

DEPARTMENT OF AGRICULTURE
CANADA

REPORT

OF THE

VETERINARY DIRECTOR GENERAL

AND

LIVE STOCK COMMISSIONER.

J. G. RUTHERFORD, V.S.

For the Two Years ending March 31, 1908.

PRINTED BY ORDER OF PARLIAMENT



OTTAWA

PRINTED BY C. H. PARMELEE, PRINTER TO THE KING'S MOST
EXCELLENT MAJESTY

1909

REPORT OF THE VETERINARY DIRECTOR GENERAL.

HEALTH OF ANIMALS AND LIVE STOCK BRANCHES,

OTTAWA, March 31, 1908.

SIR,—I have the honour to present my report as Veterinary Director General and Live Stock Commissioner for the two years ending March 31, 1908.

The period in question has been, from an official point of view, both busy and eventful and it is gratifying to be able to state that the progress made in the development of the live stock industry and in the direction of securing effective control of contagious diseases among our domesticated animals, may fairly be termed satisfactory.

Our animal industry has kept pace with the general growth and prosperity in other lines and although, the season of 1906 was in some districts, far from favourable, there is every evidence of a marked increase in the numbers as well as the value of the live stock of the country.

The continued rapid settlement of the western provinces has had a two-fold effect in augmenting the animal population, as not only have there been large importations by and for the use of our new citizens, but the breeding industry has received a fresh impetus from the ever growing demand for all classes of farm stock.

While, to the careless observer, this activity may appear of little moment, it is in reality a matter of paramount importance to the nation. Our present prosperity is based, to a far greater extent than is at first sight apparent, on the products of the farm, and while among these the western grain crop may just now bulk more largely than any other, it is an old story, scarcely needing retelling, that grain growing, without crop rotation or the use of fertilizers can only be continued for a limited period.

Even on the fertile plains of the west, this rule has full force, as is well known to those familiar with actual conditions, and today, in the older districts of Manitoba, Saskatchewan and Alberta, the best and brainiest farmers are gradually changing their methods and adopting mixed husbandry as the only means of conserving the income earning powers of the land.

Needless to say, mixed farming cannot, under ordinary circumstances, be carried on without animals, so that it is only a matter of time till every one of our western grain farms will either be abandoned to the weeds or maintain its proper quota of live stock.

The older provinces have already learned this lesson and that it has been a profitable one is clearly evidenced by the marked improvement in farming conditions, say in the Western Ontario peninsula, over those prevailing twenty years ago. To state the case in a few words, the good farmer is the backbone of Canada and stock raising is the sheet anchor of good farming.

The live stock industry is therefore one of our most valuable national assets and its present active and prosperous condition should be appreciated accordingly.

Previous to July 1, 1906, the date of my appointment as Live Stock Commissioner, my official duties were confined to the work of guarding, to as great an extent as possible, the live stock of the Dominion from the attacks of the various conta-

gious diseases, to which, from the earliest times, the herds and flocks of the husbandman have been subject.

Until a comparatively recent date, these scourges, like those affecting our own race, were but little understood, being looked upon as visitations of Providence, against which human skill was of little or no avail, but with the remarkable advance in medical science achieved within the last century and particularly within the last four decades, the view point has completely changed, and it is now realized that intelligent effort wisely directed, can do much to prevent their occurrence, as well as to modify their ravages.

The work of the veterinary sanitarian has, by these recent discoveries, been rendered much more effective and satisfactory than formerly, especially in the older and more thickly settled countries of the globe, where the conditions are such as to render possible the close supervision and control of live stock.

In Canada, however, and particularly in the west, the problems which confront our officers are often exceedingly serious.

The somewhat slipshod methods of handling stock which prevail among western farmers and ranchers constitute a heavy handicap to effective quarantine work. Many of these people permit their animals to wander at will, for months at a time, making no attempt at intelligent supervision: Scarcity of feed often gives rise to almost unsurmountable difficulties in maintaining the isolation of infected stock while severe weather such as that experienced during the season just past, makes any attempt at restriction practically impossible, suitable accommodation being frequently entirely lacking.

Under such conditions, disease may and often does become widespread before discovered and reported, while the tracing of contaminated herds or individuals over immense areas of open country, is an almost impossible task.

The situation has, during recent years, been still further complicated by the continuous influx of new settlers, many of whom bring animals with them and whose mode of entry as arranged by the immigration agents and railway officials, namely in large parties, renders it difficult to secure an effective inspection at the boundary.

In some of the districts from which these people come disease is rife and the risk of its introduction is correspondingly serious, but so eager are they to come in, and so anxious are many of our officials, and perhaps from their point of view, properly enough, to get them across the line and to remove all obstacles from their path, that the position of a conscientious veterinary inspector at one of the boundary ports is anything but a happy one.

It is, therefore, not surprising that while the efforts of the Health of Animals Branch to stamp out disease in Eastern Canada have been perhaps more than fairly successful, its work in the west has not so far been, productive of equally gratifying results.

