Of course as well as teaching cooking and house work, from the cleaning of pots and pans and the cooking of the plainest meals, up to the adorning and beautifying of the house and preparing of the daintiest dishes, sewing in all its branches are taught; it is often surprising to find how very little the average school girl knows about sewing. Think of the money it would save if the daughter of the house were able to make their own, as well as their mother's dresses.

Then again a course in domestic science fits young women for many lucrative positions right in their own line. We sometimes hear the remark "that women are taking all the positions away from men." This may be true, and they will continue to do so until men (rate payers, school trustees and others) see to it that suitable instruction be given girls in order to fit them for positions in their own line of life.

We cannot deal with every branch of domestic science in this paper, but I would like to bring out a few points in regard to food and its preparation.

Food is for three purposes: first, to supply the waste which the body is continually undergoing; second, to supply heat; and third, to give energy and force to the body. For these purposes fresh elements similar to those of which the body is composed must be supplied; these can only be supplied through digestion. They are divided into three classes: the nitrogenous or muscle forming elements, the fat or heating foods, and the carbohydrates or starchy foods.

The body might be compared to a highly organized machine capable of doing wonderful work, but like that machine it must be kept in repair and supplied with oil and running power, so to speak. Any food that will do this is considered a perfect food; but as we have very few of these perfect foods, we must combine different foods in such a way that they will contain these elements in their proper proportions.

In the warmer regions of the world these human machines of ours do not get the wear and tear that they do in the colder climates and therefore do not need either the heating or the repair foods. How wonderfully mother nature has supplied the requirements of her children in all parts of the world. Take the people of the tropics. We find there, on account of the high temperature of their climate, that they make very little physical exertion. Therefore the waste is small, and consequently we find them supplied with cereals and sweet fruits such as rice and millet, dates and bananas. As we come farther from the equator, we find the people adding a little fish and fowl to their dietary. Thus the food changes with the climate, until we find the people away up in the Arctic regions living almost entirely on seal and blubber, these foods being necessary to generate heat. But what about our own climate, who could give the dietary for the temperate zone? I think we cover the whole bill of fare from the fruits and grains of the tropics to the fat and heating foods of the Arctic circle. True, we do not eat seal and blubber, but when we realize the amount of fat pork which we consume during the year we are not so far behind. In this country, supplied with every facility as we are for importing foods from other countries, it is absolutely necessary that our housekeepers should have some scientific knowledge of the chemistry of foods, in order to make proper combinations and selections. All that is necessary to do is to follow the laws nature has laid down. In the summer time use more of these cereals and fruits, and generally speaking, less meat. Then as the cold weather comes on use more meat and strengthening vegetables; such as, peas and beans.

Then again, a person's occupation should be considered. A man working indoors does not need either the heating or the repair foods that the man engaged in active outdoor work requires. In this connection fish is an admirable food. We sometimes hear the remark that school children and students should use plenty of fish in order to build up the brain. Correctly speaking fish is not a brain food; nevertheless it is an admirable food for students, or any one leading a sedentary life, because it contains nitrogenous and carbohydrate foods in a sufficient quantity for the exertion which is made, but not in too large quantity. A great deal of the dyspepsia that is so prevalent with people in stores and offices at the present time is due to eating too much strong meats, such as, beef and pork, which require physical exercise to digest them readily.

We have seen that the elements necessary to build up the body are nitrogenous and carbonaceous foods. These must be supplied in their proper proportions, as too much of one kind of food is as bad as too little. It is estimated that a working man should use about one-sixth

muscle-forming food to five-sixths fat and heating foods. But in the absence of scientific teaching as to the chemistry of foods, how are we to know when we have these foods in their proper proportions? Before we can prepare properly balanced meals it will be necessary to know to which classes the different foods belong. It is impossible to lay down any hard and fast rules, as nearly all foods are made up of all these elements, only in different proportions; but generally speaking, lean meats, peas and beans, and cheese belong to the nitrogenous class; fats of all kinds, vegetables and cereals belong to the carbonaceous class; while milk, eggs, and bread and butter are fairly balanced foods in themselves. Fruits are an admirable food, not so much for the elements which they contain, but as relishes for other foods, thus helping digestion.

Then the principle laid down for all meals should be the proper combining of these nitrogenous and carbonaceous foods, while at the same time taking into account the season of the year and the occupation of the family.

If housekeepers understood the chemistry of these foods sufficiently to combine these elements in the most economical as well as nutritious manner, they would soon save to the community the cost of one of these domestic science schools. In this way we have seen that beef and other lean meats are largely nitrogenous, that peas and beans are equally so. Then would you not receive the same strength and nourishment from a pound of beans costing about 2 cents per pound than you would from a pound of steak costing 10 or 12½ cts? Again, if the making of nutritious, dainty dishes from cheap meats served with different sauces was understood, a wholesome, appetizing meal could be gotten up with meat costing six or seven cents a pound, instead of paying ten or twelve for roast or steak.

Now as to the need of a variety of food: We may have all these elements in their proper proportions, but if the same foods are used day after day, prepared in exactly the same manner, they have not nearly so good an effect on the system. In this country we have a large variety of foods within the reach of everyone, if a little thought and judgment were exercised in procuring them.

In conclusion, just a word as to the manner of eating. Some people have the idea that if they eat a sufficient quantity of food that is all that is necessary, quite regardless of the manner in which it is served. This is a mistaken idea. The dainty serving of a meal is a very important point, not only because it has a great influence on the behaviour and manner of the children, but it is a recognized fact that an appetizing, dainty meat excites the salivary glands, the saliva then flows, more freely causing a more complete digestion of the food. We have sometimes heard people say that their mouth watered at sight of a certain dainty; this actually takes place. Thus the benefit derived from the foods we eat depends largely on the manner in which they are served as well as on the kind of food and manner of preparation.

LABOR.

By Mrs. W. Purvis, Columbus.

"Labor," "Achievement," was the great Roman motto, and the secret of her conquests. There came one mightier than Rome, Cicero, or Aristotle, whose magnificent life and example forever lifted the ban from labor and redeemed it from disgrace. Christ did not say "Come unto me ye refined and cultured, those nursed in the lap of luxury and wealth"; but He did say "Come unto me all ye that labor and are heavy laden." It was not without significance that the Creator concealed our highest happiness and greatest good beneath the sternest difficulties and made their attainment conditional upon a struggle for existence. Depend upon it, there is something radically wrong about that young or older woman who looks upon manual labor as degrading. A noble womanhood will lift any legitimate calling into respectability.

It is manhood—womanhood—nature is seeking; it is as Burns would say, the man or the woman with the guinea stamp upon them. Ages were spent in preparation for the coming of this noblest production of a divine mind; for manhood—in that broad sense which includes his sisters—centuries have been rifled and the universe is placed at his disposal. Look where one may, is it at the bud which speaks of flower and fruit; is it at the acorn which speaks of the oak, the king of the forest, or is it at the sleeping babe, one and all speak of development. Nature assists the wee toddler to her feet, not so much that she may walk but that she may thereby be developed; when this feat is accomplished butterflies and beauties are presented that she may still walk? Oh, no! but that she may run. And the development proceeds to womanhood, rising ever forgetful of past attainments and difficulties. An allwise Providence holds the rarests gifts high so that those who would win must ever labor, climb, develop and achieve. It is the perpetual attrition of mind against mind that rasps off the rough edges of unpractical life and gives rotundity and polish to character; teaching, patience, perserverance, forbearance and application, which broadens into method and system by which the best possible labor fills each day and each hour. Labor quickens the power of decision, which is the real difference between practical and unpractical humanity.

This Women's Institute is, to go back to my homely illustration, little more than the wee toddler just feeling its feet beneath it, with a limited muscle and brain power, and an unlimited field in which to labor. These meetings will be productive of most good as we feel the attrition of mind on mind, each bringing their needs as well as their best things, meeting upon the broad plane of sisterhood, helping and being helped.

Now I have arrived at my hobby, and it is that women should read. Do not think it a waste of time, for while reading, two things are accomplished: the rest builds physically, and the reading builds intellectually. Read in order to keep pace with the times, for be you a sister, wife or mother, you will be the better able to control, help or direct a brother, husband or family.

There never was a time when good books could be had at so small a cost—when it was within the reach of all to sit at the feet of great thinkers, and with a Scott or a Dickens enjoy the flights of imagination, or with a Drummond, Murray or Sheldon solve the deep and ennobling, problems of the "Life that now is as well as that which is to come." Or with Him who was the most profound of all thinkers, walk "beside the still waters" and be refreshed, or "rest in the green pastures" and receive strength, or look away to the "hills from whence cometh my help": Help! did I say? Then I am not laboring alone for "He is my help and my shield."

United with the Omnipotent let us climb, expand, achieve, and do so by lifting others to a higher plane, and opening wider the doors of narrow lives.

BOOKS—THEIR PLACE IN THE FARMER'S HOME.

By Mrs. Wm. McK. Shields, O'Connell.

Success in her calling is, or ought to be, the aim of every woman, be she farmer, housekeeper, doctor or lawyer. One's success depends very largely on oneself. One woman's work may be excellently planned all through; she has formed an idea of what she intends doing, has thought it out, and she works accordingly towards a successful issue: while another woman has perhaps no idea at all of arranging her work, but simply does whatever she happens to think of, with the outcome that nothing is done *as* it should be or *when* it should be, and consequently results are disappointing. The world is full of both kinds of people, and these wise and prudent, look-ahead, go-ahead farmers' wives and daughters should be encouraged to go on from good to better and up to best; and the easy-going slovenly housekeepers ought to be aided likewise, made to see their distance behind the times, and helped along by advice and example.

The home has a good deal to do with a farmer's success in business. Given a comfortable, tidy home, well and economically conducted by a sympathetic helpmeet, surely, there is more chance of getting on in life than if everything in the house was allowed to go to ruin through neglect or carlessness. But most of our rural homes are comfortable enough, though we must remember that *comfort* is a relative word. What one family would deem comfort would be luxury to another household; or what to one farmer's wife might be pleasing in the home life, would be to her neighbor simply unbearable.

One thing is lacking in many of our Canadian country homes,—I say, in *many*, fortunately not in *all*,—and that is literature. Into how many homes may one peep and fail to find even a solitary book? We may search and search and find the library—nowhere. Perhaps we may exhume a dusty, musty old copy of "Pilgrim's Progress" or "Baxter's Saints' Rest"—(excuse us, Messrs. Bunyan & Baxter!)—but that is about all the stock-in-trade. Now a farmer and his family cannot nourish their minds on this sort of literature alone. It must be supplemented by reading of various kinds, agricultural literature particularly. A physician studies medical works to keep up with the times. A lawyer pores over his lawbooks. And why should not we farmers give some time to studying our business too? We have as much need of these helps as any other one. There are so many things we ought to know about, such as farm chemistry, the feeding of animals, dairying, poultry-raising, weeds, birds, etc. The list is almost endless.

It is not only our duty to become acquainted, in some degree, with those subjects; but we are highly privileged in these days by having such an array of interesting reading offered to us. What a help it is to a family to have those Farmers' Institute Reports, Bulletins, etc., coming to the house! What a quantity of pleasant and useful reading! There is something in them for each member of the family. They form a large item in our farm education. Then there is no lack of agricultural magazines and papers appearing periodically—these contain a fund of information for us. And besides, when we are in a quandary as to how to act in certain circumstances, we are encouraged to tell our difficulties to the publishers who have always some authority to help us over the obstacle. Many of us can testify to help obtained thus, and it is a grand thing to live in an age such as the present, when things are made so plain for us, and we are encouraged to seek such help.

Not one of us knows so much that we cannot learn more. Those who will not subscribe to an agricultural journal of any kind, "because we know it all already, having farmed all our

lives," will soon find themselves in the background. "As our fathers (and grandfathers) did, so do we," is their motto. They forget that the world is round and moves unceasingly, and that they cannot stand still, but must move too, and the way to keep abreast with the times is to keep in step and not fall behind. What suited our ancestors may not, nay, *does* not suit us! The flail and the dash-churn are things of the past. They were good things once; but we know of easier methods now, and can save both time and labour by our superior knowledge. Take dairying as an example, because that is a subject which closely touches us women-farmers. Probably our great-grandmothers toiled at the old dash churn and made good butter too. But if they lived to-day they would gladly consign that instrument of "hard labor," if not of "torture," to the flames, and invest in a modern buttermaker. They would, besides, read up all the information on the subject issued by the Ontario Agricultural College, and so learn a great deal which they never even dreamed of. Their butter-making would be conducted scientifically and intelligently and certainly much more easily. This is one of the results of reading about dairying, and we may profit equally as much by studying other branches of our work.

What we women want is a great thirst—not the kind of thirst that *some* people are afflicted with—but a thirst for knowledge. Let us read, read, read. No doubt we should like to have far more time for reading than than we can spare; but every minute counts, and it is wonderful how much one may learn at odd moments. Read the newspapers,—there is always a "farm" column there,—some little thing may be learned and stored in the memory for future use. A man once said: "Read? I've no time for that. I never read a book, and I know nawthin' about this here war. I hain't got no time." Poor, poor man, and likely to remain poor. More like a specimen of the lower order of animals than one of the "lords of creation."

We farmers ought not only to read what interests our business most; but we should know what is going on in the world of science, of letters, and so on, and also what is happening all over the world. Certainly we cannot be intelligent if we do not try and know at least a little of outside affairs. Especially in the long winter evenings may we have many an hour for mind-improvement. Reading aloud is a good way, for then all the family may be benefitted. The goodman or one of the boys may read in turns, and the ladies may listen, while using their hands as they know so well how to do. By all means we must encourage the boys in reading good books. They need not all be agricultural books, for that might make the boys disgusted after a time with the whole thing and cause them to leave the home "for pastures new" They are the farmers of the future, and must be encouraged. Let their reading be mixed and varied, and they will relish it far better. There are so many attractive books for boys now-a days, —written by men who know boy-nature thoroughly—Ballantyne, Henty, Jules Verne, etc. Some farmers are so situated that they may enjoy books from a public library, and what a boon that is! Others again are not so blessed; but there is not the slightest excuse for us remaining in ignorance. If we are to succeed we must read. Read the experiences of a sister-farmer, avoid her mistakes, and profit by her successes.

One advantage in reading is, that if we are in difficulty, and at our first spare moment hunt up what some authority says on the subject, we shall find our way clear, and know just what to do; and next time the same thing happens we shall be wiser than before and not commit the same mistake. These silent advisers—books—are the best and truest guides. We might consult a neighbor; but she might be more ignorant than ourselves, and lead us into errors greater than at first, and possibly retail our failure as a choice bit of gossip to the next person she meets, and our feelings might be hurt by and bye when we hear a highly amusing and extravagant account of our doings. Applying to books will save this—*they* never ridicule when consulted.

One thing to be avoided in our reading is *superficial* reading—reading with the eye alone, and not with the intellect. We may read tweny pages of a book and next day be unable to remember a single idea. Such reading is useless. One idea read and remembered every day, or even every week will amount to quite a nice little store of knowledge in a year, and this is the kind of study that makes us wise. It was Dr. Samuel Smiles who said, "The most profitable study is that which is conducted with a definite aim and object. By thoroughly mastering any given branch of knowledge we render it more available for use at any moment. Hence it is not enough merely to have books, or to know where to read for information as we want it. Practical wisdom, for the purposes of life, must be carried about with us, and be ready for use at call. It is not sufficient that we have a fund laid up at home, but not a farthing in the pocket; we must carry about with us a store of the current coin of knowledge ready for exchange on all occasions, else we are comparatively helpless when the opportunity for using it occurs."

Therefore we must be systematic in our reading, and use it to improve our thinking power, and thereby we shall find our success in life greatly helped by our proper use of those every day things called books.

THE USE OF NATIVE TREES AND PLANTS FOR BEAUTIFYING THE FARM HOME.

By Miss Alice Hollingworth, Beatrice, Muskoka.

When I am going through the country I always look at the surroundings of the farm homes and judge the farmers accordingly. I believe most people do the same, so when you go home take a good look at the place, and ask yourself where you would be likely to stand in the public estimation.

Keep the Place Neat. I have seen many beautiful farm homes that are all that could be desired; but I have seen many more dreary, homeless-looking places that I would be ashamed to call my home. There is no excuse whatever for this. Poverty cannot be pleaded, because in the country Nature takes the place of money, and provides all that is necessary to make beautiful surroundings. To begin with, it is no trouble to find a hole in which may be buried all the old boots, broken crockery, old tinware, and all such garbage which cannot be burnt. Yet how many door yards are disfigured with these unsightly objects! I do not mean to say that farmers are any worse than townspeople in this respect. I do not think they are; but I want to see the country leave the town far behind. Many farmers have nice wire fences to their gardens which are a credit to them; many, again, have fences that are *not* a credit, and if they cannot afford the wire, they might, at least, nail up the loose boards and make it tidy. I am glad that many farmers know the value of our native evergreens, and plant them around their buildings. Too many, however, make the mistake of getting them too close to the house. This prevents a free circulation of air, and shuts out the sunlight. Some people who have not the trees to cut off the sunlight foolishly keep the blinds down, as if carpets and furniture were of more value than their own health. Sunshine is our best friend, and a foe to disease, so give it free access to every room.

Plant Trees and Shrubs. There is nothing handsomer than a well kept cedar hedge, and cedar is common, I believe, throughout Ontario. Or, if you think you have not time to keep it properly trimmed, put in a row of sumach; they need no care at all, and the brilliant red to which the leaves turn in September lends a charm to the humblest cottage. The maple is also worth planting, both as a shade tree and for its beautiful autumn colors. Mountain ash, wild plum, poplar and Balm o' Gilead can be used with good effect and are easy to obtain. The nurseries cannot supply you with anything more ornamental than our own balsam, pine and spruce trees, which can be gathered by the dozen in our own wood, and grow better with less care than the nursery stock. I find that the wild rose, American haw'horne and viburnum take kindly to the garden and add much to the general appearance.

If you have not these in your locality you have others that will do as well. Nature has planted with a lavish hand, and it is a shame for any home to be destitute of these attractions when you can have a first-class shrubbery, and all that is necessary is determination, good muscle and indifference to torn clothes and bruises. Of course if you can buy the nursery stock and pay someone to do the rough work, so much the better for you; but my remarks are to the many who excuse their cheerless homes with the plea that they "can't afford" such luxuries.

How to Secure Pretty Vines. Suppose your house is only a log building! All the more reason why you should work the harder to improve its appearance. Go to the woods again, but this time follow the course of the creek, and before long you are sure to find some of our native vines—the Hairy Honeysuckle, with its heavy bunches of orange-colored flowers, or the dainty wild clematis, which uses its leaf stalks for tendrils in clinging to whatever supports it, and bears a great mass of pretty white flowers, and the leaves remain green till late in autumn. Some people have an erroneous idea that this is poison ivy. The Virginia Creeper may be found on rocky hills, and you cannot have anything better to plant around the house, as it grows rapidly, has rich, abundant foliage and its autumn colors are magnificent. If you have no nice trellis or even verandah posts to twine your vines on, don't fret about it. It you can procure the services of a boy with an axe do so; if not take the axe without the boy and cut down some nice straight saplings, trim off the branches and wire the tops together; then dig deep holes each side of your garden path, insert the base of the saplings and pack around with stones and earth. This will give you a rustic arch, which, when covered with vines is a thing of beauty and a joy forever. Don't give up in despair because some of your transplanting is a failure. Many a bonfire have I made of dead trees, and then gone to the woods for more, till now every desirable spot is filled with trees and shrubs, and the vines, instead of being coaxed have to be cut back or they would soon form a solid wall around the verandah. Flower seeds are so cheap now that 25c will give you a good variety, if you ask for mixed colors. But in the absence of the 25c—go to the woods. There is nothing prettier than the wild Columbine with its deep red and yellow blossoms or the pink and yellow flowers of the Corydalis—half brother to the Bleeding Heart so common in our gardens. Both of these grow on rocky hills, and transplant readily. Then there are the blue, yellow, striped and white Violets, which will grow in almost any soil; and ever so many more if you will only look for them. I have a friend in Australia with whom I have exchanged botanical specimens, and she is

so delighted with our beautiful Canadian flowers that last fall I sent her the seeds of sixty different kinds, and she is trying to grow them. The rockery and pyramid look well in a garden, if you can do them justice, but they require so much watering that I have discarded both. Small flower beds cut in diamond, star and crescent shapes on the lawn are very tempting to the artistic gardener, but should be indulged in sparingly by those who have much of other work to do, as the surrounding grass roots fight most persistently for possession. A vine-covered summer house in some odd corner is a real luxury, and can be made with poles driven into the ground and cedar branches woven in and out like basket work. Of course it requires four stout corner posts with crossbars top and bottom. The roof can be made the same as the sides.

Rustic Garden Seats and Flower Stands. These are things that the city people are glad to get and pay well for, while we have the material right at hand. Cedar is the most commonly used ; I think it is the nicest and best. Its habit of growing on rocky hillsides gives the lower part of the young trees natural and graceful curves which can be utilized to great advantage, while the long pliant branches bend so readily that it does not take much skill to make a good-looking seat. I took the photograph of one for my model. It is four feet long, the legs, arms and back are made of the curved stems of young trees. For the bottom I cut short lengths and split them in two, nailing them flat side down on the two 4 ft. cross pieces.