The past two years have, however, been marked by one or two important forward steps in the perfecting of our organization for preventing the introduction of diseased animals and dealing with those already in the country, and I trust that I am not too sanguine when I venture the prediction that even in the face of the adverse conditions to which I have just directed your attention, we will, in the near future, be able to show a clean bill of health from ocean to ocean.

The work of organizing the Health of Animals Branch into an effective disease fighting force has been continued. Owing to the extra duties arising out of my appointment as Live Stock Commissioner and later, in connection with the new meat inspection legislation, it has not been possible for me to devote as much time as in former years to personal work in the field. A tour through the maritime provinces in the early summer of 1906 enabled me to inspect the new quarantine buildings at St. John and Halifax and the Experimental Station at Antigonish, as also to visit

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our inspectors at Sydney, Cape Breton, and Charlottetown, P.E.I. Later in that year a hurried trip was made to Chatham owing to a reported recrudescence of hog cholera in that neighbourhood and the opportunity was taken to visit Windsor and Sarnia, two of our most important frontier ports.

During the month of August I attended the annual meeting of the American Veterinary Medical Association which was held at New Haven, Connecticut, and while there read a paper on the control of glanders, the greater part of which is embodied in the special report dealing with that disease, which is issued herewith.

In October a visit was made to Washington for the purpose of conferring with Dr. Melvin, chief of the United States Bureau of Animal Industry, on matters connected with changes in our quarantine regulations regarding the importation of American horses, which have since been put into effect. During the fall and winter numerous trips to Toronto, Montreal and other points were rendered necessary in order to meet the various live stock associations or their representatives, as well as to attend the meetings of the Record Committee on business connected with the National Records.

In February I visited Chicago to complete arrangements for a special course in meat inspection for Canadian veterinarians in order to enable them to qualify for employment under the new Act. This trip was extended to Manitoba, where many local matters received attention and where I also attended the annual convention of the live stock associations and the winter fair, which this year, were held in Brandon. In March I again visited Chicago and had the pleasure of seeing the special course, above referred to, in full swing, and the studies progressing in a very satisfactory manner.

From Chicago I proceeded to Emerson where some matters in connection with the Quarantine Station demanded attention, later visiting Winnipeg where a permanent office is now maintained for the use of both branches, under the general management of Mr. G. H. Greig. This office is the headquarters of Dr. McGilvray, Chief Veterinary Inspector for Manitoba, and of all the officers engaged in the health of animals and meat inspection work in that province.

From Winnipeg I went to Calgary for the purpose of attending the show and sale held there early in April. The occasion was somewhat enlivened by a discussion on the question of the continuation of the grant made by the Live Stock Branch for the support of the show and sale, in view of the fact that the Alberta breeders had passed a resolution prohibiting entries from stockowners outside the province, an action on their part which, in my opinion, warranted the withholding of assistance from your department.

While in the west I visited Macleod and Lethbridge, going carefully over the work being done at the Quarantine and Experiment Station at the last named place.

Returning via St. Paul, I was able to make arrangements with Dr. S. H. Ward, secretary of the Live Stock Sanitary Board for Minnesota, and a gentleman of considerable executive experience, to take the position of chief of our new meat inspection service. While in St. Paul at this time, and on the various occasions on which I visited Chicago, I took every opportunity of familiarizing myself with the work of meat inspection as conducted in those centres. I was fortunately able to be present at the final examination of our Canadian meat inspectors in Chicago, and to address them on the subject of the duties which they would have to perform in the event of their appointment to the service of your department.

Early in May I found it necessary to return again to Calgary in order to attend the annual meeting of the Western Stock Growers Association, the question of the control of mange being one of such importance as to necessitate a personal discussion with the principal owners interested.

While there I was fortunate in being able to take up with Commissioner Perry, of the Royal North-west Mounted Police, the question of taking over from that

force the work of this branch in the Provinces of Saskatchewan and Alberta. It was decided to make the change on July 1, at which time Dr. Hilton went west and assumed charge.

Although his services in Ottawa were much missed, events have since shown that his temporary removal to Regina was in the best interests of the service, as he has succeeded in the most admirable manner in reorganizing the work. I trust that in the near future it will be possible to make other arrangements, which will permit of his being able to return to Ottawa.

During the remainder of the year a number of visits were paid to boundary points, as also to Montreal and Toronto, for the purpose of attending meetings of the various live stock associations.

In November I accompanied you to Cowansville for the purpose of discussing with a number of farmers there the question of the control of bovine tuberculosis.

Altogether the period covered by this report has been an exceedingly busy one, and the work has involved a good deal of travelling, which naturally interferes to a considerable extent with my personal control of the office work in Ottawa.

The operations of the Health of Animals Branch are now so extensive and far reaching, while those of the Live Stock Branch are also constantly extending, that the correspondence, much of which from the nature of the work carried on, is of a most exacting character, makes very serious inroads on my time, rendering it somewhat difficult to give due attention to other matters. Among the various matters dealt with during the period covered by this report, the following may be considered worthy of special mention.