Now the butter tub is out of use in dairy do not let it fall to pieces in the wood shed. Split up some pieces of cedar, birch or black ash, as you prefer, cut them the length of the tub and nail on, fill it with soil and you have a becoming receptacle for a Century plant, Hydrangea or large Cactus. If these are lacking the woods will help you out again by furnishing you with lovely ferns ; a large Royal Fern is best for this purpose. For holding a group of smaller ferns we covered a shallow box about twice as long as wide with cedar bark and mounted it on a firm trestle of cedar poles. For many years my bed room window was shaded by a tall poplar tree, but evil days befell it and the poplar died. We cut it off about two feet from the ground and on the stump we fastened a cedar covered box, wider at the top than the bottom. Each spring I fill it with ground ivy, and set a potted geranium in the centre. We have also moveable flower stands for parlor, ivy, etc.

Decorating the Home. Furnishing a house without money is not so easy as furnishing a garden ; still it costs nothing to be clean, and that one item goes a long way towards producing comfort. In a clean house a few dainty touches look far better than a whole array of bric-a-brac untidily kept. Many things both useful and pretty can be made with the bark of the paper birch and ornamented with porcupine quills, which must be scalded just before using. You may dye them with Diamond dyes if you prefer them colored. Draw or stamp your design on the bark. Use an awl to punch holes for inserting the quills which are arranged the same as stitches in embroidery.

If you will only use your eyes you will find any amount of wild grasses which will retain their natural colors if dried in small bunches in the shade. I gather them every summer, also the native everlastings. In addition to these I cultivate bright colored everlastings in the garden. Then I press a liberal quantity of ferns, small vines and autumn leaves. Just before snow falls I take clothes basket to the woods and fill it with the different species of Lycopodium, my favorite being the little tree-like plant called "ground pine" which grows about six inches high and has spreading, fan-shaped branches covered with small green scales. There are other species in the form of vines, they are all evergreens and look almost as well dried as fresh. So does the "Prince's Pine" with its dark glossy leaves. These I throw loosely in a barrel till Christmas festivities draw near. Then out comes my summer's harvest, the ground pine is mixed with the fragrant brush of balsam, pine and cedar, and made into light wreaths for doors and windows. The ferns, vines and autumn leaves are arranged in panels and festoons on the walls. The grasses, flowers, prince's pine and a little ground pine are made into bouquets, with the result that the house looks as if summer had stepped in for a visit, and when the candles are lighted on the Christmas tree, the little children who gather round think there is nothing in the world so good as Christmas day at Grandma's. And they are right. Happiness is not a question of money. Life's richest gifts are the associations that gather round a happy home. Such gifts, every farmer may bestow upon his children if he will try, and in so doing I think he will solve to some extent, the problem of how to keep the young folks on the farm.

HOW WE MAY LESSEN OUR HOUSEHOLD LABOR.

By Mrs. James Gardner, Kemble.

I have often wondered how it is that so often the farmer's wife, when she comes to middle life and should be in her prime, is a miserable, broken-down wreck. I have oftentimes wondered what is the cause, and what is the remedy. The cause, I am quite sure, is too much work, too much worry, and too much monotony. Too many of us have fallen into a rut, and go on

from year to year, as our grandmothers did before us, without one thought as to how we might lighten our labors or improve our condition : just trying to live up to that old rhyme : "Man's work doth reach from sun to sun, but woman's work is never done."

The great question among farmers' wives to-day is, How may we lighted our household labors ? Of course some may say that is quite easy to answer. By purchasing better kitchen utensils and more of them, or by remodelling our kitchens to save steps and make them more convenient, or even lessen the number of hired men to cook and work for ; but these things may not be practical to some, and not even within the means of others to do so just at present. But something should be done to extinguish that epigram :

"Man's work doth reach from sun to sun ;
But woman's work is never done.'

I don't think the author of that was a woman ; it must have been a man. Someone on a dry, hot day, in longing for six o'clock hath said : "Man's work doth reach from sun to sun," then being of a poetic turn of mind thought it would be easy to compose something to rhyme with that so said: "Woman's work is never done." Or perhaps his wife may have been an invalid, or even not a very capable person, but why should we all be blamed for that ?

Well, how may we lessen our labors, that we may at least appear to have things done up ? I do not think that it was ever expected or intended that everything should be done in one day. Our husbands do not prepare the soil nor sow their seed in one day, nor gather in their harvest, nor is it expected of the housewife to can all her fruit in one day because it would be impossible ; it is not ripe ; nor to finish all the family sewing in one day, the family are not prepared to wear it. Well, my dear sisters, do not think I am going to set myself up as an example or pattern for others to go by, but we all know that there are few of us so efficient in any line of business that there is no room for improvement, for there are a few ways and means that are within the reach of us all that may lessen our household labor to a great extent. One plan is to have a little better order in our homes, if possible. Let us all try, with the assistance of our households, to have a place for every thing and every thing in that place, as far as convenient. How often do we see valuable time lost, and a room put to such disorder that it would require nearly half a day to put things in their place again, searching for some missing article that had been carelessly mislaid.

Then another means of lessening our household labors is to dispense with so many fancy pies and cakes, which take us so long to prepare and such a short time to devour. These are very nice in their place at parties weddings, socials and things of that kind, if the girls like to prepare them, but to the average farmer's wife these are not a necessity. Good, plain, wholesome food, well cooked, and plenty of it, is the demand of the farmer's table. The same may be said of our sewing. We spend far too much time at the sewing machine sewing up white stuff into innumerable tucks and frills ; then the number of changes we have to have of these things ; and the amount of time that must be spent over the washtub and ironingboard to keep them presentable, and we all know that that is hard work, when some bright-colored material plainly made would answer the purpose just as well, and in nine cases out of ten give far more comfort to the wearer.

Then we might lessen our labors some by a little better management, if that were possible. We each know what we are capable of and what our strength is, and we all have a pretty good idea of what is expected of us ; then, by intelligent calculation for the saving of time and steps as far as possible, let us consider what we may accomplish ; then, by energy and perseverance finish the tasks we have allotted to ourselves, and not get in the habit of little by little falling behind ; then when the unexpected or sickness comes, where are we ? Let us try not to spend the whole of our lives in our kitchens in a ceaseless rub and scrub and scour. I know the model kitchen is nice to read about, with its spotless floor and shining stove and tinware that looks like silver. I think I have seen some of them. They would be nice to sit and read in, or even to entertain company in ; but I would rather be excused than be asked to get up and go to work in some of them. Of course being particular and economical about small things is to be commended in all ; but if these things can be obtained only at the expense of valuable health and strength and often at the discomfiture of the whole family, better let them go. Better that our children should remember a mother with smiling countenance and happy face, with time to assist them in their studies or chores and childish amusements, than the owners of the blackest of stoves or the most highly-polished tinware, with bent frame and toil-worn face, and too often an irritable disposition.

Another means of lessening our labors that is really both pleasant and profitable in the end is to to take the stitch in time that saves so many nines. I had an excellent example of that in a girl I had living with me once. The missing button was replaced at once, and the small rent was mended before it became a great big hole making the garment about useless or defacing it for ever.

Then another helpful and pleasant means of lessening our labors to a great extent is to subscribe to not one but several of the women's papers that are published. The Ladies Home Journal is among the best of these, and should be in every home. Then there is the Farmers' Advocate, although I do not think the Minnie May Department has improved much of late ;

then there is the Housekeeper, a magazine whose chief aim is to obviate the labors of the progressive housewife. The page called the Economy Club is well worth the subscription price. Of course we may not care to experiment on all the suggestions offered, but still it is helpful and comforting to read and know of thousands of toiling women like ourselves whose duty 'tis to feed and clothe a nation whose "Empire is mightier than has been." I was much impressed not long since by the unconscious influence our reading has upon us. I had always lived on the farm and always found the Poultry Notes, Dairy Department and Dairy Bulletins quite interesting, until a few years age my husband got a man on the farm, and kept one of the village stores for three years. Then, little by little I fell into studying the pages of the Metropolitan, Delineator, the Grocer or Dry Goods Review, and before the three years were up I took no more interest in an agricultural paper than I did in reading politics ; but when we went back to the farm, the papers belonging to the business were left behind. Well, before one week I could not think what was the matter. I felt I had nothing to read, being without the one and losing interest in the other. We cannot hope to improve if we do not keep up our reading along the line of our present occupation.

Of course some may say that these things are only trifles, but who will deny that "trifles make perfection, but that perfection when once gained is no trifle."

So let us try, by all the ways and means that are within our power, to get time to brush our hair and hang up our kitchen aprons once in a while, and be able sometimes to attend a lecture or meet our neighbors in a social way, so that our husband may conclude that we, at least, must be an exception to the rule—

"Man's work doth reach from sun to sun,
But woman's work is never done."

FOOD AND ITS FUNCTIONS.

By Mrs. M. J. Rogers, Kinsale.

To the casual observer the subject of food and its functions does not at first appear to be a very deep or intricate one ; but upon a little closer observation we find it to be more so than we supposed ; and to very many of us it is as yet an uncultivated field of scientific study.

Although the preparation of food is one of the oldest of the arts, cooking as an applied science is still in its infancy, and only within recent years have any serious attempts been made to place diet and dietetics upon a proper scientific foundation.

Based as it is upon physiology and chemistry, it is impossible to secure the rational treatment of food without at least a slight acquaintance with food stuffs in general, with the chemical and other changes induced by cooking, and above all, with the subsequent course of the food within the body itself ; but of the majority of us it may be said, and without slander, that we are concerned not so much with the history of the last meal as with the prospects of the next

We find upon a little examination into the subject that our bodies contain a heat and energy producing apparatus, and that food is the fuel which supplies it with the necessary power.

The human body may thus be likened unto an engine, and like all other engines produces heat and work, but it differs from all other engines in this important respect—that it is continuously self-repairing as well as self-adjusting, and obtains the materials from the fuel itself.

The very best steam engine gives out in the form of work only one-eighth of the chemical energy of the fuel consumed, the remaining seven-eighths being dissipated as heat, while the body produces one-fifth as work and four-fifths as heat. Thus fuel for fuel the body generates nearly twice as much as the best steam engine. This gives us some idea of the amount of work performed by the system, and of the necessity of using the right kinds of food that the energy or power may be supplied to perform it.

Just at the present time we cannot hope to go into this important subject to any very appreciable extent ; we may only, as it were, touch upon a few of the most common of every day food stuffs, and endeavor to learn somewhat of their composition and of the function of each in the human system, and by which of them the body receives its most needed nourishment that it may be fully prepared for the tasks for which Nature has designed it.

As we have learned that the body is composed of various gases such as carbon, hydrogen, nitrogen, oxygen, etc., and that it demands supplies of all these to keep it in a good condition of health, the next step is to determine in what way that demand is to be met. Nature has provided at least two perfect foods, eggs and milk ; that is, they contain all the necessary nutriment in proper proportions.

In other demands of the adult body not supplied by these, as in cases where the body is deficient in iron or lime, it is well to follow Nature, and to supply the deficiency from vegetable sources. Humiliating as it seems, we feed at second hand. Plants alone can draw their food directly from mother earth. Animals are all dependent upon the tissue already formed in plants, and carnivorous animals have to draw their supplies at third instead of at second hand.

Man has been defined as the cooking animal, and with the exception of a few savage tribes all races find it necessary to prepare their food by cooking in some form. And in order to prepare food for digestion, and also to increase its attractiveness of appearance and of flavor, it is cooked in various ways ; but, as notably in the case of the egg, we find that the manner of cooking makes a very material difference in its nutritive function, as overcooking injures it to a very great extent.

We will now turn our attention to the subject in hand, "Food and its functions." First, by dividing it into three classes, nitrogenous, non-nitrogenous and mineral. These are again divided into five classes : Proteids, fats, carbohydrates, salts, water. The function of each class in the body is described as follows :

1	2	3	4	5
Proteids. Formation and repair of tissue.	*Fats.* Supply fatty tissue, energy and heat by oxidation.	*Carbohydrates.* Supply energy and heat by oxidation, and fat by reduction, also preserves the alkalinity of blood.	*Salts.* Various uses; help to form bone, muscle, gastric juice, etc.	*Water.* Various uses ; helps in formation of tissue ; its action is solvent.

The first and most important class of foods are the proteids or albuminous foods ; as a type of these we may take white of egg which is almost pure albumen, with a little water ; on heating this, as in boiling or frying, the albumen is coagulated into a white opaque mass. This change is characteristic of nearly all proteids, the majority of them coagulating at about the same temperature—163°F. This property is utilized in the various processes of cooking meat, and will be found useful in retaining the flavor and juices which by the ordinary methods of cooking are wasted.

By subjecting a roast to a strong heat to begin with, the albuminous materials are coagulated on the surface, forming a complete rind within which the juices of the meat are held. The temperature is then lowered, and the process completed by actually boiling the meat in its own juice. When the object is to extract from the meat as much proteid matter as possible, as in making soup or beef tea, the temperature of the water is kept just below the coagulating point, say 151° to 167° (water boils at 212°F).

Raw meat yields most of its extractives in water if finely minced and immersed in it for several hours at a very gentle heat, say 163°. Beef tea when made thus with great care contains as much as 6 per cent. of the nutritive material of the meat, while as usually made it contains only 1½ to 3 per cent., the heat employed being far too great, inducing coagulation of the albuminous matters instead of extracting them. The various extracts of meat are produced on this same principle ; but it is a very great mistake to suppose that they are foods in the sense of supplying materials for the maintenance of the body, and this error has led to death by starvation in very many cases. Beef tea is useful only as a stimulant or tonic and as an adjunct to other more nutritious foods. We will now discuss a few of the principal foodstuffs most in common use ; the first on the list is :

Animal food. That term is used to denote the flesh of animals used as food. It contains the ordinary constituents of muscle, fat, etc., 75 per cent. of which is water and about 20 per cent. of proteids. Fat meat contains a greater store of energy and heat than lean, and is more suitable for those who have to work hard or for very cold climate. Fats contain about 80 per cent. of carbon and 10 per cent of available hydrogen ; thus they stand first among food stuffs in respect to heat and energy obtained. All foods are heat-givers in so far as they are the subjects of direct chemical action ; but the name is more applicable to the fats on account of their greater value as a body fuel.

Of all animal foods *Beef* stands first, both as regards its consumption and nutritive qualities. It is at its best when got from an ox four or five years old, and varies in quality according to the part of the animal used. (This must have been the English man's idea of beef, as our beef rings here prefer the meat of a two year old animal.)

The next on the list is *Pork*. The pig, though properly a vegetable feeder when in its natural state, and not nearly so dirty as is proverbial, is under its present conditions, a most miscellaneous feeder, often on very questionable materials ; and hence pork, more than any other animal food is said to be responsible for the introduction of parasites into the human body ; but under right circumstances and proper feeding the flesh is very nutritious, sweet and wholesome, though perhaps harder to digest on account of its fat than some other meats, and proper cooking will destroy any parasites that may be present from its improper feeding and surroundings.

Mutton is usually much fatter than beef, while its fat is harder and more solid. On this account it often disagrees with those of delicate stomachs. The muscle fibre is shorter than that of beef, so is more readily digested. Mutton fat or tallow is known to possess very healing qualities as a salve for burns, scalds or old sores.

Fish as a foodstuff contains a large proportion of water and a varying amount of fat and flesh-forming matters. A too exclusively fish diet is said to cause affections of the skin, and to

predispose to leprosy. Fish is not so satisfying or so stimulating as animal flesh in general, but it is readily digestible, and therefore very suitable for persons of feeble digestion with whom the golden rule at meals should be "little and often."

On account of the large amount of phosphorus contained in fish it is said to be an excellent brain food, but this seems to have been much over-rated. The most profitable and wholesome method of cooking fish is by steaming, and in serving, the addition of vinegar with the other seasoning has a good effect not only in aiding digestion but also in making it more palatable.

Poultry and game, which have a short muscular fibre, small amount of fat andl arge amount of phosphates, and which give a white flesh, are the most easy to digest, therefore the most easy to be assimilated into the system. The next on the list is

Vegetable foods. Plants contain all principles found in animal food, but in very different proportions and qualities, being as a rule poor in fats and very rich in carbohydrates. Taken in all, vegetable matter is less digestible and less easy to assimilate than animal food. The first on this list is

CEREALS, called after Ceres, the goddess of corn, and comprise all grain and corn-bearing plants. Owing to peculiarities in the gluten, the only cereals suitable for bread-making are *Wheat* and *Rye* ; but all of them can be made into cakes, porridge, or puddings, as well as used in soups. As a rule the gluten cells of wheat lie just under the bran, and are liable to be removed by excessive grinding, thereby making the flour less nutritious and wholesome.

Oats head the list of cereals in respect to nutriment, and in nitrogenous (flesh forming) matters and fats. Oatmeal in water forms a most refreshing drink during hard work, especially in hot weather. For invalids, or those suffering from gastric or other stomach troubles, no more nourishing food can be supplied than oatmeal jelly, made by taking a cup full of oatmeal and adding to it in a basin enough hot water to make it rather thin, then allow it to stand for half an hour, drain off the liquid and boil with a little salt till it forms a jelly on cooling. For a very weak patient a dessert spoonful every half hour is quite sufficient.

Barley resembles wheat closely, but differs from it in having more salts, fat and cellulose, but less proteid and carbohydrate substances : The ash of barley is especially rich in iron and phosphates, and on that account barley is often given to children and invalids in the form of soups, or barley jellies. Among the Greeks it formed the staple training foods for athletes ; while some place barley before all other grains for the purpose of restoring strength. Barley water made from pearl barley is often added to cow's milk in infant feeding instead of lime water and with much better results.

Rice is much less nutritious than the other cereals, being deficient in everything but starch, which, however, it contains in a very digestible form. On account of this poorness, rice is rarely taken alone, but combined with other foods rich in proteids, as when made into puddings with milk and eggs, butter, etc. The best way of cooking rice is by steaming until the grains burst, then serve with cream and sugar, or other materials of a more nourishing quality.

Another class of cereals are called *Legumes* or pod-bearing plants (such as beans and peas and lentils. These head the vegetable kingdom in respect to richness in nitrogenous substances: The chief principle in them being legumin, or vegetable casein. They contain a good deal of starch, and are richer in salts (especially in potash and lime), which are very important in the composition of the body, they also contain a goodly quantity of sulphur and phosphorus ; especially *Beans* and *Peas* : These require judgment in their use as diet ; because, on account of the sulphur contained in them, gases are formed in the body which tends to flatulence.

For active, open air workers, legumes will be found equal to meat in nutritive powers. They dry very hard and need to be soaked for 12 to 24 hours before cooking, in the softest water obtainable, after which they must be boiled gently in soft water, since the lime and magnesia found in hard waters form insoluble compounds with legumin. Beans while cooking require at least three changes of water to extract the strong beany flavor and make them more sweet and palatable. A bean soup which is very nourishing and digestible, even to very weak persons is made by boiling them in a fourth water until they are quite dissolved, skim off the hulls which will rise to the surface, and season the liquid with salt, pepper and a lump of butter, which makes a more agreeable and delicate flavor than the meat fats which are sometimes used. If the beans are required for baking with meat, cook as for soup, but take them out of the third water (before they become dissolved) and season them to suit the taste, having previously had your pork nearly roasted, let them roast in the fat and liquid of the meat until nicely browned and the meat quite done

(This is not the way that the far famed Boston baked beans are prepared, but we know it to be good and wholesome, for it has been long tried and not found wanting.)

Roots and tubers. Of all the roots and tubers that are used as food, we will notice only the *potato*, the type of all these. They consist of 95 per cent. of water and starch, their proteid matter is exceedingly small, and the rest of the solids is made up of sugar, vegetable jelly or pectin, and vegetable acids. The nutritive matter is very slight ; and the Irishman who attempts to nourish himself on potatoes has to assimilate 10 or 11 lbs daily, while of a mixed diet of flesh, eggs and bread, from 2 to 3 lbs. suffice ; and 100 parts of wheaten flour, or 107 of wheat itself are equivalent to 613 potatoes. Since the potato is so poor in nitrogenous materials it cannot

be used alone to support life ; thus it is served with meat, butter, and other substances rich in proteids and fat, to supply its deficiencies.

The water in which potatoes have been boiled is not wholesome and should not be used. New potatoes especially being great offenders in this respect, it is necessary to steep them in water first to remove the acrid "green" juice before boiling. Severe diarrhœa has been caused by indiscriminately eating new potatoes containing unformed starch and immature cell tissue. The value of the potato as a food lies in its starch, and it is from the potato that starch is generally obtained by maceration in water.

The object to be aimed at in cooking the potato is to have it dry and "mealy," in which state the starch is very easily digested. To avoid loss of salts and nutriment, potatoes should be cooked "in their jackets." They are usually boiled or roasted, but are much better steamed.

Vegetable roots. This class of vegetables are valued as esculents rather than as foods, and like the potato are low in nutriment materials, but they are chiefly useful for their medicinal properties on account of the salts they contain. The forms of arrowroot are starch pure and simple, and have no more dietetic value than common potato starch. Roots used entire, such as radishes, carrots, parsnips, etc., are valued for their salts rather than for any nutriment in them.

All green vegetables contain but little value as food, but are valued for their essential oils and anti-scorbutic salts, as well as for their laxative effects due to cellulose. The *Cabbage* tribe all contain sulphur, therefore tend to flatulence. Boiling dissapates a good deal of the sulphur compounds, besides softening the cellulose ; but cabbage is never so digestible as when young, and eaten raw with vinegar, salt, etc.

Melons contain little else than water, and are useful rather as cooling drinks than food.

Spinach is a favorite vegetable and used in this country much as the sorrel is used in France, for clearing the complexion. A certain proverb says that "Spinach and leek keep the skin sleek." The young leaves and stems are used as "greens," either boiled, or fried in butter.

Celery is cultivated for its roots or for its blanched leaf stalks. It is eaten raw, alone, or in salad, and is used also in flavoring soups. The stalks contain an aromatic oil, sugar, mucilage, starch, and manna sugar. The daily moderate use of celery as salad is said to remove nervousness and even palpitation of the heart ; for this purpose celery may be used when in season and onions when out.