New quarantine stations at Halifax, N.S., St. John, N.B., Lennoxville, Que., Greta and Bannerman, Man., and Kingsgate, B.C., were erected and are now in full working order, while at Emerson, Man., North Portal, Wood Mountain and Willow Creek, Sask., Pendant d'Oreille, Coutts and Twin Lakes, Alta., and Midway, Osoyoos and Victoria, B.C., existing facilities have been considerably improved. A new quarantine station is at the present time being erected at Sarnia tunnel, the old premises at Point Edward being, since the building of the tunnel, inconveniently situated and altogether too large for the requirements of the service.

I regret to say that the existence of sheep scab has again been demonstrated in several districts of western Ontario. No effort was spared to secure its complete eradication, a result which was subsequently effected.

Hog cholera appears to be at last under control, a few outbreaks only having been reported, and these either attributable to old chronic cases or to fresh infection from United States sources. The district in the Counties of Essex, Kent and Lambton, so long under quarantine, was finally released from all restrictions in September, 1906, since which date, however, it has been found necessary to quarantine a few single farms on account of the sporadic outbreaks above referred to. Full statistics will be found in the special report on this disease.

Although, through the work done at the experiment station at Antigonish, it was conclusively shown that the malady locally known as Pietou Cattle Disease, is due to the ingestion of Ragwort, or *Senecio Jacobæa*, the experiments at that station were continued with a view to demonstrating whether or not sheep could eat the weed, green or dry, with impunity. These experiments were finally brought to a conclusion when it was shown beyond question that no bad effects follow the eating of this plant by sheep, and steps are therefore being taken to disseminate this information freely throughout the districts infested by this weed.

The results attending the compulsory treatment for mange of the cattle in southern Alberta and southwestern Sask., conducted by the department in 1904 and 1905, were so gratifying that the stockmen in 1906 decided that a renewal of this policy was unnecessary, with the result that infected herds, drifting over immense

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areas, again spread the disease broadcast. A strong effort was made during the succeeding summer to regain the advantage lost, and at the close of the season, when 380,000 cattle in the district referred to had been treated, the number of infected cattle had been greatly reduced. Unfortunately, however, the results of treatment were not as satisfactory as might have been owing to the fact that the use of oil emulsion was permitted. Although this form of treatment has been highly spoken of and recommended in different countries, it was found by our officers to be far less efficacious than the lime and sulphur dip, the use of which only was authorized in former years. As a result of this experience, the oil emulsion is no longer recognized as an official dip. All herds found to be affected after the weather became too cold for treatment have been held in quarantine, and will be dealt with in a satisfactory manner before they are released.

Glanders is, I am satisfied, being brought under control as rapidly as could be expected when we consider the insidious nature of the disease and the tremendous hold which it had obtained among the horses of several provinces, through being left for many years practically untouched.

The expenditure in compensation shows a most gratifying decrease, which ought to be more and more marked as the work of eradication progresses. A great forward step has recently been taken by prohibiting altogether the importation from the United States of unbroken horses, and insisting upon the application of the mallein test to all others imported from that country. As matters formerly stood, fresh centres of infection were constantly being introduced, a condition of affairs not likely to be modified so long as compensation was paid on this side of the line only.

Full reports of the work done in regard to glanders and its results will be found elsewhere.

It is worthy of note that the British Board of Agriculture has recently adopted a policy of slaughtering reacting horses, similar to that which this country was the first to adopt in 1904. There is every reason to believe that a number of other countries will soon be forced to adopt similar measures.

Maladie du Coit or dourine still continues to exist to a limited extent in Southern Alberta, several outbreaks having been discovered and dealt with. This disease is one which, from its nature, is exceedingly difficult to stamp out under range conditions. It is most insidious and in temperate climates will persist for a very long period in a chronic and practically unrecognizable form, only to develop suddenly in some specially susceptible individual, or under conditions peculiarly favourable. All doubt as to its identity with the dourine of Asia, Africa and France has been set at rest by the isolation at Lethbridge in February, 1907 by Drs. Watson and Gallivan, of the specific causal agent the *Trypanosoma Equiperdum*.

Experiments are still being conducted in the hope of our being able to secure some more reliable and easily applicable means of diagnosis, than is at present available. Fuller notes on this disease and the work done in connection with it will be found further on, while the reports of our pathologists are also attached.

Tuberculosis in cattle is, as heretofore, frequently reported, but as no practical and effective method of dealing with this disease, except by slaughter, has yet been discovered, no change has been made in the existing regulations. The slaughtering of large numbers of valuable cattle on the strength of the tuberculin test, which, though fairly reliable in detecting the presence of the disease, affords absolutely no indication of the extent to which it prevails in the individual, is, in my opinion, neither practical nor justifiable, involving, as it does, a most serious economic waste without, under ordinary circumstances, providing any guarantee of future safety. Further remarks on this subject are reserved for the special report on tuberculosis, which will be published I trust in my next annual report and which will include an

account of the interesting experiments by that time brought to a conclusion with the view of ascertaining the value of the open air treatment for affected herds.

Anthrax has been reported from several localities, but does not appear to be prevalent except in one or two districts which have been affected to a greater or less extent for some time past. The only effective method of combatting this disease is apparently preventive inoculation, which, together with the destruction of carcasses and debris and the disinfection of premises, should enable any one unfortunate enough to occupy infected territory to safeguard his stock.

As will be seen later, this branch of your department is now in a position to supply, through the Biological Laboratory, preventive vaccines for both anthrax and black-quarter.

The laboratory continues to demonstrate its constantly growing usefulness, not only by furnishing reliable information to farmers and veterinary practitioners as to the nature of obscure or rare diseases through reports on specimens sent in, of which the number is yearly increasing, but also by the production of diagnostic agents such as mallein and tuberculin and the preventive vaccines for anthrax and black quarter. In regard to the manufacture of the two last named preparations we were exceedingly fortunate in being able to secure the services of Dr. Adrian Loir, formerly of the Pasteur Institute, in Paris. His engagement, which extended for a period of six months, was of very great value to the branch and was the means of enabling our pathological staff to prepare these prophylactic vaccines and so put us in a position to supply absolutely reliable preparations at a fraction of the cost which Canadian stock owners were formerly forced to pay to the firms engaged in their manufacture.

Our pathologists are also continually engaged in carrying on, in addition to the duties mentioned above, research work on lines likely to be useful to the department in its efforts to control and minimize the ravages of various animal plagues. The work of these gentlemen has been increased with the bringing into effect of the new Meat and Canned Foods Act, and will undoubtedly still increase to a very much greater extent. Meanwhile, their reports for the past two years will be found both interesting and instructive.

There have been several changes in the personnel and disposition of our inspection staff, the most important of which has already been mentioned, viz. the taking over on July 1, 1907, from the Royal Northwest Mounted Police, of the work of the Health of Animals Branch in Alberta and Saskatchewan, formerly carried on by that force through its commissioner, under directions from this office.

On the date mentioned, Dr. Hilton, my chief assistant, established offices at Regina and detailed his inspectors, the greater number of whom had been veterinary staff sergeants in the police and who had been granted discharges on transfer to the Department of Agriculture, to different parts of the two provinces. In addition to the former veterinary staff sergeants, Drs. Patton, McKay, Christie, Paxton, McMurtry, Gebbie, Hawke, Head, Meakings and Ovens have been added to the staff in those provinces.

In Halifax, the removal to Sydney and consequent resignation of Dr. Jakeman, led to the appointment in 1906 of Dr. H. S. McPatridge as inspector and superintendent of quarantine. A number of additional inspection stations for animals entering Canada from the United States along the New Brunswick boundary, were established in 1907, and Inspector D. McCuaig appointed and placed in charge thereof.

In Quebec Dr. Etienne and Dr. Guy having resigned, Dr. J. H. Vigneau of Three Rivers and Dr. F. X. Beauchemin, of Beauce, were appointed inspectors, the latter being stationed at St. Johns for the purpose of enforcing the quarantine regulations at that point. In order to enable us to cope in an effective manner with the outbreak of glanders in north-eastern Quebec, Dr. Henri Gauvin was selected to deal

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specially with that district. Later in the same year Dr. A. Dauth of Coteau du Lac. was added to the staff and has since been actively employed. In Montreal, owing to the discontinuance of the system of marking export cattle, it has been possible to dispense with the services of four of the men formerly employed in this work, one man only being retained at each of the two yards to assist the inspector in examining shipments.

In Ontario there have been practically no changes in the staff. At Port Arthur Dr. D. B. Fraser has been appointed to deal with possible importations at that point, while at Rainy River and Fort Frances Dr. William Lawson, formerly employed for a short time in British Columbia is in charge. Dr. E. C. Oliver, previously inspector at Nelson, B.C., has been placed in Toronto to take charge of market and other inspections there, thus relieving Dr. Stork for outside duties. Dr. A. G. Hopkins, formerly veterinary inspector at Vancouver, B.C., was engaged for duty at headquarters where he performed Dr. Hilton's duties while that officer was organizing the new staff in Alberta and Saskatchewan.

In Manitoba, Dr. J. A. Stevenson, formerly of Carman, has been appointed on salary and placed in charge of the new quarantine station at Gretna. Dr. H. N. Thompson, of Melita, has been located in a similar capacity at Bannerman. Dr. J. P. Molloy, of Morden, resigned in 1906, while the recent changes in the quarantine regulations have practically abolished the positions held by the inspectors at Morden, Deloraine, Melita and Crystal City. I regret to report that Dr. Scurfield, of the last named place, who had been in the service of the department for some years, died during the winter of 1906-7.

Dr. W. H. McKenzie was appointed veterinary inspector at Emerson, and Dr. Robinson, the officer formerly stationed there, was transferred for duty at Winnipeg.