A recipe for its use in rheumatism is thus given : "Cut the celery into bits and boil in water until soft, when the water is to be drunk by the patient. Put new milk with a little flour and nutmeg into a saucepan with the boiled celery, serve it hot with pieces of toast, eat with potatoes and the painful ailment will yield." The proper way to eat celery is to have it cooked as a vegetable after the manner described.

Lettuce is cooling, easy of digestion, moderately nutritious, and gently laxative in its action. The milky juice is somewhat narcotic, and is used as a sedative.

The *Onion* family are very nutritious, containing a large quantity of nitrogenous materials and sugar in certain forms, as well as a pungent oil rich in sulphur, to which they owe their pungency and smell. This is dissipated by boiling, rendering cooked onions much milder than raw. The onion is valuable as a blood purifier : it stimulates the secretions, and like celery, as said before, is useful for nervousness. Roasted, they form a useful poultice for suppurations, while the juice and grated onion put into the ear quite warm, relieves some cases of earache, and even of deafness.

The *Tomato*, or love apple, as it was formerly called, is generally used as a vegetable. It first came from the tropical parts of America, but is now grown and used in many parts of the world. In Italy it appears in many dishes in various forms, and no other fruit, or vegetable, is capable of being served in so many ways, cooked or raw.

The tomato owes its pleasant sour taste to oxalic acid, and on that account, like rhubarb stalks, is forbidden to those of gouty tendency.

There was an opinion current that tomatoes encouraged cancer, but that is now contradicted by good medical authorities, who declare it to be "a wholesome article of food, particularly so if cooked."

Rhubarb, like tomatoes, contain oxalic acid, along with citric and malic acids. It is used on the table in various ways, and while it is useful in preserving the alkalinity of the blood, a too free use of it tends to thin the blood, and produces a certain disease of the skin.

Fruits. We may not overlook the benefits of fruit in our daily menu ; although with a few exceptions they are not so much a foodstuff as they are refrigerants and blood purifiers. They all contain sugars, with a varying amount of acids (citric and tartaric) Of home fruits, the *grape* alone can be ranked as a foodstuff. They are also said to be valuable in pulmonary disease and gastric catarrh. When taken in excess they act as an aperient or laxative.

Oranges and *Lemons* are characterized by an abundance of free citric acid. They have little nutritive power, as the proportion of water in them is high, and are chiefly used for allaying thirst, especially in fevers. Their principal virtues are in their anti-scorbutic properties.

Apples are so well known that little need be said of them. Fruits in general are best eaten at breakfast, or between meals ; after a heavy dinner is the worst time possible.

Another class of fruits are called fleshy fruits, of which we will notice only two or three varieties. At the head of these we will place the *strawberry*. It is said that, "Doubtless God could have made a better berry, but doubtless he never did." Its virtues are legion, and it has not a single defect. The gooseberry, like the rose, must be plucked from among thorns. The raspberry soon brings a warning sense of satiety. You may crush your teeth upon a grape stone; and the biggest, sweetest apple has a core. But the strawberry is one unalloyed and unimpaired mouthful of deliciousness ; it is so wholesome that you can eat it till you get tired. And last, but not least of all, it is the first fruit of summer ; and nature, in its production, seems to have imitated the host in the parable, who brought forth his best wine at the beginning of the feast. They are richer than most fruits in potash and lime salts, and especially soda salts, and are thus recommended for gout.

The *Raspberry* is one of the most useful of this class of fruits. In the wild variety the ratio of sugar to acid is 1.8:1, but in the cultivated it is 3.5:1. Its uses are too well known to be enumerated. Raspberry wine and vinegar are particularly agreeable and coaling in fevers.

The *Fig*, although quite a common fruit, is very much neglected in our list of foods. It ranks with the date as a food-stuff, and is highly nutritious, since the pulp contains 62 per cent. of fig sugar and 4 per cent. of proteids. The best figs come from Turkey, and dried are used medicinally in lung, kidney, and other diseases, while their external use as plasters for boils and similar suppurations is of long standing, as evidenced by the case of Hezekiah.

We come now to *Water*, which is the last but by no means the least principle in foods. Water is not generally considered as food, but is a very important food-stuff, and plays so necessary a part in the human economy that it may not be overlooked. It occurs in all tissues, constituting two-thirds of the bulk of the body. It also occurs in all foods to the extent of half or more. The most important mineral substance in water is lime, and when lime or magnesia is present the result is hard water. Some waters contain iron, sulphuretted hydrogen, carbonic acid, salts of magnesia, potash, soda, etc. Such waters are used medicinally and are called

Mineral Waters For a healthy diet, water, as such or in food, to the extent of 70 or 80 oz. daily is necessary, as it is required by the system for two reasons : as a solvent to aid in digestion and for purposes of tissue forming. It best performs its digestive functions when pure, and its solvent powers are greatly increased by heating.

The body is constantly undergoing tissue changes ; worn out particles are cast aside from the system, while the new are ever being formed. Water has the power of increasing these changes, and of clearing out the waste products. A glass of water on retiring materially assists in this process during the night, and prepares the tissue for the active work of the day. Hot water is one of the best remedial agents. A hot bath on going to bed, even in the hot nights of summer, is a better reliever of sleeplessness than are many drugs. A glass of hot water on first arising will very much benefit a dyspeptic patient if used persistently.

With this we will now close, hoping that we may have learned at least a little that will be of practical benefit to us all. And as the health of our bodies is of the utmost importance in conducing to the happiness and prosperity of our lives, how necessary is it for us to make a thorough examination into the subject of "Food and its functions," nor that we may live to eat, but that we may eat to live, and to live consistently with the laws of good health and of good common sense.

THE COUNTRY HOME.

By Mrs. F. M. Carpenter, Stoney Creek.

I have jotted down a few thoughts on the place where the great are sometimes small and the small are often great. The father's kingdom, the children's comfort of which youth does not fully appreciate, which the young men and maidens desire, which paradise, the mother's world, the place where you are treated the best and grumble most, the the middle aged generally possess, which the old rightly value, and which is of such vital importance to those living in the country, namely :

The Country Home There is a magic in that little word, *Home*. It is a mystic circle which surrounds comforts and virtues never known beyond its hallowed limits. The home, where God purposes to give to His children a little foretaste of Heaven—a world of strife shut out, a world of love shut in. Home is the sweetest word in the Saxon tongue. It has in it the brightness of sunshine and the fragrance of flowers. It suggests love and rest and gladness. It calls up pictures painted imperishably on our hearts. It speaks of father's care and mother's love, and wife's tenderness and devotion.

The home is the safeguard of the nation, a nursery where can be grown manly men and womanly women. The happiness of that home depends in a great measure on what you take into it. Whether we live or die, or how we live or die, is largely determined by our household conditions, and yet young men and young women marry and make for themselves homes daily in cheerful ignorance of the structure of their bodies, the food necessary for their development, or the sanitary conditions which govern the laws of health.

Helen Campbell, in her valuable work on Household Economics, says "The human animal feminine trusts that instinct will teach her how to rule a house and guide her young. The human animal masculine believes that Providence arranges these things, and that scientific cookery, sanitation, and all that, are the fads of a small school of cranks." We recognize the truth of this, humorously as it is put, and we recognize, too, that books of this kind are needed to open the eyes of men and women to the duties of which they are ignorant.

To this ignorance can be largely traced the filling of our homes of refuge, our asylums and jails.

Long ago the art of doing housework well was acquired by a long and slow process, in a time when women had few pleasures which could compete with it, and when it was considered a disgrace to be ignorant in this direction. Those times will never come again, but it is unquestionably the duty and privilege of every women to be the homemaker, and fit herself to fulfil worthily her duty in her allotted sphere. Our education can never be too broad, our wisdom too deep, our sympathy or enthusiasm too large for the infinite variety and delicacy of relation and situation incident to a household of children. If school has unfitted us for domestic life, our education has been on too narrow and too low a plane.

It does not require very wide opportunity to observe and to realize that there are thousands of women and girls who have no opportunity to become good housewives, no matter how much they desire, to learn the art. How are these girls, who are during the early part of their lives in factories, to know the art of home making when marriage comes to them? They enter into the new domain inexperienced, untaught and unskilled. What is the result? The lovely picture of the home by which they were so recently enchanted has vanished, the task supposed to be so easy, so light, so natural that no training is required, is found in reality to be so intricate, so burdensome, that the young wife is overcome by discouragement or settles into mediocre methods that fall far short of the *Model Home*. If all women were by custom and usage compelled to show proof that the were prepared to enter upon a line of duty and employment that so largely affects a nation, it would work a moral elevation the magnitude of which can scarcely be conceived. Is it not a fitting time for women to plan and devise methods that, if politically considered, would elevate and protect what is essentially ours—*the Home?* Please do not mistake me. I am not asking, nor do wish for, the franchise to be extended to women, but that the country should wake up and have training schools in the country, or branches of domestic science taught in our schools as they are having in the cities; branches particularly practical, that will elevate and benefit the home. I think most women, and, I hope, some men, are by this time convinced that the average women requires education as well as men to become skilled in any line of industry.

Health is one of the first requisites toward a happy home. With pure drinking water, dry walls, dry cellars and good drains that carry off refuse without letting in foul gases, half the battle for good health is won. If we could moderate our hurry, lessen our worry, and increase our open air exercise, a large portion of nervous diseases would be abolished. A home is like a piece of music where all essentials are in harmony. Every mind has its hidden light, and each member of the family brings its radiance to the breakfast table, where the keynote of the day is sounded. It may be a low growl on the bass notes, a shrill falsetto, or a sweet clear sound, but from it the strain of the day largely takes its tone. Some one has said, "Every meal should be a love feast."

It is true our stomachs have much to do with our tempers—our digestion with our ability to bear burdens and withstand temptations. One can hardly wonder that the man who rises from an unsatisfactory, ill-cooked breakfast is unfit for his days duties, and finds himself before night or at nightfall hastening to the saloon after something which (he thinks) will brace him up. It is false delusion. However, let us look well to the keynote, that it be strong and bright, and thus make it easier to keep the whole strain melodious. Who are the men and women, the rulers, statesmen and governors, of the coming century? The children of to-day who are now the spirit and inspiration of the home, and so the parent's first duty is to them.

The Frœbel system teaches "that the little child is like a delicate plant, needing sunshine, fresh air, nourishing and care to be brought to blossom, and there could be no better brand of psychological light than cheerfulness, and no finer fresh air for a child's soul than the atmosphere of of kindliness and kinship with nature. Character building with children should begin in infancy and be founded in the solid rock of truth between parent and child. Establish trust and confidence, and never deceive a child ; no eyes can see through a sham quicker than those of little children. If there is the least discrepancy between the teaching and the life of the mother they know it long before they can formulate it even in thought ; but the observer of child life can see it in the defiant eye, the curling lips, the shoulder braced back to repel the meaningless aphorism

of elders who never apply their rules to themselves. We are loth to believe our daily lives are honey-combed with shams, but our little children often bring us to that conviction.

Of all that happens in the home to grieve the little ones and weaken the mother's moral hold on them, broken promises are the most fruitful. In our association with adults a promise is held sacred, and "His word is as good as gold" is the highest recommendation that can be given, but a promise is made to children and never thought of again unless they bring it to our mind. Carelessness on the part of parents in this respect is a source, not only of pain, but of evil influences that warp the character of children and sometimes results in life long injury. Young children and hearty merry happy children, too, are capable, if properly guided, of possessing as high a standard of honor as their elders, and when they do not possess it there is something very wrong somewhere. The mother who does not or cannot trust to her children's sense of honor, would do well to pause and examine the situation, and see if it may not be bettered. The watchfulness that does not seem to watch, the power of commanding absolute obedience without employing harshness, are assuredly worth trying.

Let the children share some responsibility. It drives a man to toil and brings out his best gifts. Johnson wrote his immortal Rasselas to raise money to buy his mother a coffin. Hunger and pain drove Lee to the invention of his loom. Left a widow with a family to support, in mid-life, Mrs Trollope took to authorship and wrote a score of volumes. The most piteous tragedy in English literature is that of Coleridge. Wordsworth called him the most myriad-minded man since Shakespeare, and Lamb thought him an archangel slightly damaged. The generosity of friends gave Coleridge a house and all its comforts, without the necessity of toil. But ease and lack of responsibility, together with opium, wrecked him. Hunger and want would have made him more famous, and enriched all English literature. It is responsibility that teaches foresight, prudence, courage, and slowly but surely turns feeblings into giants.

Educate the boys and girls on the same moral plane. Right is right, and wrong is wrong. Teach them kindly words, that sympathizing attentions, watchfulness against wounding others' sensitiveness, cost but little and are priceless in their value, and that a good name is more to be desired than riches. True are the words of Shakespeare: "Good name in man and women dear, my lord, is the immediate jewel of their souls. Who steals my purse steals trash, 'tis something, nothing, 'twas mine, 'tis his; and has been slave to thousands. But he who filches from me my good name robs, me of that which not enriches him and makes me poor indeed."

Young people need employment. Everything ought to be done to conduce to their happiness and to give them joy, gladness and pleasure. There are three most joyous sounds in nature—"the hum of a bee, the purr of a cat and the laugh of a child." They tell of peace and happiness and contentment. If possible have music in your homes. Lovers of music must echo the words of Gounod in his letter to his mother when he says: "I see nothing more imposing and more touching than a grand musical work. Music is so sweet a companion to me that were it excluded from my life I should be deprived of a great deal of happiness." We who enjoy it in the home know what a source of pleasure it is

Have the evening lamps burning cheerfully, such bright lights that the rooms will be pleasant places to be in. Do not shut up some of the rooms for company, but use the whole house for the family, and provide for them the best it can produce; it is none too good for them—for our own. Provide the best papers, periodicals, and books for their perusal, and encourage reading, study, and discussion among them. Have games and amusements in abundance. Through all ages and climes, with every race and tribe since the world began, men and children alike have sought to be amused. Monotonous indeed would life become were it not for occasionally looking forward and anticipating some source of pleasure.

It is not alone in passing a pleasant hour that amusements are useful; they assist in quickening the perceptions, in expanding the muscles, in invigorating the system and in driving away care. They may be made an adjunct to education and aid us mentally, morally and physically. The boy who can lead his playmates in the game is the one most likely to lead them in the school-room, and the mechanic who can unravel the mysteries of a puzzle is the one most apt to learn the intricacies of his trade or calling. Rather let play be an ideal which we may strive to reach, than a frivolity from which we would fly. Give us the man who can play his game heartily and then go to work, rather than the one who has no game to play, good though his work may be.

We require amusements and recreation almost as much as we need food and raiment, and wise is that parent who early teaches his children to seek their pleasures at home in place of abroad. All of us, even the youngest, have heard of cheerless homes from which the children steal away to seek in other channels the sports and pastimes that are there denied them, and all of us, especially the older ones, have tender recollections of bright firesides where, when the lessons and labors of the day were over, we gathered to indulge ourselves in festive amusements. If we have such attractions about our homes we will not find so many of our young people leaving the farm home to find their pleasures amid the whirl and excitement of city life.

We find our greatest men to-day leaders at the bar, on the bench, in our legislative halls, in every commercial enterprise, in fact in nearly every walk in life, were country boys, born, reared and educated in the freedom of the fields and woods, and revelling in their childhood days in the pleasures of the country home.

Encourage the children to bring their playmates home with them, giving them time and assisting them in having pleasant social gatherings. It may be a little bother, but it will enable you to keep on a more familiar footing with them and to know their associates As parents, link your pleasures, your interests, everything in the home with your children. "A parent's love, it is a gleam of sacred light. What makes the world an Eden seem, without its gentle cheering beam all would be night."

Mothers, homemakers, the coming women, what will be your life's influence? It is felt long after you have gone to rest. The poet says: "As the shadow of a tree that to and fro did sway upon a wall, our shadow selves, our influence, may fall where we can never be."

Give your children the best education your means will allow. Do not check the natural intelligence of the child who always asks an explanation of terms or phrases it cannot understand, and who is never willing to repeat parrot like that which is incomprehensible; he will far outstrip in education the ordinary routine scholar. Education goes on with children at home, in the street, at church, at play, everywhere. By teaching them close observation, developing an eye for Nature's beauties, you will perceive how much more enjoyment they have in life, and how far it strengthens the home ties.

Nature will be reported. All things are engaged in writing her history. The planet goes attended by its shadow; the pebble leaves its impress in the sand; the rolling rock leaves its scratches on the mountain, the river its channel in the soil, the animal its bones in the stratum, the fern and leaf their modest epitaph in the coal; the falling drop leaves its sculpture in the sand or stone; not a footstep in the snow nor along the ground but prints, in characters more or less lasting, a map of its march, and so it is with the child In youth is the impression made for weal or woe; therefore let us watch the inclinations, the associates, and be as careful as lies in our power that good impressions alone are brought to bear on the child mind.

A president of a college said he received his education in his mother's dye-tub. The covered dye-tub stood near the fire in New England kitchens, and was a comfortable seat for the children while the mother carried on her work. Horace Greeley throughout his life declared that the strong bent of his character and his noblest aims had been given to him before the age of five, as he stood by his mother's spinning wheel learning to spell. Cromwell's puritanism was taught to him, not by his parents or tutors, but by a maiden aunt whose belief was rigid and strong. Tourgeneiff gained his passionate love of that freedom which dominated his character before he was ten years old from a serf belonging to the family. The serf ended his life in Siberia, but he had fitted the boy to become the emancipator of his race. Mendelssohn was destined to be a pedlar, and the pack was actually bought and filled for his back. But the influence of an usher in his school had awakened new longings and hopes in his soul. He struggled against his fate, and at last was fitted to utter the high message given him to deliver in music. All the influences of Lord Beaconsfield's youth were intended to make him a scholar, but because he was the only Jew in a large English school he was treated with contempt. It was this injustice that roused in in him a fury of ambition to lift himself above his tormentors, which made him resolve, before he was ten years old, to become Prime Minister of England, and work steadily towards that end every hour of his life.

In the life of almost every leader of men some influence in youth has opened and directed the currents of thought and action. The best service a woman can do is to devote the major part of her executive ability, intelligence and interest to her own home. Every neglected home is a disgrace to society whatever the cause. Any life is wrecked that is torn from its true relation. No matter what philanthropic movement, what interest or how important it may be in the eyes of of the public, if it causes a woman to minimize relations to her home, it is a wrong done to her family and to society.

A GOOD EDUCATION.

By Miss Fannie Pettit, Tapleytown.

What education is and what it is for are matters on which there are wide differences of opinion. In these latter days we have resorted to the system of loading a child's mind with a quantity of facts which he is expected to remember and to be able to state when required. We try to make him a living encyclopedia of useful information, so that the scholars of whom we are most proud can tell in a moment the distance of the sun from the earth, the date of a battle and the Latin name of a plant. All this is useful in its way, and the child when he comes into the business of life will find it an advantage to know all these facts. Some of them he may have no occasion to use, but that cannot be forseen, and if he is well equipped he will have the information he does need as a nucleus which can be enlarged, and the facts that are useless to him in his walk of life can be forgotten. But when all this has been done, is the child educated? No; there is more to be done; he needs various accomplishments. He has to be taught to read, to write, to cipher, to speak grammatically, and to reason. If the child belongs to what is called

the upper class, there are other things that the parents want him to be able to do, such as to speak one or two other languages besides his own, to dance, to know how to bear himself according to the laws of etiquette. So we have two features of education, (1) the acquisition of knowledge, and (2) the training to do certain things.

When these two subjects are accomplished, is the child educated? In too many cases the answer is yes. Yet the one quality which can preserve the child from evil and provide for his exerting a wholesome influence on society has not been touched. We can conceive of a young man having a thorough knowledge of science and history and being an expert logician and arithmetician, yet being an altogether bad man, without conscience or moral sense. The better educated such a man is the more mischief he might do. So something more is required in order that the world may be a better world than it is now, and that the new generation may be more elevated than the present one. The child cannot get it at school, where the teacher is too busy imparting information and giving mental training to teach righteousness, unselfishness and purity of soul. Nor does he always get it at home, where the father is exhausted by his hard labor, and the mother is engrossed with her domestic duties. In the Sunday school once a week the child may get some glimmering of the needs of this neglected part of his being. With this poor assistance the youth is thrust into a world full of strong temptations, and we wonder that he falls into sin. We have to re-constitute our ideas of education if we are to get better results, and to begin where the wise king advised us to begin: "The fear of the Lord is the beginning of wisdom, and the knowledge of the holy is understanding."

The child needs to have right principles, to know right from wrong and to be trained to keep his animal propensities in subjection. It is precisely this important feature which is so often omitted from education.

OBITUARY.

John I. Hobson, Esq., Guelph, Ont.

Died on November 23rd, 1900, aged 65 years.

A strong man has fallen,—very suddenly and in the vigor of his manhood! a manly man! my friend; and I feel impelled to say a word.

For many years John I. Hobson has been a prominent figure in municipal and agricultural matters,—reeve of his township, warden of his county, expert judge of beef cattle at the principal fairs of the Dominion; director of the Guelph Fat Stock Club, director of the Sheep Breeders' Association. President of the Dominion Cattle Breeders' Association, President of the Dominion Shorthorn Breeders' Association, President of the Provincial Winter Fair, Provincial prize farm judge for ten years, an able and most acceptable Farmers' Institute lecturer for fourteen years (1887-1900), examiner in agriculture and live stock at the Ontario Agricultural College, and chairman of the College Board from its organization till the present time.