In British Columbia there have been but few changes. The outbreak of glanders in the Okanagan Valley having been brought under control, the services of Dr. George, who had been temporarily employed, were no longer required and his engagement was therefore terminated. On the removal of Dr. Oliver to Toronto, Dr. Frank was transferred to Nelson from Grand Forks, the latter post being placed in charge of Dr. Tamblin, our officer at Midway. Dr. Knight who was early in the year employed for the purpose of dealing with outbreaks of disease in the Fraser River Valley, was entrusted with the work of boundary inspection at Myncaster and Bridesville on the new V.V. & E. Ry., while Dr. Jerymyn formerly relieving at Osooyos was employed during the summer of 1906 in dealing with a serious outbreak of glanders in the Bulkley Valley district of Northern British Columbia and subsequently stationed at Myncaster on Inspector Knight handing in his resignation. Dr. T. Bowhill has just been specially engaged for experimental work at Vancouver in connection with the disease known as Red Water. A report of the work done by this officer is published herewith.

In the Yukon Territory, Inspector A. Hawes was engaged with headquarters at Dawson, to replace Veterinary Staff-Sergeant Acres whose term of service in the Royal Northwest Mounted Police had expired.

On September 3, 1907, the Meat and Canned Foods Act went into effect and on that date inspectors of the department commenced the inspection of all meat and meat food products entering and leaving all packing houses throughout the Dominion which exported meat products to other provinces or countries. The services of Dr. S. H. Ward as chief meat inspector were obtained and a large staff of veterinarians who had passed the special examination at Chicago previously referred to, was engaged. The labour involved in getting the machinery in sufficiently satisfactory working order to have it running smoothly on the date set by the Act was by no means inconsiderable. It has, of course, been necessary in many cases to educate the parties concerned as to the necessity for certain portions of the regulations, but I

can fairly say that the act is being enforced with surprisingly good results and little friction. Full details of the work are given in another portion of this report.

HOG CHOLERA.

The progress made in the work of stamping out hog cholera has been both satisfactory and encouraging. A few restricted outbreaks have occurred in Ontario, some of which took place in the old quarantined area and were evidently traceable to chronic cases unsuspected and of long standing. In another instance a group of small outbreaks detected and dealt with in the County of Welland, were directly traceable to the feeding of swill from a large summer hotel near the frontier, the provisions used in which were largely imported from the United States. The frequency with which supposed outbreaks of hog cholera, not only in this country but in others, are credited, and with apparent reason, to sources of this kind is well worthy of note, a circumstance which appears to merit a closer investigation than it has hitherto received.

As may be noted from the accompanying summary the disease has also existed to a slight extent in British Columbia. Its presence has not, however, been detected elsewhere, which, in view of the conditions prevailing a few years ago, when widely separated centres of infection were constantly being discovered, is very satisfactory, especially when considered in conjunction with the gratifying decrease shown in the amount paid for compensation, when compared with those years. With the doubling of the period of quarantine imposed upon American swine, the present effective inspection and control of the large transit trade in these animals still carried on across western Ontario, and the prompt and thorough enforcement of the regulations relating to outbreaks among Canadian stock, the prospect for the complete eradication of this dangerous and expensive disease is rather encouraging. Our long and loosely guarded boundary line and the almost historical easy-going disregard of borderers for customs and other legal and moral obligations will, however, militate against complete immunity as long as the disease continues to prevail, as it does at present, in many different parts of the United States.

STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1907.

Ontario.

203 hogs, valued at \$1,981.00 were destroyed in the following counties, at a cost of \$1,320.61.

2 hogs valued at \$12 were also slaughtered for purposes of examination, at a cost of \$8, but no evidence of Hog Cholera found.

	No. of outbreaks.	Hogs destroyed.
County of Kent—		
Harwich township.	2	78
Chatham “	1	1
Oxford “	2	16
County of Essex—		
Gosfield township.	1	10
County of Welland—		
Bertie township.	8	38
County of Lambton—		
Euphemia township.	2	24
County of Huron—		
Tuckersmith township.	1	36
	17	203

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In British Columbia there were 6 outbreaks, 3 of which were on Vancouver Island, 2 in the New Westminster, and 1 in the Kootenay District.

125 hogs, valued at \$1,309.60 were destroyed at a cost of \$873.05.

In Manitoba one hog, valued at \$3 was killed for purpose of examination, at a cost of \$2, and was found not to have been affected with hog cholera.

In Quebec, 1 hog, valued at \$15, was killed for purposes of examination, at a cost of \$10, and was found not to have been affected with hog cholera.

The total number of hogs slaughtered throughout the Dominion as being affected with hog cholera, therefore, was 228, the value of which was \$3,290.60 and the compensation paid, \$2,193.66.

STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1908.

In Ontario, 437 hogs, valued at \$3,624.50 were destroyed in the following counties, at a cost of \$2,416.58 in compensation:—

	Outbreaks.	Hogs destroyed.
County of Kent—		
Harwich township.	7	61
Raleigh township.	1	16
County of Essex—		
W. Sandwich township.	5	154
Pelee Island.	13	175
Maidstone township.	1	19
County of Simcoe—		
Vespra Township.	1	12
	28	437

In British Columbia there were 8 outbreaks, all at the Pacific coast, where 116 animals, valued at \$992.89 were destroyed at a cost of \$663.05 in compensation.