In all these positions Mr. Hobson did a work that was creditable alike to himself and to the association, institution, county or Province that appointed him. And his success was due, not merely to the fact that he possessed good ability and sound judgment, but to two other well-known facts: First, that he could always be relied upon to do right and deal fairly, whether it was popular or unpopular to do so; second, that he never neglected the duties of any office or position to which he was appointed,—having once accepted a position, he allowed neither private business nor personal comfort to prevent him from attending promptly and faithfully to all the details of work involved in that position. Such men are scarce.

Mr. Hobson travelled a good deal in his own country and abroad, and read widely,—no doubt for pleasure, but chiefly to fit himself for the work which devolved upon him in the various positions to which his fellow countrymen had elected him. He never was considered what we speak of as a popular candidate for office; he was too straightforward and outspoken for that. He did not possess the popular arts and devices; but he possessed sterling ability, honesty, fidelity and courage; and his fellow citizens showed their appreciation of these qualities by electing him and continuing to elect him to so many high and responsible positions.

I shall not venture to speak of Mr. Hobson's church relations or religious life; but I may say that he was kind and tenderhearted, and carried the burdens, not only of his own family, but of many widows and orphans throughout this county—many for whom he has been quietly and unselfishly acting as executor and guardian.

Mr. Hobson's sudden and unexpected death is a very severe blow to his family and a great loss to the community and country in which he has lived.

Dr. James Mills,
President O.A.C.

INDEX.

A Street in Renfrew
Macadamized in 1899.

Gore Street, Perth,
Macadamized in 1899.

FOURTH ANNUAL REPORT

OF THE

PROVINCIAL INSTRUCTOR IN ROAD-MAKING

ONTARIO

1899.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE.

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:
WARWICK BRO'S & RUTTER, PRINTERS, &c., 68 & 70 FRONT STREET WEST.
1900.

To the Honorable JOHN DRYDEN,
Minister of Agriculture.

SIR,—I have herewith the honor to submit to you my fourth annual report for the year 1899, on Road and Street Improvement in Ontario.

I have the honor to be,

Sir,

Your obedient servant,

A. W. CAMPBELL,
Provincial Instructor in Road-making.

PARLIAMENT BUILDINGS, TORONTO,
ONTARIO, 7th February, 1900.

CONTENTS.

FOURTH ANNUAL REPORT

OF THE

PROVINCIAL INSTRUCTOR IN ROAD-MAKING

ROAD REFORM.

The value of good country roads as a part of Ontario's transportation system is far from being fully understood and appreciated. The Province has not spared its energies in the building of railways and canals, largely for the benefit of "our undeveloped resources." There are resources existing in Ontario, not usually regarded as "undeveloped" because they exist in the older and more thickly populated districts. Nevertheless agriculture, the most important industry of the Province has by no means assumed its proper proportions, largely for the reason that the country roads, the veins and arteries reaching the farmer's lands, have been mismanaged and neglected.

AFTER THREE YEARS TRAFFIC.—IN NORTH MONAGHAN.

A remarkable example of this has recently been given by a number of Hamilton and Toronto merchants and manufacturers who have established a freight wagon service between the two cities, a distance of forty miles, in competition with railway rates, resulting in a saving of seven and eight cents per hundred on the freight carried. That this can be accomplished on the highway traversed, which is no better than the average bad road, would seem to be proof conclusive that the common roads offer advantages which have been overlooked.

In France we find teamsters competing with railways in drawing goods two and three hundred miles over country roads. In Belgium there are instances, as between Liege and Brussels, or Antwerp and Brussels, in which teamsters commonly haul their loads sixty and seventy miles in competition with the railways. Similar examples could also be found in Germany and England.

That traffic over the common roads can compete with railway rates is regarded by many as an anomaly, a condemnation of freight rates, and a return to the primitive conditions of our grandfathers. Nevertheless for limited hauls, as great as three hundred miles in France, the common roads provide a means of competing with the railways which we cannot afford to disregard. That such competition is successful on the very inferior roads between Hamilton and Toronto is an index to what the farmer should be able to procure for himself. With good roads, farmers would equip themselves with better stock, journeys could be made more quickly, and double the present loads could be carried. There are no better means of regulating freight rates than to render ourselves largely independent of railways, by improving the common roads, a matter which, European experience tells us, is not beyond our power to accomplish.

The agitation in favor of good roads, carried on by the Government during the past few years, has not only advanced public opinion in favor of better roads, but has revealed to the general public that the system by which our roads are at present being made and maintained has been by no means conducive to the best results. The effect of the movement has been and no doubt will be to increase the expenditure upon roads. The popular idea, which at first prevailed, that this was the chief object has, however, been largely dispelled and it has become generally recognized that the aim of the reform already in part accomplished in Ontario has been to procure a proper administration of the money now being spent upon the highways. That there is urgent need of this there is everywhere abundant evidence, and is universally accepted. This applies not merely to country roads, but to town and city streets, in all of which a great annual waste is going on without producing the desired results, thereby entailing both a direct and reactive loss.

The Large Amount Involved.

The actual money spent upon roads, streets and bridges is of very much larger dimensions than is commonly supposed. During the ten years, 1887 to 1896, it amounted in cities to $14,483,643, in towns to $6,759,626, in townships and counties to $9,380,689, a total of $30,623,958. If to this we add about 11,000,000 days of statute labor expended in the townships, we have a money and labor value of $41,623,958, an average of over $4,000,000 per year. This is more than one-third of the taxes levied on the people in municipal and school rates.

It forms the greatest outlay of the municipalities on any one public service, and is one which will constantly increase. It is estimated that the canal system

of Canada, chiefly in Ontario, has cost since its inception about $80,000,000. The cost of the railway system within the Province has been about $150,000,000. In ten years, as has been shown, the expenditure on roads in money and labor has amounted to $41,623,958. While an exact estimate cannot be made, it is apparent that the common roads of the country have in all probably cost in the aggregate, fully as much as both railway and canal systems put together.

This large sum has been spent on the roads in comparatively small amounts throughout the Province, the ratepayers see only these small sums, and in consequence do not realize the enormous total. The expenditure is made too, with little or no attempt at careful supervision, with the result that a large proportion is actually wasted and much of the remainder turned to poor account. Much of the expenditure is undoubtedly devoted to a very good purpose, but a careful examination of the methods pursued in townships, villages, towns, and as a general thing in cities, will disclose that owing to faulty administration, careless and inexperienced supervision, and the improper influences which are brought to bear upon those in charge, our system of road-making is incompetent, utterly unjust and extravagant, and is almost solely responsible for their poor condition.

That this vast expenditure should be made upon such an important public work, in so slipshod a manner, without rule or design, seems inexplainable. That, as a general rule, work is done without plan or specification, without system, organization or proper supervision, seems startling in view of the fact that wherever any other public work is done systematically it is watched with the closest interest by the ratepayers, and the expenditure criticized to the most trifling item.

When the people of a municipality are shown what the roads are costing them, it is a revelation, and for the first time are they now commencing to realize the importance of the work and the magnitude of the expenditure. They see that better roads, and even good roads, do not necessarily mean an increased outlay, but a better administration of the present expenditure. Any department of government which can even successfully criticize such an outlay would be performing a valuable service. And where the services of such a department can be extended so as to reduce the work to a system, and insure such consultation and assistance as will bring about the most profitable expenditure of this money, it will confer a lasting benefit upon the country.

Such a heavy expenditure made upon a public service so important, certainly warrants the attention of the Government, which can be directed in various ways. In addition to educating and instructing the people in the proper methods of road-making; educating the people by a criticism of the work done, and methods of expenditure; construction of sample sections as object lessons to elevate their ideals of what a road should be; and circulation of proper literature, there should be legislation so revised as to be in keeping with advancing conditions, and constantly changing requirements; municipalities might be furnished with the

means required at the lowest rate of interest on easy terms of re-payment; the co-operation of railway companies could be secured in the cheaper carriage of road-making material for districts without a local supply, the railways and people thereby obtaining mutual benefit.

Ratepayers generally, are possessed of the idea that their roads are now built and maintained almost solely by statute labor, and that if this work is not performed in the most faithful manner, no serious crime is committed. They fail to realize, however, that owing to the very imperfect manner of doing the work, municipal councils are obliged to impose a direct tax. The amount of this tax, the indifference displayed in expending it, and the inferior results produced, comprise the serious phase of the whole question.

Underlying Defects.

For well populated districts, where more advanced principles of government should be applied, the present system is fundamentally weak from two main causes which bring in their train many abuses, and cause failure in the effort to improve the roads in a manner corresponding to increasing requirements. These causes are: First—the control is so scattered that no one can be held responsible for a proper expenditure of the labor and money devoted to the roads; and second— the payment of a tax in labor is too vague and clumsy to meet modern conditions.

From these two sources spring many important results: neglected roads, injustice to the men who do honest work, misappropriation of labor and money, and similar abuses. Some pay the tax with honest work, while others, from various motives, do not.

Under present conditions, all responsibility is, in the first place, distributed among members of the council; the council again distributes it among fifty or one hundred pathmasters. The large amount annually spent by most townships in the way of money and statute labor is also so scattered, together with responsibility that the people do not realize how large a sum is being spent; but when mis-spent and innocently squandered as it generally is, there is no one whom they can call to account. The councillors can shift responsibility from one to another, and then to the pathmasters. The latter have nothing to lose and so can merely shrug their shoulders when any improper or careless expenditure comes to light. Divided responsibility is never successful even in township government.

That the money expenditure is so largely scattered in patchwork, in temporary and perishable work, is due largely to the fact that all roadwork is viewed from the standpoint of statute labor. The money appropriations, while large in the aggregate, are made in small amounts with the object of supplementing statute labor. If this were reversed, a system of money expenditure used as a basis, and the money concentrated in durable and permanent work.

from year to year, statute labor being the supplementary force, it would greatly tend to correct present weaknesses. It is found, however, to be almost impossible to combine the two systems in this latter way. Immediately the greater economy of a concentrated money expenditure is realized, with its greater flexibility, and adaptation for securing better work, the awkwardness and wastefulness of statute labor becomes apparent, and it is found to be, in many ways, a hindrance to its more efficient rival.

The Details.

In pursuing a study of the details we find that statute labor is slighted in many well known ways by the taxpayers individually and collectively. Some do their duty and others try to do it. Some will not do their duty, and try to keep others from doing it. Some would do their duty, but seeing the carelessness of others, feel the injustice of the system, and so are as careless as the rest. Others neglect the work in order to have greater claim for money appropriations.

Even if there were honest endeavour to do the required amount of labor, the system would still be unproductive of the best results for many reasons. It is not a system which provides for the needs of the roads, so much as for the wishes of the men who do the work. This applies to the kind of work done, whether grading, ditching or gravelling; to the time it is done, and to the locality where it is done.

No matter how much grading may be needed, no matter how much ditching is required, if it is more convenient for the farmer to draw gravel he does so, and the other work is neglected. It is the same under other conditions, and grading and ditching are very often done to the neglect of gravelling if the former involve less bother. And so it goes on, the man who is doing the work, not the work itself, being the first consideration.

In the care of roads, there is a proper time for doing the work, and no other time will do so well. No other time will be so satisfactory. No other time will keep the roads in good condition at the minimum of expense. But this, under the statute labor system, is an impossibility. This labor is available only at one time of the year, that, a very unfavorable time for road-making, and it is not then devoted to a proper scheme of repairs. Repairs are made only when the road becomes entirely worn out. Once placed in a good condition, they are neglected and allowed to become almost impassable before repairs are made.

The work under statute labor is not done at the points where it is most needed, but it is an unwritten law that the pathmaster for the year will look after his own interests, even to the extent of digging a ditch, which will benefit only his own farm, without benefit to the road, possibly to its detriment.

The Result of the Agitation.

All these are things which the average ratepayer will now admit. Three years ago the statute labor question was one of exceeding delicacy to handle, but

by a continuous campaign, pointing out the small amount of good produced by statute labor, its unfairness and injustice, the large amount of money spent in addition and the poor results from the united expenditure; and by pointing out what could be produced if proper methods were resorted to, the devotion of the people to statute labor has been largely removed. A number of townships have abolished statute labor, and others are preparing to do so. The feeling is growing that statute labor should be abolished by the Provincial Legislature. In the meantime, as a result of the agitation, townships are putting forth greater effort to obtain better results. They are organizing their forces more efficiently, purchasing modern road machinery, and are learning and applying in a better manner the principles of roadmaking.

This however, in the main, is but educative. The efforts they are putting forth are but teaching them the need of a more efficient system. The Township of North Monaghan is probably the most advanced in this respect. The municipality has been divided into four divisions and a road commissioner placed in charge of each. All taxes are paid in money, and work is done by contract or day labor as its importance dictates. The details of the system are being gradually perfected, and it is giving entire satisfaction to the ratepayers and the roads are rapidly improving.

The demand for information has been general, and meetings for the purpose of discussing the question have been held in every part of the Province. The question is now practically in the hands of councils or other executive bodies, the minds of the people being pretty well prepared for action. Consultation with municipal councils will always be necessary, and much detailed information required on methods of taxation, principles of construction, supervision, material, the use of modern machinery, etc. This would be accomplished largely by correspondence and the issuing of bulletins.

This is but one phase of the question of road reform which the people are gradually working out, and problems of a different nature are presenting themselves.

THE RELATION OF TOWNS AND CITIES TO COUNTRY ROADS.

A map of the main roads through Ontario as they existed half a century ago presents a striking similarity to a map of the railroads of to-day. The construction of railways was, in effect, but the improvement of the former trunk lines of common highways, providing them with firm and well graded roadbeds, smooth, hard tracks of steel, and discarding the less efficient horse power for mechanical traction. We are most readily impressed with the larger and newer enterprises, so it is that we are inclined to regard the railways as the chief factor in transportation. It is not the massive root branches of the tree which abstract nourishment from the soil, but the diminutive, thread-like off shoots from them. It is not the steam railway which is the active agent of a nation's growth; but

like the root branches of the tree, the railway is secondary, subservient to the lesser avenues, to the net-work of which is deputed the task of first gathering the means of subsistence. In proportion to the excellence of the network of common roads will the country be occupied and productive. As the roads are good, the country occupied and therefore productive, so will the railways have employment. The activity of the railways is a certain index to the magnitude of the flow of commerce. And commerce is the life stream of national prosperity.

Equal Economy Demanded by Country Roads and City Streets.

The city is the product of the country; the country is not the product of the city. The first roads on the continent were country roads, not city streets. As country roads were first in origin, so they are first in importance. There is too great a tendency among townspeople to overlook the wider application of the question of roads in general. With city paving, there is certainly a greater demand for engineering skill, and the engineering difficulties appear to be farther from solution than is the case with country roads. At the same time, the simplicity of country road construction is not always so real as it appears, and the difficulties are greatly increased by the deficiency of funds with which to overcome them. The same obstacle, it is true, is met with in city paving, and the question becomes in each case, one of obtaining the best results with a minimum or within a limited cost. In view of the strict economy demanded, the construction of country roads, in selection of materials, location, drainage, grading, bridge and culvert building, and the various details, becomes a matter in which the greatest skill is not wasted.

Cost of Streets and Roads Compared.

The people in the cities are very apt to urge that, because their pavement cost so much per foot frontage more, because the farmer receives the reciprocal use of the city street in return for the city man's use of the country road, they have, therefore discharged their obligation with regard to roads. Contrasting an eighty-acre farm, however, with a fifty-foot town lot, and a farm road at $1,000 with a city road at $5,280, we find the cost to the individual farmer is $125, and to the city property owner, $25.

Many of the streets, it may be said, cost much more than the amount named. The same is true of the country roads, almost the minimum has been named in each case, and if we double the cost in the one instance we must do so in the other, so that the proportions remain about constant. Then too, a fifty-foot city lot is double the frontage occupied by the majority of city houses. An eighty-acre farm is not uncommon in the country, and in levying it with one-eighth of a mile, there has not been included its proportion of flankage existing in every block.

The work of country road building is one of considerable expense, as compared with the number and wealth of those upon whom it now commonly rests. Wherever it is left solely to the farmer it will be years before the condition of the roads will be adequate to the complete development of the resources of any country.

A Matter of Self-Interest for the Cities to Assist in Roadmaking.

The sum of the matter is that, whether or not the towns and cities discharge their strict duty in the construction of streets within their limits, their prosperity is dependent upon the prosperity of the country districts, and it is but a matter of self-interest, of profitable investment, to assist the farmers in road building.

There is, first of all, the broader aspect of the question which regards the welfare of the nation as a whole. In this aspect of the question, we are led to regard the relations which exist between the great metropolitan centres which have as territory upon which they depend for support, the nation as a whole; which, whether for agricultural, mineral or forest wealth, are ultimately dependent upon the rural highways for the materials of manufacture and consumption.

There are again the towns and cities of lesser magnitude which draw their support largely from the agriculture of the immediate vicinity. From these latter there comes a more urgent demand for good roads, a demand which all urban communities have made of late years, for it is these lesser cities which would be more directly benefited by the improvement of roads in the immediate district. The benefits being more direct, the value of good roads becomes more apparent.

The larger cities, less directly benefited, but benefited to no less, indeed to a much greater degree, appreciate less perfectly their value because, being less direct, the benefit is less apparent. They have usually many manufacturing industries, and therefore seem more self-supporting than do the towns more directly dependent upon the agriculture of the district. The more apparent independence is, however, deceptive. If the town is a manufacturing centre, it must have country roads over which to draw the material for manufacture; to a much greater degree, however, must it have a wealthy territory surrounding it to purchase its articles of manufacture. It is to the agricultural country that good roads are most beneficial, and no agricultural country can become wealthy and to the highest degree prosperous, without good roads. From greatest to smallest, towns and cities are dependent upon good rural roads.

Comparison of Benefits.

Many towns, it has been said, have learned that it is most important to have free and uninterrupted communication with the surrounding farm districts at all seasons of the year If the farmer must come over the roads to the centres of population and the railway station, to dispose of his farm produce, it is equally necessary to the townsman that he should use the roads to draw the merchant's

goods back to the farm. It merely happens as a matter of convenience for obvious reasons that the farmer draws his produce to the town and his purchases back to the farm, instead of the merchant hauling his merchandise to the farmer and the produce of the farm back to the town. The country roads are nearly, if not quite, as much benefit to the townsman as to the farmer.

Without the means of access, a country is valueless for production purposes. A farm of highest fertility within fifty miles of Toronto, if there were not roads by which it might be reached, would be as valueless as if situated in the heart of Africa. Distance is not measured by miles, but by rapidity and ease of travel and transportation. It naturally follows that, with the opening of the first wagon track leading to it, the value of a farm commences, and as the road improves the value of the farm advances, other conditions remaining constant. It is true that the more the country districts become filled with population the more rapidly the improvement of roads will advance, but it is equally true that the more rapidly the roads are improved the more rapidly will population advance. The construction of the Canadian Pacific Railway has been the means of enticing a population to the Canadian North-west. The improvement of roads will have the same influence upon the less distant territory, and there is every need for greater attention to the home field for missionary effort in this respect. As population increases, the wealth of our cities will increase, and it therefore points forcibly to the conclusion that one of the potent means of improving and lengthening town and city streets is to provide at the distant end of the chain of transportation, good country roads.

A COUNTY SYSTEM.

Throughout Ontario, in the great majority of municipalities, the country roads, in addition to being constructed entirely by the farmers, are kept up by the statute labor system, supplemented by money grants from the county and township councils, chiefly the latter. This applies to all the roads however important they are. The result is that there are inadequate and imperfect methods employed. No experienced skill, an absolute necessity for good road making, is employed, so that the roads are, for the greater part of the year, in an exceedingly deplorable condition, materially interfering with all commercial and social functions within the Province.

There are distinct classes of roads throughout the country districts. One of these classes is composed of the main roads, the through roads, the leading roads. They serve large areas, an entire township, or several townships, and usually lead to the chief market towns in the district or county. They are the trunk roads from which branch another class of less importance which serve only the two adjacent concessions, or perhaps only a small neighborhood, perhaps only a few farms.

The Main Roads.

The construction and maintenance of these main roads is much more expensive and exacting than the roads of lesser importance. They already absorb most of the expenditure and energy of the townships. Upon them the greater part of the township money appropriations is spent, and the greater part of the statute labor, to the neglect of the little-travelled roads. Heavily-travelled, they quickly get out of repair, and, under the system which townships can adopt, they cannot be constructed so durably nor maintained so thoroughly and economically as under a county system, in which latter the most workmanlike system, together with the best and most suitable machinery, can be employed.

Passing, as these main roads do, through an entire township, and continuously through several townships, it is necessary that they should be maintained in a uniform manner throughout their entire length, if they are to serve their best purpose. At the present time, so far are they from being maintained uniformly, even through one township, that they vary from statute labor beat to statute labor beat; one beat being in good condition and well kept, the next, perhaps, almost impassable, according to the relative skill of the various path-masters, the opportunity for drainage, the convenience and quality of the road material. These main trunk roads should not be subject to such caprice, but should be maintained after a uniform plan, under all circumstances, from township to township, and through the greatest area possible.

A Larger Area for the Distribution of Revenue.

The necessity for providing that towns and cities contribute to the maintenance of roads has been explained. We find, however, that in some townships there are none of these urban municipalities, while in others there are several, and perhaps very large cities. The duty and interests of these towns do not remain, except in rare instances, with so small an area as a township, and indeed, in some cases, the entire county is too small to spread their contribution over. The tax thus raised from urban municipalities cannot be equitably distributed on a less scale than a county system.

A county road system does not necessarily mean that a greater expenditure will be made upon the roads of the county, but means rather that the townships will spend less on the roads and the county council will spend more.