The total number of hogs slaughtered throughout the Dominion as being affected with hog cholera, therefore, was 553, the value of which was \$4,617.39, and the compensation paid, \$3,079.63.

TUBERCULOSIS.

No change has been made in the policy of the department in regard to this disease. Cattle imported into Canada for breeding purposes or milk production are tested in quarantine, except in the case of cattle from the United States which are admitted on inspection only when accompanied by a satisfactory test chart signed by an inspector of the United States Bureau of Animal Industry. Our officers test similar classes of cattle exported to the United States as also the cattle in a few herds which are placed entirely under their control and supervision. All reactors are permanently earmarked and their exportation prohibited.

The tuberculosis circular printed hereunder has been very extensively distributed and as a result, a considerably increased number of doses of tuberculin have been sent out from the biological laboratory to private practitioners, the number of animals thus tested during the years ending March 31, 1907 and 1908 being 1,527 and 1,978, respectively.

TUBERCULOSIS.

REGULATIONS RELATING TO TUBERCULOSIS.

By Order in Council dated 23rd December, 1904, in virtue of "The Animal Contagious Diseases Act, 1903."

'(1) The disease of tuberculosis is hereby exempted from the operation of Sections 5, 6, 7, and 8 of the 'Animal Contagious Diseases Act, 1903.' R. S. 1906.

'(2) Cattle which have re-acted to the tuberculin test shall be deemed to be affected with tuberculosis, and shall be permanently marked, in such manner as the Veterinary Director General may, from time to time prescribe

'(3) Cattle which have re-acted to the tuberculin test, shall not be permitted to be exported from the Dominion of Canada.'

Extract from Canadian Quarantine Regulations, in regard to Cattle from Countries other than the United States and Mexico.

'Cattle six months old or over imported from countries other than the United States and Mexico shall not be discharged from quarantine until they have been submitted to the tuberculin test by the Superintendent of the quarantine or other duly authorized officer.

'Cattle re-acting to the tuberculin test, but not showing clinical symptoms, shall be permanently marked in the right ear with the letter 'T' by the officer making the test, and may then be released at the expiry of the prescribed period of quarantine if found free from all other infectious or contagious diseases.

'Cattle showing clinical symptoms of tuberculosis shall be destroyed or otherwise disposed of as the Minister may direct.'

Extract from Canadian Quarantine Regulations, in regard to cattle from the United States.

'Cattle for breeding purposes and milk production six months old or over, if unaccompanied by a satisfactory tuberculin test chart signed by a veterinarian of the United States Bureau of Animal Industry, must be detained in quarantine for one week or such further period as may be deemed necessary and subjected to the tuberculin test; cattle re-acting thereto must be returned to the United States or slaughtered without compensation.

'Importers may be required to furnish a statutory declaration that the chart produced applies to the cattle it purports to describe and no other.'

Export of Cattle to the United States.

To enable exporters to comply with that portion of the United States Regulations printed below, the Department, will, on receiving not less than one week's notice, arrange for the testing with tuberculin, by one of its regular salaried Inspectors, of Canadian animals about to be exported to that country.

"A certificate for cattle over six months old for breeding purposes and for milch cows must also show that they have been submitted to the tuberculin test by a Canadian official veterinarian or an inspector of the Bureau of Animal Industry, and found free from tuberculosis, giving the date and place of testing, with a chart of reaction, and a description of the cattle, with age and marking

"All cattle imported for breeding, milk production, grazing, or feeding, when not accompanied by the required affidavits, must be detained in quarantine for one week, at the expense of the owner or importer, under the supervision of the inspector in charge. During this detention a rigid inspection will be made, and cattle over six months old for breeding and milk production, will be tested with tuberculin. Animals found free from disease at the end of that period will be released."

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CONDITIONS UNDER WHICH TUBERCULIN IS SUPPLIED.

The department does not test any cattle for tuberculosis, except those imported and exported for breeding purposes, and such herds as are placed entirely under the control and supervision of its officers.

If any owner of cattle desires to have his animals tested, and will send in to the department the number of doses required, and the name of any reputable qualified Veterinary Surgeon whom he wishes to employ to do the work, the latter will be furnished free with sufficient tuberculin, on condition that he reports to the department the results of the test on charts which are supplied for that purpose.

The department does not order the slaughter of tuberculous animals, and consequently no compensation is or can be paid.

It must be distinctly understood that the remuneration of the Veterinarian making the test is to be paid by the owner of the animals and not by the department.

Directions for Applying the Tuberculin Test.

To obtain the normal temperature of the animal to be tested, at least four temperatures, three hours apart should be taken on the day the tuberculin is to be injected.

The requisite dose should be injected under the skin with a hypodermic syringe that has been previously sterilized. The skin at the point of the injection should be saturated with an antiseptic solution before the injection is made.

(The most convenient agents for the sterilization of the syringe and the saturation of the skin are carbolic acid or creolin in solution. The solution is made by the addition of one part of carbolic acid or of creolin to twenty parts of water.)

The hypodermic needle should be dipped in the antiseptic solution after each injection before proceeding to again fill the syringe or inject another animal.

After injection five temperatures should be taken at intervals of three hours commencing with the tenth hour.

In cattle which have recently undergone a previous test the re-action frequently begins much earlier, and it is then advisable to take the first temperature not more than two hours after injection, and to continue taking temperatures every third hour thereafter up to the usual time.

Veterinarians about to apply the test should carefully study the chart on which its results are to be recorded. The hours are not fixed, as under pressure of work, these may vary.

The Veterinarian must mark, in the space for that purpose, the actual hours at which temperatures are taken, so that no misunderstanding of the record may be possible.

Attention is also directed to the note in the column for decision.

The plan at one time followed of deciding as to the health or disease of an animal tested with tuberculin, viz.: by a rise of 2° in the temperature after injection, is no longer considered satisfactory. Under that system it was possible, where the normal temperature was low, to condemn an animal with a temperature under 103° . On the other hand, an animal with a high normal temperature on injection might be passed as healthy, although showing a re-action approximating 105° , which is entirely out of the normal range.

Under the system now followed animals whose temperatures after injection do not exceed 103° are to be classed as healthy unless clinical symptoms of tuberculosis are present.

Animals showing temperatures after injection of 104° or over are to be classed as tuberculous

Animals whose temperatures after injection do not reach 104° , but rise above 103° , are to be marked suspicious, unless some extenuating circumstance accounts

plainly for the rise, in which event a clinical report is to be attached to the chart as indicated in the note

Earmarking of Re-actors.

Attention is specially directed to the fact that cattle re-acting under any circumstances are permanently earmarked by one of the regular officers of the department, and may then be dealt with as the owner sees fit, subject to the approval of the local health authorities, except that their exportation will not be permitted

J. G. RUTHERFORD,
Veterinary Director General.

HEALTH OF ANIMALS BRANCH,
DEPARTMENT OF AGRICULTURE,
OTTAWA, July, 1906

STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1907.

435 cattle were tested for export, 39 of which re-acted, 1 was classed as suspicious, and 395 successfully withstood the test.

386 cattle were tested on being imported into Canada, 23 of which re-acted, 3 were classed as suspicious and 360 proved healthy.

1,527 cattle were tested by private practitioners with tuberculin supplied by this department, 183 of which re-acted, 25 were classed as suspicious and 1,319 proved to be healthy.

STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1908.

502 cattle were tested for export, 11 of which reacted, 2 were classed as suspicious, 489 thus successfully withstanding the test.

366 cattle were tested on being imported into Canada, of which 27 re-acted, two were classed as suspicious and 337 healthy.

1,978 cattle were tested throughout the Dominion by private practitioners, with tuberculin supplied by this department, 263 of which re-acted and 60 were classed as suspicious.

With regard to this general testing it must be borne in mind that in many cases the existence of tuberculosis is suspected in a herd before tuberculin is applied for, and the proportion of re-actors cannot be cited as that obtained from indiscriminate testing.

All re-actors were permanently earmarked by a veterinary inspector in cases where the owner did not voluntarily destroy them.

GLANDERS.

The statistics printed in connection with this highly dangerous and insidious malady cannot fail to give great satisfaction.

While the efforts of our inspectors have been as energetic as formerly, and the number engaged in the work considerably increased, it is very gratifying to note that in the twelve months ending March 31, 1907, nearly 250 fewer horses were slaughtered than in the similar period ending October 31, 1905, while the figures for the twelve months ending March 31, 1908, show a still further decrease of more than 550 over the 1907 figures. I am convinced that this disease is being systematically and thoroughly eradicated, but its ravages are in many cases so insidious that the work is obviously one which cannot be completed rapidly nor dealt with in a manner other than systematic.

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The testing of all American horses entering Canada, a policy which has now been inaugurated, will undoubtedly result in the prevention of fresh centres of infection being introduced into Canada, and I can confidently predict a still further large decrease in the number of horses slaughtered and the corresponding amount of compensation involved.

The number of doses of mallein issued to our inspectors during the two years ending March 31, 1907 and 1908 was 14,203 and 20,946 respectively.

STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1907.

Dominion.

During the year, 1,881 horses were slaughtered, as hereunder shown:—

1881	{	177 killed on inspection.	}	Valued at \$213,086.00. At a cost of \$142,057.07.
		1,531 " after 1st test.		
		160 " " 2nd "		
		7 " " 3rd "		
		2 " " 4th "		
		4 " " 6th "		

954 showed clinical symptoms.

8687 horses were tested with mallein, of which 1,704 reacted and were destroyed.

Of the 1,704 re-actors, 777 showed clinical symptoms of glanders at or during the test.