At the present time, under a county system, all towns and villages may be taxed for roads at the county rates. Cities within the county, however, are not so taxed, and this it might be advisable to rectify.

County Systems Now Operated In Ontario.

The only counties in Ontario which maintain county roads are Wentworth Lincoln, Wellington, Frontenac and Hastings. Wentworth County has for some time been considering the advisability of extending its system, and during the past year a commission was at work in the County of Oxford. Victoria,

Grey and York Counties have also canvassed the question to some extent. For the best information on the subject in Ontario, however, the County of Hastings will most repay consideration. The County of Peterborough appointed a committee to look into the Hastings system two years ago, and this committee fully endorsed the system as they found it.

The Hastings system commenced about twenty years ago with the purchase of the toll roads throughout the county. These have been added to until at present about 370 miles are maintained as county roads. These roads are among the finest in the Province of Ontario, and in many parts are undoubtedly the best. The County Council appropriates annually about $18,000 for the county system, including the expenditure on county bridges which are expensively built of iron, concrete and stone. The management of these roads is deputed to a committee of the council, by whom a superintendent of roads is employed. The roads are divided into four sections, and a gang of men under a competent foreman is placed over each. Whenever a section of roadway requires re-construction or repairs it is inspected by the superintendent, from whom the foreman with his gang receive proper instructions and are sent to the place to carry out the work.

The plan was at first vigorously opposed, but after a year's trial it proved so satisfactory and economical that it was continued, with the result that the added experience enables them to do the work at about one-half the first cost, and the roads are becoming better every year, owing to the careful supervision exercised and the ability to make repairs as soon as they are needed on the road.

The expenditure on the county roads proper in Hastings county, exclusive of bridges, is estimated at $35 per mile only. A careful study of the present expenditure on township roads including statute labor will show a comparison very favorable to county roads in view of the better results obtained. At present the main roads absorb the greater part of the energies of the townships so that the side roads are apt to be neglected, whereas by relieving the townships of the main roads they are enabled to very much improve the roads of less importance under their particular jurisdiction.

Advantages of a County System.

Under a county system, a portion of the cost of road building is levied, in the county rate, against the towns and villages within the municipality for road purposes. In order to extend this tax to the cities, it would be necessary to amend the statutes. At the present time under township systems, the farmers bear the entire cost. All the expenditure placed on roads would be spent in the county, and thus returned in a great measure, to those who contributed it in the first place.

Under county control a properly organized corps of men can be employed to build and repair roads. As at other employments they become experienced and

do better work, and in the matter of repairs are ready to make them as soon as signs of wear appear.

By a county plan, uniformity of work and system will be secured throughout the various municipalities. Whereas under township control a diversity of plans is sure to be adopted.

In a county plan an experienced and properly qualified man could be employed to have constant supervision of the work, whereas under township control, each municipality cannot afford to pay the salary of such a man. Under every good system it is necessary to have responsibility centralized and defined, not divided and easily shifted from one to another, as it now is under the statute labor system.

Under county control modern machinery too expensive for individual townships can be purchased and handled to advantage, an experienced operator can be employed for each implement, and a better and more uniform class of work will be secured.

A township can manage its roads properly only by adopting a plan similar to that outlined under a county system, but by extending it over a county it becomes more cheaply operated.

There is not community of interest between the townships. In one township there is a certain leading road, much travelled and well made and maintained. The adjoining municipality may, for various reasons, not consider it of so much importance as to warrant them in making an expenditure to benefit largely their neighbors who are obliged to travel over it. A properly connected system of leading roads throughout the county will be obtained under a county system; whereas with each township, and even each statute labor beat, working independently of those around it, this will be lost sight of.

During the winter months, when snow is plentiful, the necessity for use of the roads is as great as at any other season. But, unfortunately, often in one night snow drifts may render them almost impassable, especially for heavy teaming; or at least, owing to drifts and pitchholes, they are made very unserviceable. The opening of the roads would be part of the work of county maintenance, and the necessity would supply implements for doing the work promptly and cheaply.

If no greater expenditure is made upon the roads than at present, the rate will be reduced, because most of the township's expenditure is now placed on the leading roads; and the township will be relieved of these by a county system. Under the county system the funds will be sufficiently concentrated to undertake durable work, and consequently these roads will be properly constructed and afterwards maintained at a less cost than at present.

A county road system equalizes the cost of maintaining leading roads. In every county within a certain radius of a market town, traffic constantly increases as the town is approached. The cost of construction and maintenance increases in proportion to the traffic. It is unfair to charge those living near the town with

the cost of building the roads to accommodate traffic from a distance; so unfair as to cause discouragement, and often withdraws support.

Property is very largely valued according to distance from the market and the convenience with which the market can be reached. Property a long distance from the market is affected to a greater extent by the bad condition of the roads than is property very near the market. Good roads are therefore of greater value to townships a long distance from the market town than those in the immediate vicinity.

Under a county system durable road construction would be undertaken. The economic value of this work would be seen and appreciated by the people of the different townships. The well-built roads would stand as object lessons, and would teach the better expenditure of funds spent by the townships on the roads maintained by them.

While there may be some feeling averse to townships parting with any control of their roads, it is nevertheless impossible, under a township system, to levy taxation equitably, or employ the most economical and at the same time serviceable system. The trend of opinion has turned towards collecting the most important roads of each county, placing them under the management of the county council. It has been shown that by such a means road-making can be placed on a more business-like basis, and consequently greater efficiency is secured. It provides for a more equitable system of levying the cost, for a better use of modern machinery and for a higher grade of oversight and workmanship. At the present time township councils are unable to maintain the roads by statute labor, and are in consequence compelled to make annual appropriations of money from the general tax. This money is, in the main, spent on the roads which would comprise a county system, but owing to the contracted character of the system, township councils cannot expect to apply this expenditure to the greatest advantage.

Despite the advantages of a county system of roads, township councillors are frequently unwilling to give up any of their present powers, and the influence and patronage which accompany them. Their sessions are mainly occupied with the distribution of money over the roads, the building of culverts and bridges, and the settlement of road accounts. This distribution, as a general thing, is made at the request of a community of favor-seeking electors, and not in accordance with the real requirements of the roads, as would be the case if reported upon by a responsible official under a county system.

ROAD EXPENDITURE AND STATUTE LABOR.

Statute labor should be worth one dollar a day. This is a moderate estimate for a day's work, and there are few men who would be willing to sell their time for so small an amount in the open market. And yet there are some communities which protest against the commutation of statute labor, or its abolition, for a tax amounting to half this rate, or fifty cents a day. Indeed, where it has been proposed to commute for twenty-five cents a day, there have been those who oppose the change, preferring to work on the road for a day in order to retain so small an amount.

A GRAVEL ROAD IN N. MONAGHAN.—FINISHED IN 1896, AND NOT TOUCHED SINCE.

The farmer whose work on the farm is not worth one dollar a day is not likely to be worth that amount in statute labor, and opposition to commutation of statute labor at that rate is, to a great extent, one of the best reasons for adopting a commutation system, indicating, as it does, that the roads are not receiving the amount of honest labor which it was intended should be placed upon them. Roads are of much too great importance to be slighted in any degree.

With the purpose of comparing the present annual expenditure upon roads in the Province with the amount needed to keep roads in good repair, the money and labor spent by townships and counties has been collected under county totals. With these it is interesting to compare the expenditure upon the Hastings county roads of 370 miles, kept under a management admirably suited to the needs of every county. These Hastings roads cost in 1896 an amount equal to $49.82 per mile; or, deducting the expenditure on bridges which is included in this sum, the roads proper cost, it is estimated, about $35 per mile.

An anlysis shows that there are two counties, York and Wentworth, which show an expenditure exceeding $60 per mile; the former, to be more exact, $69.87, and the latter $61.34. Three counties show an expenditure of between $50 and $60; Elgin $51.25, Middlesex $51.20, Oxford $56.23. Seven counties show an expenditure of between $40 and $50; Essex $45.32, Lambton $40 52

Perth $47.84, Wellington $41.17, Waterloo $41.57, Lincoln $45.07, Hastings $40. Fifteen counties spend between $30 and $40 ; eleven spend between $20 and $30. Only three, Frontenac, Renfrew and Haliburton, fall below $20.

Out of thirty-eight municipalities thirty show an average expenditure per county of $39.46, while of these the expenditure of five exceeds that of the county of Hastings on their county road system. The roads of Hastings, including township and county roads, it has been stated, cost $40 per mile, an amount which certainly compares most favorably with other sections of the Province, in view of the condition of the roads.

These estimates, it may be pointed out, consist of all expenditure upon roads within the several counties ; that is, the township money appropriations, county money appropriations, and statute labor at the value provided by law, one dollar per day. These statistics are deserving of careful consideration, and point out that a straightforward, business-like policy with regard to roads is no more costly than the present unsystematic methods in common use ; that good roads are no more expensive than bad roads in actual monetary outlay if right principles are adopted for their management ; and, in addition, bad roads mean the many losses which bad roads necessarily entail, and the absence of the benefits conferred by good roads.

Township Reports.

Returns received from township clerks in reply to a circular dated October 30th, 1899, indicate that the reform of statute labor is making rapid headway and point to a great change of feeling from that exhibited by the returns included in the report of 1897. Extracts from the returns of 1899 respecting statute labor are as follow :

Nelson Township.—At the first council meeting in 1900 a by-law was passed commuting statute labor at fifty cents a day.

Pelee Island.—Statute labor is abolished by by-law.

Blanshard.—Statute labor is abolished.

Burford.—A by-law is in force whereby a majority of any road division may petition to commute their labor at 50 cents per day. Eight divisions commuted this year.

Saltfleet.—Statute labor is commuted at 35 cents per day. Three commissioners are appointed by the council there being three divisions in the township.

Binbrook.—The statute labor system is not used in this township. We have one road commissioner appointed in each school section, whose duty it is to keep the bridges in proper repair. The system seems to be working very well, our roads are certainly improving every year. The plan is to get over all the roads with the grader in three years ; we have nearly 60 miles.

East Zorra.—Some divisions commute statute labor.

Euphemia.—Commutation tax was reduced from 75 cents to 25 cents per day. Ratepayers were given their choice either to labor or avail themselves of the use of the road machine, the council paying for same and charging the several road divisions accordingly. More than one half of the divisions availed themselves of the use of the grader. The other divisions did no work, all were charged at the rate of 25 cents per day.

Front of Yonge and Escott.—Statute labor is commuted at 75 cents per day and collected with other taxes.

Louth.—Half the statute labor was commuted for this year to pay for the road machine work. In 1898 the whole of the statute labor was commuted and double the work performed that year over all years, but this year a few old fogies wanted to work it out, and when the machine came over their beats the most of them were in their harvest or other work and could not attend to the statute labor and about one third was thrown away.

SARAWAK.—The statute labor system is still used in two or three wards only. The statute labor is commuted at 60 cents per day in the largest half of the municipality, and to be paid with the taxes and the plan works well. More work is done with 60 cents than for one days labor in the old way. The other two divisions are agitating for commutation at 60 cents per day, and believe it will be in force before two years. It is four or five years since the change in first two wards and they would not go back to statute labor.

EAST OXFORD.—This year we have commuted our statute labor at 60 cents per day and I think we have got one third more gravel on the roads. I think all municipalities should commute their statute labor and the roads will be better made under one or two men to build them.

ANCASTER.—Statute labor is commuted at 50 cents per day and an account opened called the statute labor account and a column on collector's roll used for same and collected as other taxes. Commutation has been adopted for three years, but the system and appointment of overseers is not complete.

TORONTO GORE.—The statute labor system is not used in this township, a change was made last spring. Have been spending from $400 to $500 in gravelling leading roads, but are working at a disadvantage as there is no supply except creek gravel.

WHITCHURCH.—The statute labor system is still used except on Yonge St. and some village lots north of Stouffville, being commuted at above places at 75 cents per day. A member of council is commissioner for Yonge St.

NORTH GRIMSBY.—Statute labor is commuted at 50 cents per day. Since commuting the statute labor our roads are in very much better condition. We raise a trifle over $1000 for road purposes which amount is expended by the road commissioners.

SARNIA.—Statute labor is commuted in one road division only, the amount of such commutation is expended in said division by the commissioner.

MALDEN.—Statute labor is abolished.

NORTH CROSBY.—Statute labor is commuted in one road division only.

NIAGARA.—Statute labor is abolished.

NORTH MONAGHAN.—Statute labor is commuted at rate of 75 cents per day.

TILBURY NORTH.—In two road divisions the statute labor is commuted at 50 cents per day. These divisions bought a road making machine.

REACH.—The statute labor system is still used with the exception of four divisions in which the statute labor has been commuted at 50c. per day instead of 75c. In the four divisions three commissioners were appointed whose duty was to collect the commutation tax, and supervise the expenditure when most needed. On the whole the change is working satisfactorily with a few exceptions (there are always some grumblers as you doubtless know). I may say that there is a growing feeling in the township for a better system of roadmaking and think it time that the old worn out statute labor system was entirely abolished.

BARTON.—Statute labor is commuted at so much per day according to outlay rate struck at the time of other rates. We find the commutation of statute labor a benefit, works well in the township.

WINCHESTER.—The statute labor system is abolished and road work is done by commissioners of whom we have eight in the township.

AMELIASBURG.—Statute labor is commuted in one road division, and it is proposed to commute one-half the statute labor throughout the entire township in 1900.

STAMFORD.—The statute labor system of road improvement is still used in about one-third of the township. In 1896 a by-law was passed commuting the statute labor in two polling divisions, and we hope to see the whole township commuted in a short period.

CLINTON.—Statute labor is commuted at 40 cents per day.

BASTARD AND BURGESS.—A number of road divisions have within the past two years commuted statute labor at 50 cents per day; money is expended by overseer appointed by council—improved roads the result. The township owns a stone crusher; breaks free of charge all stone got out in any road division, whether statute labor is commuted or not. The tendency is to do away with statute labor, spend money in getting out stone and spreading it on road, townships paying expense of breaking.

BECKWITH.—Statute labor is commuted in some cases.

YORK.—The statute labor system is used only in a portion (about one-half, according to assessment). In commuted portion of the township the money is all expended under the supervision of the township engineers. The feeling is growing stronger to entirely abolish statute labor, if the law would permit of rate being levied in each division (4) according to its requirements. The two northern divisions of township being rural and the southern portion urban, the requirements of the latter for sidewalks are greater than the north.

The holdings in the north are large as compared with the south, therefore they prefer commutation to abolition as the law stands at present. With the amendment in the law as suggested I think abolition would follow and a rate in the dollar (the only equitable mode of levy) would be levied for "public works" in each division (not more than four), and spent withm the division. The provision as to division of the township could be left subject to by-law of the municipality.

Scott.—Statute labor is a wretched failure. The 2,000 days of statute labor and half that number of dollars fail to keep our roads good.

Whitby.—The great hindrance to good roads is the lack of system occasioned by appointment of yearly overseers and commissioners, resulting in patchwork. This year's (1900) council proposes to abolish statute labor.

South Sherbrooke.—I believe if statute labor was done away with altogether and money raised it would be a great benefit to the roads. I consider a great part of the statute labor work is miserably laid out.

Albion.—We work on the same old plan, but it is not a good one.

Townsend.—The statute labor system is still used in this township, but there is a strong feeling to do away with it.

Ops.—Some few are in favor of abolishing statute labor, but at present at least 90 per cent. would rather work than pay any reasonable equivalent. In some beats statute labor is done systematically and well. Fifty cents per day is accepted in lieu of work if paid before the month of June. After that a commutation of one dollar per day is exacted for any work appearing undone on pathmaster's returns—generally about $50 on collector's roll annually. An effort was made last year to place the leading roads under the control of the County Council and borrow a heavy loan on thirty years' debentures for macadamizing, but the councils of the municipalities declined to assent to such change, for the present at least.

Madoc.—Statute labor system not satisfactory. I think ere long it will be abolished and a tax of so much per day of statute labor added to ratepayers' taxes, and all the roads in the township put under the supervision of township road surveyor.

Rama.—The township officials are talking of doing away with statute labor.

Grantham.—There has been considerable discussion about commuting the statute labor, but the change has not yet been tried.

Southwold.—The statute labor system is still used, and a great humbug it is. Statute labor is not abolished, but it is about time the unprofitable system was abolished.

Egremont.—Statute labor system is still used in this township, but many regard it as a relic and are longing for a change. Our road improvements have not kept pace with the other improvements, and it is owing entirely to the system. The sooner it is abolished the better as we cannot have a worse.

McMurrich.—The present system of statute labor gives very poor satisfaction, the general impression is that the sooner a change is made the better.

Brant.—It is probable that statute labor will be commuted in the near future.

Moore.—The statute labor system is still adhered to, although many advocate a change.

Eramosa.—There is a strong growing feeling that the system of statute labor has outlived its usefulness, and should be abolished and a competent road engineer appointed, instead of the council overseeing the roads.

Carden.—It is time the statute labor system was abolished.

South Fredericksburg.—I am in favor of the abolition of the statute labor system and in lieu thereof impose a tax of 50 or 75c. per day, and think if it were left to a vote the tax system would carry.

Amherst Island.—I am of the opinion it would be very much more advantageous to do away with the old system of statute labor, substitute tiles for culverts and do away with wooden coverings.

Woolwich.—I and a few others are in favor of having statute labor commuted, but our people do not seem to be ready for it yet.

Orford.—I have advocated for years a payment of 50c. to commute instead of work, and eventually it will come to that.

Mara.—I believe that if statute labor was commuted at 50c. per day we would have more and better work done than under the present system.

Enniskillen.—Would like statute labor abolished by Act of Parliament.

South Easthope.—The same old way used with some awakening that this old way does not give best results.

Brantford.—The statute labor system is still used but it should be abolished.

Clarke.—There is considerable dissatisfaction with system of statute labor and a growing desire for some better way.

Sullivan.—The statute labor system is getting into disfavor with most of the progressive farmers in the municipality, and I think the time is near when there will be a change—and it cannot come too soon

Front of Leeds and Lansdowne.—The plan adopted in this municipality for improving the roads is to advertise for stone in September, to be delivered by the 1st of June of the following year, about 25 cords in each place in twin piles (near the highway and convenient for crusher) on all the leading roads. The crusher here is owned by a private party who crushes and puts the stone on the roads with special carts for the purpose after the road has been graded with statute labor, at a rate per cord. This plan is giving good satisfaction. But it is thought that statute labor should be abolished.

PORTLAND.—The statute labor done in this township is of very little use. It should be made compulsory to commute all statute labor in the township.

GLENELG.—While the statute labor system is still in use, it is giving very poor satisfaction. Our councils are trying their best to make the statute labor more successful but with no apparent result. This is the result of: 1st—the ignorance of the pathmasters; 2nd—the indifference of the pathmasters. A change would seem to be necessary but the ratepayers as a rule are not in favor of commutation.

MARMORA AND LAKE—We have still the old blundering way of doing or pretending to do statute labor. Although there are a few conscientious pathmasters. A good many people pay 75c. a day for commutation. In the village of Marmora, unincorporated and included in the municipality of Marmora and Lake a little more than one-half pay a commutation of their own free will without being asked to do so. It is very beneficial to the village. Statute labor as performed in the municipality is with a few exception a farce, all sorts of dodges and schemes are put in use to get out of it. The grants made by the Council are not all put to good use; in some cases the money might as well be put down a rat hole. The system of work is uncertain and needs a thorough reforming, and compulsory at that.

GLOUCESTER.—The statute labor system is still used in this township but a great deal worse than it was fifty years ago. It is commuted to the extent of reducing it to 50c. per day and pay $1.00 per day for men to do the work, and as a further reduction the statuary scale is reduced two-thirds, as you will observe by the instructions enclosed herewith. The statute labor system as practiced in this township is virtually a failure—as the reduction made in the statuary scale, and the payment per day in lieu of performing the work and the price per day for performing the work and the chronic determination of the men to do just as little work as they can—has resolved itself into a sort of play day for the neighborhood to gossip and smoke away the time.

SHEFFIELD.—The statute labor system is better worked than formerly, but it is generally acknowledged to be unsatisfactory yet the ratepayers are not ready to give it up.

MELANCTHON.—The statute labor system is a fraud. It would be much better to charge 50c. per day and expend the money under a commissioner. Years ago we had a great amount of non-resident lands and the statute labor system yielded a large sum. We have very little non-resident lands now.

SOUTH MARYSBURG.—We have very bad roads during the spring and fall, every one does just as little road work as he can. The old system is a failure, we want improved legislation in this direction.

SOUTH NORWICH.—I have received instructions from the Council to submit to the ratepayers in January the question of doing away with the statute labor system. It is commuted at 50c. per day in the Police Village of Otterville and a portion of the township and it works wonders. The village is nearly all cement walks.

HUMBERSTONE.—The Government should pass an Act abolishing statute labor system.

HILLIER.—To me the statute labor system is very unjust.

OSNABRUCK —Think we will be able to abolish the statute labor system inside of two years.

SYDENHAM.—There has been some talk about doing away with statute labor, but no action has been taken in the matter as yet. The Council of this year (1900) proposes to raise $40,000 for road improvement.

FARADAY.—The system is very faulty as carried out here. Too many pathmasters, some only have their own work to oversee and others only have one or two to oversee.

NASSAGAWEYA.—The statute labor system is still used and many are sick of it, believing that a commutation tax of 50c. per day would give much better results.

HUNGERFORD.—In many sections of the township the road work is not half done.

MARCH.—I am of the opinion that if theLegislature would abolish the old fashioned system of statute labor, division of the township could be left subject to by-law of the municipality.

WOLFE ISLAND.—There is very little interest taken in roadmaking, and I do not look for much improvement until our people are educated to the benefit of better roads, and until statute labor is commuted instead of performed.

USBORNE.—There is some agitation to have the statute labor system abolished.

PELHAM.—Statute labor is commuted only in two small unincorporated villages, and giving good satisfaction there.

CRAMAHE.—Statute labor is not commuted in our township, but I think it would give better satisfaction if it was; a portion of the work each year is not done, and the council is asked each year to do so much repairing I think it will have to be done in time. The only objection I see in commuting statute labor is the laboring class who would far rather work for 50c. per day than pay it in their taxes.

SAULT STE. MARIE.—Statute labor system is still used in the township, I am sorry to say, as I consider that the better way would be to commute it.

MONCK.—In some instances statute labor is commuted but not abolished, nor otherwise modified. It should be abolished by statute, as it is not only detrimental to progress but a source of municipal corru tion. I have had 30 ears of experience to convince me.

Dawn.—We are now in Dawn township just upon the limit or divide between the old system and a new one ; the unsettled or new parts, however, will hold to the old methods yet for some years.

Sherbrooke.—Our township makes poor progress ; one man will grade and gravel and another will come along and cover it up with earth.

Caradoc.—The abolition of statute labor and a better system of road improvement is very slowly gaining ground. How to make it practicable is the question.

Aldborough.—There is quite a feeling that the present statute labor system should be abolished.

Middleton.—Our Council is in favor of doing away with statute labor, but there is a strong feeling among the ratepayers against it, and they do not like to make a move in the matter.

Kaladar, Anglesea and Effingham.—This municipality sticks to the old system, and getting no aid from county and being a rough country, results—bad roads.

Carlow.—The statute labor system is still used and a very poor system it is.

Wilberforce.—The statute labor system is still used but many express the desirability of abolishing it.

McKellar.—The statute labor system of road destruction is still used in this township.

Nepean.—Yes, I am sorry to say, statute labor is still in use in this township.

South Walsingham.—Our statute labor is a perfect fraud.

Albemarle.—There is an agitation in favor of abolishing the statute labor system, but whether it will be successful in accomplishing the same is yet uncertain.

Puslinch.—The statute labor system is persistently adhered to with its defective and unsatisfactory results.

Yarmouth.—The present Reeve, after two years' experience, is in favor of the abolition of statute labor. The councillors are of the same opinion, but the approaching elections have an influence and the matter has been laid over.

Bertie.—During the five years that the road grader has been in use more actual improvement has been wrought than for a decade before. Some permanent work has been accomplished through use of rock crusher, but the amount done in any year will be necessarily small so long as the statute labor system is in practice. Ready funds is the desideratum.

Christie.—Many of the more intelligent ratepayers of this township would be pleased to see statute labor abolished, but we still have too many who like their annual holidays.

Woodhouse.—There seems to be a growing opinion that the present system of bridging, building culverts and road-making needs revising.

Pittsburg.—I am of the opinion that if statute labor were commuted better results would follow if commutation money were better laid out.

Tudor & Cashel.—Our roads are in a very bad state and will be as long as the old statute labor system is used.

Artemesia.—There is considerable talk of abolishing statute labor.

North Easthope.—We spend a great deal of time and money upon the roads, and they are gradually improving, but we can never—in the opinion of the writer—have really good roads until the whole statute labor system is abolished and a new uniform system is adopted.

Storrington.—A by-law was passed in March abolishing statute labor, but such a storm was raised that the council repealed the law before it was acted upon.

Derby.—The idea of abolishing statute labor and introducing up-to-date methods is being freely discussed and growing in favor.

East Garafraxa.—There was a vote of the electors taken on a by-law to commute statute labor two years ago, but it failed.

Sandwich East.—The council have the idea to abolish statute labor system which seems to be a failure in our municipality.

Perry.—The statute labor system is still used in this township, I am sorry to say.

Asphodel.—The statute labor system is still used in the township and gives very poor results.

Charlotteville.—Same old style of pathmaster work.

Oro.—A great many of the ratepayers in Oro would like to see the statute labor system abolished, while a good many would oppose it.

Flos.—Since the commutation of statute labor in Elmvale a very great improvement in the streets is noticeable.

West Nissouri.—Some of our people are in favor of having statute labor abolished and others think taxation is as high as they can stand. If we could enforce the performance of the work the system is all right.

Ryde.—The idea is gaining ground in this municipality that the statute labor system is not the best if we are to have and maintain good roads.

Tuckersmith.—The statute labor system is still used in this township but its days are numbered, at least in its present form. The trouble about abolishing statute labor system is to get some good feasible scheme to replace it with. Are considering the advisability of reducing the pathmasters from 86 to 4, giving each one a ward of his own under council's control and allowing ratepayers to draw the gravel as at present.

ENDORSING THE ABOLITION AND COMMUTATION OF STATUTE LABOR.

ALMOST IMPASSABLE UNTIL STATUTE LABOR WAS ABOLISHED.—NOW IN FAIR CONDITION.

A by-law to commute statute labor at fifty cents a day, was submitted to the ratepayers of Orillia Township at the municipal elections in January, 1900, a majority favoring commutation. In discussing the proposed reform the Orillia *Packet* of December 28th, 1899, published the following article and letters which are self explanatory:

"Experience, it has been said, is the best teacher, but the wise man benefits as far as possible by the experience of others. With a view to ascertaining how the system of roadmaking advocated by Mr. Campbell worked in the municipalities where it had been put into operation, the *Packet* wrote to the Clerks of ten of these townships, asking them to give the ratepayers of North and South Orillia the benefit of their practical experience. Eight have complied with the request, and their replies, given below, make interesting reading. It will be noticed that while the details differ widely, the verdict is unanimous that commutation gives much better results than the old statute labor system. This unanimity of opinion where the commutation has been given a trial should be proof enough to the ratepayers of Orillia Township that they will make no mistake in voting for the change. The question has been asked, how it is possible that fifty cents in cash should build more road than a day's statute labor, which represents $1. Whatever the reason, it is perfectly plain that such is the case, as is exemplified plainly in the case of every municipality heard from. The most plausible explanation would seem to be that the performance of statute labor is, as has often been said, a farce, and that there is truth in the statement that much of the labor is never performed. The farmer who believes in good roads and works hard to get them is thus made to suffer in passing over beats where the call to statute labor is not looked on seriously, but rather as an invitation to a picnic. It is, however, of little use discussing the cause. The fact is plain that commutation at fifty cents a day does produce better results than the statute labor system.

"There are one or two other points which evidently need to be cleared up. It was a mistake to refer to the proposed change as the abolition of statute labor system. It would be better described as a reduction of the commutation from $1 to fifty cents a day. The road tax will still be reckoned on the same basis as at present, and those who wish will be given an opportunity to work out their statute labor, provided they are willing to work faithfully and to earn the money. Most of those who do work will doubtless get much more than enough to pay their road tax, and will be paid the extra sum out of the amount received from those who prefer to commute at the low rate. It should also be distinctly understood that, according to the scheme outlined by Mr. Campbell, and to the intention of the Councillors, the money received in commutation from each beat will be expended upon the improvement and up-keep of the road on that beat, so long as may be necessary to render it perfect. The only difference in this respect will be that the work will be done on a cash instead of on a picnic basis."

From J. F. Kelly, Mallorytown, Clerk Front of Yonge & Escott :

"Sir,—Yours of 18th to hand and noted. In reply would say that we have only been commuting our statute labor for two years and am hardly able to tell how it will work yet, as they have not decided on any regular system ; but think it is the proper thing to do and will work all right when properly arranged."

From H. Bryant, Barton, Clerk of Barton :

"Sir,—In reply to yours of 18th inst. The Township Council of Barton has commuted the statute labor and, after a trial of six years, we find it very satisfactory. Our people, I am quite sure, would not go back to the old rut. I am very busy at present, as we are on the eve of a lively municipal contest. But if we can give you any assistance in the new year by sending copies of by-laws, rates, etc., I shall be pleased to do so."

From N. Harrison, Castlemore, Clerk of Toronto Gore :

"Sir,—Your letter of 18th inst. to hand, and has come at a very busy time. Therefore I cannot answer so fully as I would wish. I enclose you a copy of by-law abolishing statute labor. At the time the by-law was passed, about one-half the ratepayers raised a strong protest against it, but are now coming round to look at the question in a different light, and I think after another year's trial all objections will have disappeared. I claim that more work has been performed and a more uniform quality this year for about $600 than was done in previous years by over one thousand days under the statute labor system."

From W. H. Nelles, Grimsby, Clerk of North Grimsby :

"Sir,—Yours of 18th inst. regarding commutation of statute labor duly received. We have commuted our statute labor for the last four or five years, with very satisfactory results. Our roads are now in first-class condition. We employ two commissioners to look after the work. We use a stone crusher and a road grader. The latter is handled by a party owning two good teams. We pay him $6.25 per day. He will do as much work and do it far better than fifty men would do after the old style. At first we commuted at sixty cents a day, which gave us something over $1,000. This year we have lowered it to fifty cents, not requiring so much to keep our roads up. The ratepayers are fully satisfied with the system, and we would never think of returning to the old way."

From G. W. Tinlin, Beamsville, Clerk of Clinton :

"Sir,—I received a letter from you asking about the abolition of statute labor. About four years ago we bought a road machine and commuted half the statute labor at sixty cents per day. We tried this plan for two years and found it was too expensive, as we had to appoint pathmasters for the half of the time, and some pathmasters will charge a day for coming after their list and time for warning men to work, and some pathmasters would return their list and mark it all worked when probably they have not worked at all. So two years ago we commuted the whole of the time at forty cents a day. I think we have better roads than we had on the old statute labor system. The first year that we commuted the whole time we hired two teams and men to work road machine and would get some farmer who was living on the beat where the machine was working to do the ploughing. We had a great deal of trouble in this way, as a great many men do not know how to plough for a road machine, and in busy time we had trouble to get them when we wanted them. So this year we hired three teams, one team to go along with the plough and two teams on the road machine ; and when the team was not ploughing they would put the three teams on road machine. We have road commissioners to look after road machine, to mend culverts and bridges. I might say that the first year that we commuted half the time and bought a road machine there was a lot of fault found. But before the season was over the most of the ratepayers were in favor of it and would not like to go back to the old system."

From F. A. Hutt, Southend, Clerk of Stamford :

"Sir,—I have your letter of 18th inst. In the beginning of the year 1896 our Council passed a by-law amending our old statute labor by-law by commuting the statute labor in two of the largest electoral districts in the township. These two divisions have been worked on that system ever since. Whenever any road divisions in the two remaining uncommuted districts petition to be added to the divisions that are now commuted, the Council has granted the petition. We have had to commute a road division in the uncommuted district every year since, and I do not think the time is far distant when it will be worked wholly on the commuted system.

"The statute labor in the commuted district is commuted at 50 cents per day, and in the uncommuted district at 75 cents where unperformed. The roads have been greatly improved by the adoption of the system, by the purchase of two road grading machines and by using vitrified sewer pipe for waterways. It is very probable that if the whole township were worked on the commuted plan better roads could be made for a tax of 25 or 30 cents per day than are now obtained under the old system in the uncommuted districts. Besides, the roads are worked under improved methods and uniformity in making is obtained. Where the path-

masters work the roads there is diversity and difference, and not being skilled in handling the road machine the roads are not constructed in the best possible way, but are sometimes left in a worse condition than found. But they have performed their statute labor and the travelling public have to put up with the inconvenience. I am quite certain that if a vote was taken of the ratepayers of this township that the statute labor system would be abolished. Kindly let me know the result."

From W. B. Switzer, Binbrook, Clerk of Binbrook.

"SIR: I received your letter some days ago and would have answered it sooner, but as you are aware we have a very busy time at this season of the year closing up our township matters for the year. So you will have to forgive me for not being more prompt. We did away with the old system in 1896. So we have had four years' trial of the new system, and we are all very well satisfied with the change. Of course there are a few who are not satisfied, but I find they are mostly those who in years gone by used to dump their scrapers full on the roads and leave them for time and travel to level them, or those whose time is of no value on the farm and who would like to work for the Queen and do nothing.

"But the almost universal opinion is that our roads are a great improvement on those of some years ago. I have heard travellers say that when they entered Binbrook they could immediately see a difference in the roads. For general work we have a road machine and our calculations are to go over the road once in three years. We have between sixty and seventy miles of roads. We take about one third of this and put it in good shape each year, and if there is a bad piece anywhere in the township we try to reach that too, and we find a great improvement in our roads. We appoint an overseer of roads in each school section, whose duty it is to see that the roads are levelled as early in the spring as possible, to repair all culverts and washouts, and report to municipal council when any large bridges are in need of repairs. They are responsible also for keeping the roads open in winter, having power to call out any number they may require. The municipality pays for all work performed at the rate of 10 cents an hour. I might say this seems to be the most difficult part of the whole system, as there is a disposition on the part of some persons to take all the advantage of the municipality they can. But of course you would not have any of them in Orillia. We began the system of commutation of statute labor at 60 cents per day the first year. The second year 50 cents per day. Third year 35 cents per day. There was where we made our mistake, as we had to pay out hundreds of dollars for shovelling snow in December of last year, leaving us short for the present year. We have now gone back to the 50 cents per day basis which for a few years will probably be the amount of commutation. Our rate is any assessment up to $800 two days, and for every additional $800 or fractional part over $400 one day, giving us about $850 in our township from this rating. I do think in large townships the appointment of a superintendent of roads would be a good thing. But our township is too small for that expense."

From J. Honor, Amherstburg, Clerk of Malden.

"SIR,—Your letter of December 18th to hand, and in reply I beg to state: Malden Township, County Essex, contains twenty-one thousand acres with an assessed value of $730,000, and about sixty-five miles of road, about one-half of which are earth roads, the rest gravelled, with two exceptions of about four miles of crushed stone. The land is very flat except a few hundred acres lying close to the town of Amherstburg. About twelve years ago we passed a by-law to commute statute labor, and this continued in force and seemed to work well for about five years. Then a vote was taken at the time of the municipal election. The necessary number of ballots were printed as follows: 'For the abolition of statute labor,' 'Against the abolition of statute labor.' And statute labor was wiped out. I notice that you say that in North Monaghan statute labor is abolished. I beg to differ from you. They have only commuted it. We have abolished it. Our council divided our township into four divisions for their own convenience, each councillor looking after his part. But on large contracts they consult each other. There is no commissioner employed. In the month of April they make a tour of inspection of the township and inspect each job of work that is most necessary to be done, and put an estimate on it. Later on they advertise that on a certain day they will sell jobs of work around the township, and each job is sold to the lowest bidder. There are a certain number of men who make a business of ditching for a living, and they become very expert at the work, so that all work is done in a thorough, workmanlike manner. We have two road graders. We let the contract of operating them to the lowest bidder by the day, he to furnish two teams and two men. One half of the township costs us about $4 a day and the other half $4.50. What I mean by grading is going over the roads in the spring when they are beginning to dry up, and levelling them. Our township usually expends about $2,000 a year on our roads and bridges. And I think that I can say without fear of honest contradiction that there is not another municipality in the Province that gives its ratepayers better value for their money than we do. Our council receives the handsome salary of $32 a year each for their services. All money required is raised in the general township rate. The rich land owner pays the bulk of the taxes, and the poor man who is assessed for only $100, who under statute labor had to do either his two da s work or pay fifty cents a day, now pays only about twenty cents taxes. In

conclusion you will notice that our council control the whole work. No commissioner is employed. Their salary is saved to the township. All work is let by contract to the lowest bidder, and is received by the council. So that if a councillor does not prove himself to be a good roadmaker and ditcher he knows what his reward will be. We advertise for tenders for cutting thistles and all noxious weeds from growing upon the roads, each tenderer to state the price for the job and which of the four divisions he wishes to work in. We prohibit all stock from running at large, and employ a bailiff to enforce the by-law. There is no corruption or mismanagement. In our township everything is done openly and above board. I herewith send you one of our financial statements for the year."

From G. W. Bennett, Peterboro', Clerk of N. Monaghan.

"Sir,—Yours of December 18th reached me at a very busy time for township clerks. I can scarcely do justice in general terms to this question (i.e., Good Roads) as we have found it in North Monaghan, other than the plan outlined in the letter of 1898 to which you refer and which is still in the main the principal upon which we work. I may say that any alteration to this plan adopted since has been only of such a nature as to widen the breach between our present system and the hydra-headed statute labor. In the beginning of the year 1899 our council increased the commutation rate to seventy-five cents per day, reduced the road districts by one, purchased another gravel pit at so much per acre, and also supplied each commissioner with a number of short-handled shovels for filling gravel. These changes together with a few minor ones in the matter of detail were adopted after practical experience, and a favorable comment throughout our township. Our system seems complete in every detail, and at present is working excellently. Of course varying conditions will necessitate corresponding changes from time to time. What is of vast importance, our commissioners are, through experience and the progressive literature supplied from time to time, becoming expert and more self-reliant. I mean by the latter that they are becoming independent of the patronage that is frequently bestowed by councillors in view of a coming election, and which in no case can be applied beneficially to the roads. At our nomination meeting to-day our Reeve and Treasurer presented a financial statement which differs from its predecessors in this township inasmuch as it shows all our taxes for the year paid on December 15th, all our debts paid, and a substantial balance on hand to begin next year, and this without either charging interest or allowing discount. This is largely due to the fact that the people are recognizing the benefits of well-directed efforts and well-spent money upon the roads, and signify their approval by their readiness to pay their taxes for these purposes. If there is any specific information or any detail that I can furnish you I will be pleased to do so, but as I said before, I cannot cover the ground in this general way to the extent I would like, and I do not know the circumstances under which you are working. In 1896 we voted upon the question of the abolition of statute labor. This was carried against by two to one. In closing I might say that the objective in reform of this kind is success. One or two good live men can carry the thing through with a little push, and very soon you will hear the last of road beats and pathmasters. By all means procure a road grader, and when procured, do not over-do the amount of grading. Make haste slowly. Crown and thoroughly build the work for the first year so as to avoid adverse criticism and enlist sympathy in the beginning. See that your pay lists are kept accurately and publish them with your auditor's statements, for no doubt you understand the peculiar desire some of your ratepayers may have to know 'where the money goes,' 'or who gets it.' I strongly advocate and advisedly so, the abolition of statute labor. There can be no doubt about the result. Any of the methods open to you by the 'Act' is better and more business like, and as such encourages better men to come forward as councillors. I wish you every success."

THE TOWNSHIP SYSTEM.

The system which townships are advised to adopt in place of statute labor, is included in the summary which follows. This has not been uniformly adopted, several townships making slight alterations such as they deem more suited to local conditions, instances of which are shown in the by-laws of two townships included in this report:

JUST GRADED AND GRAVELLED—A ROLLER WOULD COMPLETE IT.

Do away with the statute labor roll entirely. If this plan is not favored the labor may be commuted at a rate per day. This ranges from 25 cents to 75 cents in the townships now commuting.

If statute labor is entirely abolished, levy a rate on the assessment of the township to raise the money required.

For road purposes, divide the township into a convenient number of divisions, usually four.

Apportion the money among the road divisions, keeping in view all circumstances, viz. Importance of roads, works needed on them, benefit resulting to the greatest number of people, amount of traffic, assessment, etc.

Appoint one township road commissioner, or if preferred one commissioner for each road division, to advise, consult with, and carry out the direction of the council.

The office of road commissioner should be similar to that of the township clerk or treasurer.

Councillors should not act as commissioners, as they are subject to undue influence from the ratepayers, and their term of office is uncertain.

A general plan for road improvement should be laid down by the council for the commissioner or commissioners to follow.

This plan should specify the width to be graded, width and depth of road metal, character of drainage, etc., of all roads.

Roads of importance should not be less than twenty-four feet between the inside edges of the open ditches. No road should be of less width than eighteen feet.

Early in the year the commissioner should go over the roads to consider the work to be undertaken, and report to the council.

Work of construction, such as hauling gravel, ditching and drainage, building bridges and culverts should be done by contract, and supervised by the road commissioner.

No account for labor or material should be paid by the treasurer except on the certificate of the road commissioner.

Minor work and repairing should be done by day labor, only the road commissioner being authorized to employ, direct or discharge the men and teams needed to operate the machinery.

If a member of the council desires to interfere in any of these matters he should do so through the commissioner.

The same man and teams should be hired to operate the machinery for the entire season, or longer if possible, as they become proficient and do better work. This applies particularly to the operation of a road grader; or for the grader a traction engine may be hired.

The commissioner should keep a pay roll to return quarterly to the council, showing who have been paid and the amount paid, the roll to be then filed for auditors.

This roll will act as a check on favoritism on the part of the commissioner. Work should be divided as much as possible among the residents of the township desiring it.

Work should be commenced with a definite end in view and continued systematically, from year to year if necessary, until the entire road mileage has been brought to a proper standard.

ROADMAKING OUTLINED.

Previous reports of this Department have dealt as fully as seems advisable with the practical work of roadmaking. It therefore does not appear necessary to again enlarge upon it at the present time, other than to briefly outline the subject. This can best be done by quoting from a previous report, a list of instructions for pathmasters, which contain briefly the elementary principles of roadmaking, as applicable to the roads of Ontario, and the systems under which they are maintained:

1. Every good road has two essential features:
   (a) A thoroughly dry foundation.
   (b) A smooth, hard, waterproof surface covering.

2. The foundation is the natural sub-soil, the "dirt road," which must be kept dry by good drainage.

3. The surface covering is generally a coating of gravel or broken stone, which should be put on the road in such a way that it will not, in wet weather, be churned up and mixed with the earth beneath. That is, it should form a distinct coating.

4. To accomplish this:
   (a) The gravel or broken stone should contain very little sand or clay—it should be clean.
   (b) The roads should be crowned or rounded in the centre so as to shed the water to the open drains.
   (c) Ruts should not be allowed to form as they prevent water from passing to the open drains.
   (d) The open drains should have a sufficient fall, and free outlet so that the water will not stand in them but will be carried away immediately.
   (e) Tile under-drains should be laid wherever the open drains are not sufficient and where the ground has a moist or wet appearance, with a tendency to absorb the gravel and rut readily. By this means the foundation is made dry.

5. Do not leave the gravel or stone just as it drops from the wagon, but spread it so that travel will at once pass over and consolidate it before the fall rains commence.

6. Keep the road metal raked or scraped into the wheel or horse tracks until consolidated.

7. Grade and crown the road before putting on gravel or stone.

8. If a grading machine is available, grade the roads which you intend to gravel before the time of statute labor, and use the statute labor as far as possible in drawing gravel.

9. A fair crown for gravel roads on level ground is one inch of rise to each foot of width from the side to the centre.

10. The road on hills should have a greater crown than on level ground, otherwise the water will follow the wheel tracks and create deep ruts instead of passing to the side drains. One and one-quarter inches to the foot from the side to centre will be sufficient.

11. Repair old gravel roads which have a hard centre but too little crown, and which have high, square shoulders, by cutting off the shoulders, turning the material outward and placing new gravel or stone in the centre. Do not cover the old gravel foundation with the mixture of earth, sod, and fine gravel of which the shoulders are composed. The shoulders can be most easily cut off by means of a grading machine.

12. A width of twenty-four feet between ditches will meet most conditions, with the central eight feet gravelled or metalled with broken stone.

13. Wherever water stands on the roadway or by the roadside, or wherever the ground remains moist or is swampy in the spring and fall, better drainage is needed.

14. Look over the road under your charge after heavy rains and during spring freshets. The work of a few minutes in freeing drains from obstruction or diverting a current of water into a proper channel may become the work of days if neglected.

15. Surface water should be disposed of in small quantities; great accumulations are hard to handle and are destructive. Obtain outlets into natural watercourses as often as possible.

16. Instead of having deep open ditches to underdrain the road and dry the foundation, use tile.

17. Give culverts a good fall and free outlet so that water will not freeze in them.

18. In taking gravel from the pit, see that precautions are taken to draw only clean material. Do not let the face of the pit be scraped down, mixing clay, sand and turf with good gravel.

19. Gravel which retains a perpendicular face in the pit in the spring, and shows no trace of slipping is generally fit for use on the road without treatment. Dirty gravel should be screened.

20. Plan and lay out the work before calling out the men.

21. When preparing plans keep the work of succeeding years in view.

22. Call out for each day only such number of men and teams as can be properly directed.

23. In laying out the work estimate on a full day's work from each man and see that it is performed. Specify the number of loads of gravel to constitute a day's work. Every wagon box should hold a quarter of a cord.

24. Make early arrangements for having on the road when required, and in good repair, all implements and tools to be used in the performance of statute labor.

25. Do all work with a view to permanence and durability.

A study of the foregoing will point to three main faults commonly to be found in the roads. These are, bad drainage, poor gravel, and improper methods

of placing the metal, (gravel or broken stone) on the roads. It is doubtful if any of these evils can be fully remedied under the statute labor system. To overcome bad drainage it is essential that there should be a constant system of repairs keeping the road well crowned, free from ruts, the gravel or broken stone raked into place, and the side drains and culverts open and without stoppages. The use of poor road metal, (gravel or stone) is likely to continue until there is someone, who, by experience, is able to select the best material available. and is provided with proper implements to screen and crush it when necessary, Nor can statute labor ever provide the means necessary for putting metal on the roads in the right way, first preparing the road by the use of machinery, then properly spreading the metal and rolling it.

IMPROVING SAND ROADS.

A degree of moisture is necessary in the summer season in keeping sand roads or roads over sandy ground in their best condition. Drains are necessary but they should not be deeper than will provide suitable drainage in spring and fall. Under-drains, if they are needed at all, should be shallow.

One of the most lasting and beneficial improvements to sand roads, is the planting of rows of trees on each side of the road, and close enough together to provide continuous shade. They will prevent, in part, the drying effect of the winds, as well as intercept the rays of the sun. For this purpose the white elm with its arching branches is most serviceable, and will add many times to the appearance of the country.

ROAD MACHINERY.

The importance of using modern machinery in making good roads, has become pretty generally recognized since the commencement of the good roads movement in Ontario. A road grader has become a standard implement, employed by a great majority of townships, and wherever it is properly used is a great saving of labor, and does the work more efficiently than can be done by hand. Municipal clerks report their use in 215 townships, a considerable number of these having two. Several, among which are Minto, Trafalgar, Tecumseh, Toronto and Plympton own three and four.

Several townships and numerous towns have supplied themselves with rock crushers. Among the townships owning these implements are:—Nottawasga, Ameliasburg, Front of Leeds and Landsdowne, Mara, Winchester, Bastard and Burgess, Bathurst and Emsley, Bertie, Rear Yonge and Escott, Smith, Williamsburg, Charlottenburg (crusher and traction engine), and North Grimsby. A number of townships of which are Keppel, Elmsley South, Beckwith, Pittsburg, Elizabethtown and Ramsay, hire a crusher or contract for broken stone. The county of Hastings uses a complete outfit of roadmaking machinery, roller, crusher, grader and traction engine. Victoria also has an outfit of roadmaking machinery for the use of the townships, and Wentworth rents its crusher to the townships within the county.

Broken stone roads are, when properly made, very much more serviceable than gravel roads, and wherever there is a plentiful supply of good stone, particularly if gravel is scarce or of poor quality, a crusher with screen attachment should be used. It is profitable also to put certain qualities of gravel through a stone crusher, such gravel as contains a quantity of large stone. If there is much clay or earthy material in the gravel it will be well to remove it by using a revolving screen attached to the crusher.

Townships should, wherever possible, use a road roller, particularly if broken stone is used. A roller will at once consolidate the metal, leaving the road in the best condition for travel, at the same time resulting in a great saving of gravel or stone. Without the use of a roller, the road reaches a condition fit for travel only after a long period, during which time the loose material causes much inconvenience, and is mixed with the soil beneath, largely destroying its usefulness. Townships should own a horse roller, or better, should rent a steam roller from a town or city in the vicinity possessing one.

If a steam roller is available, its use may be further extended to picking up the road and loosening the old material before placing the new material on the road; after which the road may be rolled down solidly, the new material and the old road surface having a perfect bond.

Road graders are commonly operated by two teams of horses at a cost of $6 per day. A traction engine, such as is used for threshing machines, is, however, a very much better power, and is sometimes hired for about $3 a day, or

half the cost of using horses. The engine gives a steady draught, and does not need to stop to rest, two advantages over the use of horses. It is customary to go two or three miles with a traction engine before turning and by making two or three circuits, up one side of the road and down the other, it is generally possible to cut off the square edges which have formed, restoring the crown and preparing it for a new coating of gravel or stone.

TRANSPORTATION OF ROAD MATERIAL BY RAILWAYS.

In several counties, such as Essex, Kent, Lambton, Norfolk, Haldimand, Monck, Welland, there is a total absence of roadmaking material, and in these counties the improvement of streets of towns and cities, as well as the rural roads, appears to be a hopeless task, and almost outside of their consideration. The ratepayers suffer through bad roads, are anxious for good roads, but helplessly complain of having no material, and have almost given up hope of any improvement. With an earnest endeavor to better their condition, they are lavishing their money and labor in raking and scraping the mud, which work is almost completely destroyed every spring and fall.

These counties are completely traversed by the Michigan Central, Grand Trunk, Canadian Pacific, Lake Erie and Detroit River, Erie and Huron Railways. Along these lines are several stone quarries, at Amherstburg, Hagersville, St. Davids and Fort Erie, in each of which have been recently placed stone crushing plants, capable of turning out first-class road material in large quantities. In addition to this, at Komoka, Blenheim and many points along these lines, this material can be cheaply loaded by machinery and scraped off the cars at any road crossing convenient to the work, reducing the haul to a minimum. Railway companies have in every way signified a desire to assist in the building of roads, especially those leading the traffic to their own lines, and in some instances have delivered the material free, in others not charging more than half freight rates. When they are permitted to carry the material at slack seasons, they have expressed a willingness to do the work at actual cost of hauling, which would place these municipalities in a position to procure first-class material at less cost than others where material is considered plentiful. In this way, too, many towns and cities now using gravel of an inferior quality would be enabled to use a first-class quality of durable material.

In many townships, by a liberal expenditure of money and labor, the roads have been improved, as in the township of Ekfrid, where few miles remain ungravelled; but in doing this the supply has been exhausted, and now these roads, built of an inferior quality of gravel, are suffering for want of repairs. Unless some method is immediately adopted this work will suffer, and the expenditure of labor and money already made will be lost. At the last municipal

nomination the chief question in that township was as to how an additional supply of gravel or broken stone could be best secured.

Railway haulage of broken stone is now being looked upon as impossible by most municipalities, but through the influence of the Government it may be possible to arrange a general plan of delivering this material at a low freight rate, resulting in an immense advantage to the municipalities and solving their difficulty.

PERMANENT ROADWORK.

With merely sufficient exceptions to prove the rule. permanency and durability are entirely lacking in road construction throughout the Province. This is characteristic of all new countries where immediate needs are pressing and where the money and material for substantial work are lacking. This we find exemplified not only in Ontario, but in the whole of Canada, the United States and the entire American continent. Not only is this temporary character of construction characteristic of roads (and the bridges which are a necessary part of the roads), but it is to be seen in the quality of work placed in other works public or private as well.

As a country emerges from the days of pioneer settlement, a different feeling should, and does, prevail. Temporary work, while it may be the best investment under the conditions surrounding early settlement, becomes very expensive and unsatisfactory under circumstances attached to a denser population and its attendant commercial and social requirements.

Permanent work, with its fewer repairs, its less interruption to traffic when undergoing these needed repairs, the better service at all times, renders durable construction, particularly in highway building, a measure of economy, in spite of the fact that the first cost of such durable work is more than that of temporary construction.

An effort should be made to get away from the spirit which prompts the building of flimsy wooden culverts and bridges that render but poor service at their best, and in a few years are twisted and bent out of all resemblance to a bridge or a culvert. The expenditure for the repair of such structures will generally, at the end of a term of years, make up much more than the cost of a permanent work.

The only really permanent bridge or culvert is the arch of masonry or concrete, which, up to spans of forty feet, can be very cheaply built for ordinary highway traffic. Such arches have been in use in Scotland and Ireland for more than a century, and, with scarcely any repair, are still in good condition. It is common there for a farmer living in the vicinity of the work to contract for it, supply stone and other material, hiring one or two masons to do the work. In this way the money paid out for the work is all kept in the locality, and the method has proven very popular.

Iron bridges, with masonry or concrete abutments or piers, come next, in order of durability and economy. The iron superstructure, with proper repairs, should last for fifty years, while the masonry should be good for at least a century, if rightly built and attended to when signs of wear appear.

During the life of the superstructure three or more wooden bridges would be needed, even with close attention to repairs, while the service rendered would not be at all equal to that of the stronger and more durable work.

For small culverts, which at present are the cause of so much annoyance on our highways, sewer pipe, iron pipe, or concrete work should replace the wooden boxes now so much used. Care should be taken to provide a level roadway at these points, so as to avoid the disagreeable bumping and jolting which so many of these boxes now create.

For the roadway itself, attention should be given first to a permanent system of drainage in all its parts, involving tile under-drainage where necessary. The grade of the road should be brought to its permanent level, before gravel or stone are placed on it. Hills should be permanently graded, and low sections permanently filled. Ontario has emerged from the days of temporary work, and the time has come when we should avoid the past policy which, by scattering money and labor in patch-work, has left our roads in a most unsatisfactory condition.

HIGHWAY CULVERTS.

The construction of culverts is a detail of road improvement which demands, in many townships, a large annual expenditure. Until very recently timber, principally cedar, was the only material employed, with the exception of an occasional rubble-stone structure. Timber is a very temporary material for this class of work. It quickly decays, warps and is displaced by the frost, so that the life of wooden culverts is frequently not more than eight, and rarely reaches fifteen years. During this period it is very apt to be in an unsafe condition and is generally an impediment to traffic. In a term of years the cost of repairs, frequently necessitating a man's labor for half a day if only to put in a new plank, is considerable.

The price of timber, too, is constantly increasing while the quality obtainable is not equal to that of former years. The returns received from municipal clerks with regard to last year's work, show a decided tendency on the part of municipal councils to follow the suggestion of this Department in adopting, in place of timber, sewer pipe, concrete pipe, and stone, brick and concrete arches There will be failures, undoubtedly, of these new materials. Inexperience in their use, carelessness in workmanship, and an inferior quality of material, will almost of necessity be found in come cases, but with care and growing experience they will be found a decided advantage both in point of economy and service. Experience, too, in the use of these new materials will, in nearly every case, enable councils to largely lessen their cost.

Returns from municipal clerks show that 176 townships in the Province are using cement-concrete and sewer tile, cement, concrete, stone or brick arches. Of these, only eight report unfavorably to their use. The common expressions are: "Growing in favor," "Good satisfaction," "Not in use long enough to express an opinion," "Full satisfaction," "Are doing well," "Give general satisfaction," "Excellent satisfaction," "So far have proven satisfactory," "Good results," "Very satisfactory," "The best satisfaction," "No complaints," "First-class," "Fair satisfaction," "Entire satisfaction," "Very satisfactory results."

A selection from these reports is appended, such as are most instructive, and including the eight unfavorable replies to which reference has been made. These replies indicate that tile are most satisfactory for small sizes of culverts; that care must be taken to put a sufficient covering of earth over them; that they must have a free outlet so that water will not freeze in them; and that for larger sizes, arch culverts of concrete, stone or brick should be used. It may be well to recommend here also, that the earth covering over and around these culverts should be of clay or other heavy soil, such as is not readily washed out by freshets, and this covering should be firmly tramped into place.

Township Reports.

The comments of a number of township clerks regarding culverts are as follows :

West Oxford.—The council are using cement concrete pipe for culverts up to 3 ft. 6 in. with good satisfaction.

Windham.—The tile gives very good satisfaction in all cases where there is fall enough to take the water from the lower end of culvert.

King.—Have been using sewer pipe for 8 years. They give good satisfaction for culverts and are much cheaper than cedar.

Toronto.—Tile gives very good satisfaction when you can get them well covered, so that heavy loads do not break through them.

Lobo.—Cement concrete tile is used for culverts very extensively and gives good satisfaction.

West Flamboro'.—We have one cement concrete culvert. Is giving good satisfaction. We have several vitrified or sewer pipe culverts. They are all right where there is a good fall from the discharge so that the water will not stand in them and freeze.

Waterloo.—Cement concrete is used extensively with good satisfaction.

Brooke.—Concrete tile for deep culverts is coming into use, and where properly placed are satisfactory. A large concrete culvert has just been completed.

East Hawkesbury.—We purchased a car load of vitrified pipes for culverts and have used them with good results. They are still good and sound after three years usage.

McKillop.—Built three cement abutments for steel bridges this summer.

Oakland.—We have been using vitrified tile for some time and find the results very satisfactory. Have not had to renew any as yet except where they were not large enough.

Carrick.—We put in one tile culvert in 1898 and it gave good satisfaction. We put in three this year. The tiles we use are cement concrete.

Bosanquet.—Using the small sizes of tile with satisfaction.

Blanshard.—We have been using all concrete tile for culverts and have built one cement archy. They have given the best of satisfaction.

Adelaide.—Cement-concrete is used in all culverts where they are of sufficient size to carry water. We put in a three foot one this summer, which gives good satisfaction.

North Dorchester.—Cement-concrete is used for culverts and gives good satisfaction.

Trafalgar.—Coment-concrete and vitrified tile are used very extensively and are most satisfactory ; have not had any broken by frost although frozen solid when over three-quarters full.

West Zorra.—Concrete tile is used almost entirely, with good success.

Rochester.—Tile are now used generally for culverts.

Bathurst and Elmsley.—Tile for culverts has been used to some extent but it is said that where tiles fill with water in the fall that the freezing destroys them. Where there is plenty of fall to keep the water away and no danger of it freezing, they have given good satisfaction.

Willoughby.—Vitrified tile are in quite common use in this township and are giving good satisfaction.

Markham.—Cement-concrete and vitrified tile have been used with very good satisfaction.

Thurlow.—The county has used vitrified tile in a couple of places in the township to my knowledge with satisfaction. I do not think the township has used any.

Elma.—Vitrified tile has been used in some culverts this year for the first time, but as they have not stood a winter yet cannot tell the result but if they give good satisfaction will be entirely used.

Hay.—Vitrified tile was used 10 years ago and they give the best satisfaction. But since then nothing but timber has been used, with very unsatisfactory results.

West Williams.—About eight years ago we bought a carload of vitrified tile. They have stood all right. Since then we have used cement-concrete tile, the contractor manufacturing them at a convenient place in the township. They give perfect satisfaction where properly put in, but much care must be taken to pack them well around to prevent them washing out. We built, four years ago, a 51 foot long culvert of 3 feet cement concrete tile with masonry at each

end ; there is 17 feet of earth above it, giving entire satisfaction. We built this year a 56 foot arched stone culvert at a cost of $1,000.

KINCARDINE.—A few tile have been used this year and are giving good satisfaction being much cheaper than timber.

BINBROOK.—We have two cement-concrete culverts in the township. It was merely for a test and it would appear as if they were going to be very satisfactory. We have no vitrified tile.

EAST ZORRA.—Cement concrete mostly is used. Very few wooden culverts built in last ten years. Very good when properly put in, otherwise not.

YARMOUTH.—Cement concrete and vitrified tile are both used and found to be satisfactory when properly put in. Cull pipe are usually supplied where vitrified tile is used and these do not fit, causing leaky joints and washouts.

BERTIE.—Vitrified tile is used for culverts and sluiceways with excellent results where properly put in.

CARADOC.—Concrete tile for culverts has taken the place of wood altogether. Good satisfaction. Some glazed tile is used but not much.

NEPEAN.—Vitrified tile is used occasionally, giving fairly good satisfaction where the place is suitable.

SOUTH WALSINGHAM,—Built three culverts with cement and stone in 1898 and they are all right ; have used vitrified tile a number of years ; in deep gullies use iron pipe, both giving good satisfaction.

WHITBY.—Vitrified sewer pipe has been used for culverts for a few years, almost entirely this year. Give good satisfaction at less cost than timber when properly placed.

TOWNSEND.—Tile is used somewhat, but not with satisfaction. Stone culverts are being used in place.

WOOLWICH.—Vitrified tile used for culverts, etc., and have given good satisfaction during the past ten years.

THOROLD.—Tile have been used for about ten years with perfect satisfaction.

ANCASTER.—Vitrified tile is used in some cases, also plank. The plank gives better satisfaction in shallow culverts.

NASSAGAWEYA.—Cement concrete and vitrified tile have been used with very good satisfaction, as no injury has resulted from frost or from any other cause.

WOODHOUSE.—More tile is used every year and, where suitable, gives good satisfaction. No concrete cement has been used.

OPS.—Ops has one large culvert, or sluice, arch-shaped, built of brick and cement. It cost about $300 and, being filled overhead, it serves as a bridge, and is supposed to outlive any bridge, but no tile culverts have yet been used.

USBORNE.—Cement concrete tile very largely used during the past three years. Also arched culverts of the same, 3 to 6 feet wide. So far they seem to be perfectly satisfactory.

CHARLOTTEVILLE.—Vitrified tile used altogether for the last eight or ten years ; good satisfaction so far ; no complaint.

WEST NISSOURI.—Vitrified tile have given the greatest satisfaction where the flow of water is not too large. Cement concrete is used.

TUCKERSMITH.—We use cement concrete tile wherever possible, also cement arches for small culverts. Good satisfaction if put in large enough and carefully.

GRANTHAM.—Tile as large as two feet in diameter have been used with good result for a number of years.

SOUTHWOLD.—About all the culverts constructed with vitrified tile and concrete, principally vitrified. I believe the cement concrete will give the best satisfaction.

BARTON.—Tile is used where practicable, otherwise plank. Our soil in many places is too shallow for tile ; we are near the rock in the south portion of the township.

BURFORD.—We have been using cement tile for culverts for the last five years and they are giving good satisfaction.

NELSON.—Vitrified sewer pipe is used to a limited extent and, where properly put in, is giving good satisfaction.

HULLETT.—Cement concrete is very generally used in our township both for culverts and bridge abutments, but so far is not quite satisfactory for culverts.

GLANFORD.—The use of cement concrete has been proposed but not yet tried. Sewer pipe has been used a good deal for culverts, but is, I think, not so much thought of as formerly, especially the large sizes. The medium and smaller sizes are fairly satisfactory.

MIDDLETON.—Tile is used in a few instances, but not very satisfactory.

SOUTH NORWICH.—A few years ago I bought a car-load of drain tile a foot through. They were not given a good show and were not used after that lot. I think they would be all right if properly put in.

WALPOLE.—We have been using cement concrete for culverts this year, but cannot give results as yet. We have not found tile very satisfactory.

DAWN.—We have used concrete some, but not satisfactory. We have been using vitrified tile for about five years, and satisfaction is fairly good.

DUNWICH.—Tile used, but have not proved very satisfactory.

CULVERT SPECIFICATIONS.

The following specifications for highway culverts include only those clauses necessary to the actual work of construction, and are intended more as a basis for a complete specification, rather than to be followed in detail in every case.

If the work is done by a contractor, there are a number of clauses relating to excavation, protecting the public from accident while the work is in progress, manner of payment and other agreements which it will be necessary to include.

The details of construction should be altered and amplified to suit local conditions, such as the quality of stone and sand obtainable. The paving of the stone culvert requires the use of flag-stone, whereas this may not be obtainable locally, and a concrete or rubble stone paving may be more suitable. Local conditions may suggest various alterations.

A culvert of cement concrete will generally be found most economical but there are circumstances, no doubt, in which municipal councils will wish to avail themselves of a plentiful supply of suitable stone, within easy reach, for a stone masonry waterway. The specification for a stone arch culvert will indicate the character of masonry most suitable for coursed rubble stone or broken range work, and is adapted to highway culverts up to a considerable span.

A Stone Arch Culvert.

Plans and drawings. 1. The culvert shall be built in accordance with the dimensions indicated upon the plans and drawings hereunto attached and forming part of these specifications.

Masonry. 2. The masonry shall consist of coursed rubble or other approved stone laid in cement mortar. No stone shall be less than six (6) inches in thickness and not less than twelve (12) inches in its horizontal dimensions. At least one-fourth of the stone face shall be headers, evenly distributed throughout the wall. The stones shall be roughly squared on joints, bed and faces, laid so as to break joints and in full mortar beds. The face shall be "rock face" with edges pitched to line, with no face projections exceeding two inches. All vertical spaces shall be flushed with good cement mortar and then be packed full with spalls. No spalls will be allowed in the beds. Selected stones shall be used at all angles, and shall be neatly pitched to true lines and laid on hammer dressed bed ; draft lines may be required at the more prominent angles. The foundation shall be of large sound stones, roughly squared, no stone to measure less than two cubic feet.

Coping and step stones. 3. The top of the parapet wall shall be capped with stones extending entirely across the wall, and having a front and end projection of not less than six (6) inches. The steps of wing walls shall be capped with stone, covering the entire step, and extending at least six (6) inches into the wall. Coping and step stones are to be roughly hammer dressed on top, their outer faces pitched to true lines, and shall not be less than six (6) inches in thickness.

Details of masonry work. 4. Care should be taken that all stones are laid on their natural bed ; that they are brought to an even bearing ; that there shall be no vertical openings between the stones. Mortar shall be used throughout the structure and the practice of using mortar only on the face and back of the walls shall not be permitted. The inside of the wing and side walls, that side on which the earth rests, shall have a frost batter of one (1) inch to the foot.

Arch stones. 5. Arch stones must invariably extend through the entire thickness of the arch and have a minimum thickness of five (5) inches on the soffit. Each stone is to be well and closely fitted so as to give half-inch joints and to break joints with its fellow 9 to 7 inches. The whole must be laid in cement mortars, and each course well grouted immediately after being laid.

6. The face stones of the arch are to be as nearly uniform in depth as possible, of large size, and neatly incorporated with the perpendicular face of the masonry. The key-stones are to be 10 or 12 inches on the soffit, to have a chisel draught around their edges, and to project beyond the face of the wall 2 or 3 inches.

Face and key stones.

The extrados. 7. The extrados of the arch shall be flushed with cement mortar two (2) inches thick, levelled up and rounded to a moderately even and smooth surface.

Pointing the masonry. 8. All outside joints shall be raked out to a depth of one (1) inch and neatly pointed with a mortar made of one part Portland cement and one part sand.

Each course to be grouted. 9. Each course of masonry as laid shall be grouted with a mixture of one part of Portland cement to two parts of sand, no more water being used than that necessary to give the required plasticity.

10. The waterway of the culvert between the side walls, and to such distance between the wing walls at both ends as the engineer may direct, shall be paved with stones not less than three feet long, eight inches wide and four inches thick. The stones shall be cut and squared so as to form close joints with each other and with the walls of the culvert. The stones shall be laid on a bed of gravel two (2) inches thick, the joints to be filled with cement mortar.

Waterway to be paved.

11. All cement furnished must be of a well and favorably known brand of Portland cement, and shall be approved by the engineer or superintendent in charge of the work. It shall be delivered in barrels or equally tight receptacles, and after delivery must be protected from the weather by storing in a tight building or by suitable covering. The packages shall not be laid directly on the ground, but shall be placed on boards raised a few inches from it.

Cement.

Water. 12. The water employed for mortar shall be fresh and clean, free from mud or other objectionable matter.

13. Mortar shall be composed of two parts of sand and one part of cement, mixed thoroughly dry, and tempered to the required consistency. It shall be used as soon as made, and any mortar that may have "set" while unused shall be wasted. No variations from the above proportions shall be permitted, unless to make the mortar richer when required in special cases. The thorough mixing and incorporation of the materials will be insisted upon. The dry cement and sand shall be turned over and mixed with shovels by skilled workmen not less than ten (10) times before the water is added ; after the water is added the paste shall be again turned over and mixed by skilled workmen not less than six (6) times before it is used. Mortar shall be mixed on a flooring to be provided by the contractor.

Mortar.

14. The centring must be well formed, an exact semi-circle, of ample strength, securely placed in position, and in every respect conform to the requirements of the superintendent. The ribs must not be placed farther apart than three (3) feet. The lagging shall be three (3) inches thick ; the supports of centres shall be substantial and well constructed. Centres shall not be struck without permission from the superintendent.

Centring.

A Cement—Concrete Arch Culvert

Plans and drawings. (1) The culvert shall be built in accordance with the dimensions indicated upon the plans and drawings hereunto attached, and forming part of these specifications.

"Fine" and "rubble" concrete. (2) Concrete referred to in this specification shall be known as "fine concrete" and "rubble concrete." Unless rubble concrete is definitely specified, fine concrete shall be used.

Framework and centring. (3) The abutments are to be erected within a framework of dressed lumber, closely boarded up against the work as it proceeds. The centring for the arch must be well formed, an exact semi-circle. The ribs must not be placed farther apart than three (3) feet, and the lagging shall be three (3) inches thick, dressed to the intrados of the arch. The framework, centring and their supports shall be substantial and well constructed and shall not be removed less than fourteen days from the completion of the work.

Fine concrete. (4) Fine concrete shall be composed of one part by measure of Portland cement, two parts by measure of sand, and four parts by measure of broken stone. The concrete shall be mixed in a water-tight box placed close to the work, by first spreading evenly a layer of sand ; upon this shall be evenly spread the proportionate quantity of cement and the two thoroughly mixed in a dry state. To this water shall be added and the whole thoroughly mixed and brought to the consistency of a stiff mortar. The proportionate amount of stone shall then be spread evenly over the mortar, and thoroughly intermixed therewith. The concrete, when mixed as described, shall be immediately put in place and thoroughly pounded and rammed until it is perfectly and uniformly solid, moisture appearing on the surface.

(5) Within the body of the abutments of culverts, of not less than four foot span, but not nearer than six inches to the surface in any direction, large stones may be placed by hand in layers. These stones shall be in "rack and pinion" order, and not less than two inches apart. Concrete shall be carefully inserted between the stones thus placed and thoroughly packed and rammed so as to fill all voids. Concrete shall cover each layer of stones to a thickness of half the depth of the stones, when another layer of stones may be placed. A facing of concrete is at all times to be kept at least six inches higher than the rubble concrete; and shall be united with the rubble concrete so as to form a continuous and solid mass. This outer rim of concrete shall precede the placing of the rubble work within, and shall be placed around the interior of the casing to a height of nine inches and a thickness of six inches. It is to be thoroughly pounded so that no cavities shall remain when the outside casing is removed. In no instance is the rubble concrete to extend higher than one foot below the top of the abutment, which top of the abutment shall be finished with fine concrete. The rubble stone is not under any circumstance to extend into the arch.

Rubble concrete.

(6) All cement employed in the work must be of a favorably known brand of Portland cement, and approved by the superintendent in charge of the work. It shall be delivered in barrels or equally tight receptacles, and after delivery must be protected from the weather by storing in a tight building or by suitable covering. The packages shall not be laid directly on the ground, but shall be placed on boards raised a few inches from it.

Cement.

(7) The stone used shall be granite, quartzite, fine-grained limestone or other equally strong and durable stone, care being taken to exclude soft limestone, friable sandstone, and stone affected by the atmosphere. It shall be broken into varying sizes, the largest to pass, any way, through a two-inch ring. The sand used shall be clean, sharp, silicious and of varying sized grain. The water used shall be clean and care shall be taken not to use an excessive amount, the concrete when mixed and ready for the work to have the consistency of freshly dug earth.

Stone, sand and water.

8. When gravel is used instead of broken stone, it shall be screened to remove all sand and earthy material. If excessively dirty it shall be well flushed to remove loamy matter, the dirty water being allowed to run off; nor shall it contain stones, any diameter of which exceeds two inches.

Gravel in place of broken stone.

9. Care should be taken to make the extrados of the arch a smooth, regular surface such that moisture will not find lodgment All framework and centring shall be of dressed, well-fitted lumber, and the concrete shall be perfectly rammed into place so that all surfaces shall be smooth, without cavities, when the casing is removed.

Finished surface of culvert.

10. While the work is in progress, it shall be so arranged that a steady supply of mixed concrete shall pass from the mixing box to the point where it is to be placed. At any time when the work is interrupted before its completion, or at the end of the day, a wet covering shall be placed over the last layer of concrete; before the work of depositing the concrete is resumed, this surface shall be thoroughly flushed with water to remove any foreign material which may have gathered thereon. No concrete shall be laid in wet or freezing weather.

Concrete to be laid rapidly. When work is interrupted surface to be dampened and flushed.

CAUSES OF DEFECTIVE SIDEWALKS.

The advisibility of replacing old plank sidewalks in very many cases with the more permanent concrete has been frequently urged, and a specification was included in the report of this Department for 1898. In so doing, however, it has not been advocated that an inferior quality of concrete would be preferable to a good quality of plank walk, the comparison being, in every case between good quality of both plank and concrete.

The first cost of plank walks is about five cents a square foot. The life may be extended to about fifteen years, but for the last ten years repairs will have been many. Each repair requires that a man be sent with material so that the patch-

ing process is very expensive in proportion to the first cost. The result is to about double the original cost of the work in a term of fifteen years, making the cost ten cents a square foot.

Cement concrete walks are being laid for eleven and twelve cents a square foot, although the circumstances of some cases, the difficulty of obtaining broken stone, gravel, or sand, may require a slightly increased outlay. The life is indefinite for we really do not know how long concrete work will endure, but we do know that concrete structures of the Romans, build 2,000 years ago, are still in existence. It is not too much to expect that the concrete walks now being laid will do service for fifty years if laid as they should be. The cost after a term of fifteen years is very little more than that of plank walks, so that their life beyond a term of fifteen years is a practical saving to the municipality.

The use of concrete is far from being properly understood by those who have charge of sidewalk construction in some municipalities, and the result has been in many instances, that most unsatisfactory work has been obtained.

Cement concrete in walks, culverts and other structures of a like nature, is lasting and serviceable, and when properly mixed and rightly put in place, is in the best sense economical. But defective work shows itself quickly. Wherever there has been careless or "scamped" work, it is very likely to show itself after exposure to a winter's frost and dampness. Work which stands for two years without signs of cracking, shaling or crumbling is likely to be permanent, its life conditional chiefly upon the actual wear which it receives.

Among the most frequent causes of poor concrete is the use of an inferior brand of cement. A cheap sidewalk obtained by the use of cheap cement will, in the end, prove exceedingly costly. Cement is a material of widely varying degrees of excellence, and experiments should not be tried by the smaller municipalities. There are good and reliable brands of Canadian Portland cement which have proven their qualities in large Government works, and in other extensive contracts, and to go beyond these is unnecessary and in many cases entirely unsafe.

Just as to how cement can be of poor quality is not understood by many, and it may be pointed out, as one example, that the presence of free lime causes what is known as "blowing" in the finished concrete, and rapidly results in decomposition of the sidewalk.

Again among causes of inferior sidewalks is the use of gravel and cement to form the entire work, in place of a proper mixture of sand, cement, and stone. In the composition of concrete we first prepare a mortar of sand and cement with just sufficient water to make a plastic mass; this is mixed with a quantity of stone in such proportion that the mortar will completely fill the voids between the stones, with a proper excess of mortar for safety. There are certain definite proportions of cement, sand and stone which must be uniformly mixed in producing a good quality of artificial stone.

In using gravel only, the difficulty arises from the fact that the cement, sand and stone are not and cannot be expected to be mixed uniformly in these proportions. Gravel usually contains sand, but not in uniform quantities, nor in any definite proportions. Some pockets of so-called gravel will be almost completely sand, while adjoining it there is scarcely any sand, perhaps almost clean stone. To mix such material with cement to produce concrete, while in many cases it may be successful, is always hazardous. The only safe way, where gravel is the material to be used, is to separate by screening, the sand and stone which compose the gravel, then to mix the sand and cement in proper proportions to form the mortar, to which is then added the stone, uniformly, and in its proper proportion.

A cause of an inferior sidewalk is that the materials composing it have been carelessly mixed. The cement and sand should first be mixed dry. This should be turned over and mixed with shovels not less than ten times before the water is added. Water is then added in just sufficient quantity to slightly dampen the mixture, and the paste should be again turned over and mixed not less than six times. If this work is properly done, each grain of sand will be surrounded by a sufficient coating of cement. This mortar having been spread out, the stone should be added and the whole turned over and mixed not less than ten times before being used, the last mixing ensuring that each stone is completely surrounded by a coating of mortar.

The use of too much water in mixing will produce, when set, a concrete of spongy texture. Concrete when ready to be put in the work should have the consistency of freshly dug loam, and should be rammed into place until moisture appears on the surface.

Neglect to keep a newly laid walk damp, and protected from the rays of the sun, will permit the surface to set too rapidly. Minute, hair-like cracks will appear on the surface. These fill with water, which freezes in cold weather, and the expansion destroys the surface of the walk, causing a thin layer to shale off in patches. The same shaling will result from laying concrete in frosty weather; nor should it be mixed nor laid in wet weather.

Another cause of the failure of sidewalks is that the concrete has not been properly and completely separated into flags to allow for expansion, with the result that in hot weather, when expansion takes place, the sidewalk is thrown up at points of least resistance. The expansion of concrete is about the same as that of steel, and no railway company would contemplate for an instant the laying of a continuous steel track in which there are not joints at proper intervals to allow for this expansion. This is true to the same extent with a concrete sidewalk, and every care must be taken to first cut through the foundation layer of concrete, then through the surface layer directly in line with the joint underneath. The entire joint should then be filled with sand to ensure complete separation.

The surface layer of the sidewalk must be laid upon the foundation layer while the latter layer is still damp and before it is set, otherwise there is not a proper union of the two, and shaling will result.

The effect of frost on a wet sub-soil must also be guarded against by the use of under-drains, otherwise the upheaval of the ground, under the expanding influence of frost, is very apt to crack the walk. The separation of the sidewalk into flag divisions, however, is also of service in this respect by giving the separate divisions an opportunity to rise and subside with the soil underneath. No dependence, however, should be placed on this, as a saturated sub-soil will eventually cause a very uneven surface, since the separate flags when once upheaved seldom return exactly to their original position.

Walks are very commonly laid by contractors who furnish their own specifications and agreement. Where such is the case, the agreement should contain a clause specifying in the most stringent terms that the walk is to be kept in perfect condition, order and repair, so that at the end of the term of guarantee, usually five years, the walks shall have given satisfactory evidence of their proper construction and durability. The guarantee is generally so worded that it can be interpreted to mean that the contractor is simply to keep the walk in repair for five years, and entailing no responsibility upon the contractor even if the walk at the end of that period it is ready to crumble to pieces, demanding almost immediate reconstruction. A town, however, should not depend upon the contractor's guarantee, but should employ an experienced and reliable inspector to see that the specifications are faithfully carried out.

BY-LAW COMMUTING STATUTE LABOR IN TORONTO GORE.

By-Law No. 347.

To make provisions for Making, Grading, Gravelling, and otherwise Improving and Keeping in Repair the Highways in the Township and under the Control of the Council of the Corporation of Toronto Gore, and to Repeal Certain By-Laws relating to Statute Labor and the Duties of Overseers of Highways.

Whereas, by chapter 223, section 561, sub-section 6, Revised Statutes of Ontario, 1897, power is given to the councils of township municipalities to pass by-laws for reducing the amount of statute labor to be performed by ratepayers and others within the municipality, or for entirely abolishing such statute labor ;

Therefore, the Corporation of Toronto Gore by the council thereof, enacts as follows:—

First.—That from and after the passing of this by-law no statute labor shall be levied or assessed against any person, resident or assessed, in this municipality.

Second.—That the council shall in each and every year levy an amount equal to a commutation of the prescribed statute labor at 65 cents per day over and above the amount heretofore raised for roads and bridges, and that said sum shall be expended in grading the highways and gravelling or otherwise permanently improving and paving the leading roads of the township.

Third.—That the council shall annually appoint a commissioner or commissioners or an engineer to carry out the provisions of this by-law, whose duty shall be to go over the whole township as early as convenient in the spring, and present report for adoption to the council at

the April meeting, giving plans and estimates of the work required to be performed for th year.

Fourth.—The said engineer, commissioner or commissioners, as the case may be, so ap pointed shall have full supervision of all work performed within the township and shall super intend all work ordered by them, but may appoint some competent person to operate and take charge of the grader, with power to employ men and teams, establish route and to have full supervision of the grading for the portion of the township in which he has been appointed to act.

Fifth.—That the council shall appoint an experienced and trustworthy person overseer in each statute labor division whose duty shall be :—

(1) In the event of any breach or sudden giving away of any bank or bridge, or any other work required to be done for the convenience or safety of travellers, they shall immediately report the same to the engineer or nearest commissioner.

(2) They shall see that thistles and other noxious weeds detrimental to husbandry are prevented from going to seed, and they shall employ men to cut such weeds and thistles on the highway within their respective divisions.

(3) They shall employ men and teams where considered necessary for the purpose of making and keeping open the township roads within their road divisions during the season of sleighing in each year, and shall report from time to time, stating the work performed, to the council.

Sixth.—The before-mentioned overseers shall remain in office from year to year unti removed by by-law of the council.

Seventh.—That the pay for all work under this by-law shall be regulated by the following scale :

Commissioner or Engineer 20 cents per hour.

Operators of grader while at work on road, 17½ cents per hour.

Man and team for any purpose, 25 cents per hour.

Man filling gravel or other work, 10 cents per hour.

Eighth.—That all by-laws or parts of by-laws contrary or inconsistent with the provisions of this by-law be and the same are hereby repealed.

Passed this 10th day of April, A.D. 1899.

BY-LAW TO COMMUTE STATUTE LABOR IN NIAGARA TOWNSHIP.

Whereas, by vote of the ratepayers of the township of Niagara, taken at the same time as the Municipal Elections held January 2nd, 1899, a majority of the said ratepayers voted in favor of abolishing the statute labor system, and in paying a commutation fee in lieu thereof, and as by section 561 of chap. 223 of the Revised Statutes of Ontario for 1897, every township council is authorized and empowered to pass by-laws for that purpose.

Therefore, be it enacted, and is hereby enacted by the municipal council of the

Township of Niagara.

1st.—That from and after the passing of this by-law all statute labor in this township shall be abolished, and in lieu thereof all ratepayers and others liable for statute labor shall pay a commutation in money, at the rate of twenty-five cents per day for every day's statute labor for which they are liable, in accordance with section 102 of chap. 224 of the Revised Statutes of Ontario for 1897; and the clerk when making out the collector's roll shall charge to the parties therein named the amount for which they may be liable, and the same shall be collected at the same time and in the same manner as any other taxes.

2nd. That the township be divided into four divisions as may be agreed upon by the council and one councillor appointed a committee for each division ; each committeeman to engage a foreman who shall do all small jobs under the direction of the committee, and if any extra help or teams are required, the committee in charge of the division shall employ those nearest the work, in case they can be got at reasonable rates ; and when required the foreman shall be paid at the rate of one dollar and twenty-five cents per day, and shall keep an exact account of the time he is engaged in every piece of work, and also of the time put in by any extra help required and shall render an account of the same to the committee by whom he is employed and the committee shall furnish a copy of the same to the township council for their approval.

3rd. That the Committees for the north and south portions of the township shall in each and every year, and as early in the spring as the roads and weather will permit, travel over and inspect the roads and bridges in their respective divisions, and make a detailed statement of all work required, naming the different roads where the road machine can be used to advantage, and the approximate length of road required to be graded ; the bridges to be re-built, style and ize of stringers, width of opening and amount of plank required ; also the different bridges that need repairing and materials required for said repairs. They shall also state where tile can be used to advantage in replacing wooden bridges, and the number and size of tile required for that purpose ; and keep an account of good plank in old bridges that can be utilized for repairing, and dispose of all others to the best advantage for the township.

4th. That when any piece of work is required to be done, whether in ditching, gradinig, road-building or repairing bridges, removing obstructions on the road, on account of snow in winter, or any other cause whatsoever, it shall be the duty of the Committee for the division in which the work is to be done to give written instructions in regard to the same to the foreman, and the foreman shall do such work in accordance with said instructions ; and in case at any time the said foreman shall not work faithfully, or shall neglect or refuse to perform any of the duties required of him, it shall be lawful for the Committee having charge of the division, and he is hereby authorized to discharge such foreman, and to hire some other competent person to take his place.

5th. That the Clerk is hereby instructed to furnish each Committeeman, also each foreman, with a memorandum book, in which they shall keep the necessary instructions and accounts of the different divisions.

6th. That by-laws numbered 159, 204, 214, 271, 273, 290 and 324, and all other by-laws contrary to the provisions of this by-law, be, and the same are hereby repealed.

Passed in Council this 20th day of February, A.D., 1899.