There was one ceased re-actor.

Fifty-six horses are under control for re-test.

New Brunswick.

3 { 2 killed on inspection } valued at \$375.00.
3 { 1 killed after first test } at a cost of \$249.98.

3 showed clinical symptoms.

3 horses were tested, one of which re-acted, and also showed clinical symptoms during the test.

All three horses were in Carleton county.

Nova Scotia.

Three horses were tested with mallein, but proved to be healthy.

Quebec.

227	{	16 killed on inspection.	}	Valued at \$25,960.00. At a cost of \$17,306.21.
		198 " after 1st test.		
		7 " " 2nd "		
		2 " " 4th "		
		4 " " 6th "		

104 showed clinical symptoms.

992 horses were tested with mallein, of which 211 re-acted and were destroyed. Of the 211 re-actors, 88 showed clinical symptoms of glanders at or during the test.

There were no ceased re-actors. No horses are being held for re-test.

Of the 227 horses slaughtered—

5	were in	Drummond and Arthabasca,
2	"	Richmond and Wolfe,
3	"	Pontiac,
11	"	Wright,
1	"	Hochelaga,
1	"	St. Johns and Iberville,
1	"	Jacques Cartier,
5	"	Charlevoix,
2	"	Argenteuil,
6	"	Laprairie and Napierville,
7	"	Yamaska,
6	"	Montreal City,
7	"	Nicolet,
1	"	Missisquoi,
3	"	Sherbrooke,
2	"	Beauce,
162	"	Chicoutimi and Saguenay,
2	"	Labelle.

Ontario.

78	{	22 killed on inspection	} Valued at \$9,106.00.	
		53 " after 1st test		} at a cost of \$6,070.59.
		3 " " 2nd test		

63 showed clinical symptoms. 235 were tested with mallein, of which 56 reacted and were destroyed.

Of the 56 re-actors, 41 showed clinical symptoms of glanders at, or during the test.

There were no ceased re-actors nor any horses being held for re-test.

Of the 78 horses killed.

9	were in the district of	Russell,
4	"	" Peel,
16	"	" Hastings,
15	"	" Thunder Bay and Rainy River,
3	"	" Wentworth,
2	"	" Renfrew,
2	"	" Lennox and Addington.
4	"	" Durham,
3	"	" Northumberland,
2	"	" Ontario, S.R.
4	"	" Dufferin,
2	"	" Frontenac,
4	"	" York,
2	"	" Wellington,
1	"	" Waterloo.

Manitoba.

336	{	23 were killed on inspection	} Valued at \$40,810.00.	
		303 " after 1st test		} At a cost of \$27,207.37.
		10 " " 2nd test		

173 showed clinical symptoms.

1,403 horses were tested with mallein, of which 313 re-acted and were destroyed.

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Of the 313 re-actors, 150 showed clinical symptoms of glanders at, or during the test.

There were no ceased re-actors.

One horse is being held for re-test.

Of the 336 horses slaughtered.

18	were in the district of	Marquette.
8	"	Macdonald.
54	"	Selkirk.
24	"	Souris.
43	"	Winnipeg.
33	"	Lisgar.
47	"	Provencher.
73	"	Dauphin.
36	"	Portage la Prairie.

Saskatchewan.

928	{	89	were killed on inspection	}	Valued at \$105,105.00. At a cost of \$70,070.03.
		730	" after 1st test		
		107	" " 2nd test		
		2	" " 3rd test		

475 showed clinical symptoms.

4,699 horses were tested with mallein, of which 839 re-acted and were destroyed.

Of the 839 re-actors, 386 showed clinical symptoms of glanders at, or during the test.

There were no ceased re-actors, 50 horses are being held for re-test.

Of the 928 horses slaughtered in Saskatchewan—

271	were in	Regina and the district east thereof.
114	"	Moosejaw district and west thereof.
164	"	Estevan district and north thereof.
201	"	Prince Albert and Battleford district.
6	"	Maple Creek district.
119	"	Wood Mountain "
53	"	Yorkton "

Alberta.

114	{	23	were killed on inspection	}	Valued at \$11,390.00 At a cost of \$7,593.17
		77	" after 1st test		
		14	" " 2nd "		

63 showed clinical symptoms.

587 horses were tested with mallein, of which 91 reacted and were destroyed.

Of the 91 re-actors, 40 showed clinical symptoms of glanders at or during the test.

Of the 114 horses destroyed,

58	were in the	Macleod and Lethbridge districts.
21	Calgary	district
35	Edmonton	"

There were no ceased re-actors.

Three horses are under control for re-test.

British Columbia.

188	}	2 killed on inspection	} Valued at \$19,290.00	
		162 " after 1st test		} At a cost of \$12,859.72
		19 " " 2nd "		
		5 " " 3rd "		

71 showed clinical symptoms.

749 horses were tested with mallein, of which 186 re-acted and were destroyed.

Of the 186 re-actors 69 showed clinical symptoms of glanders at or during the test.

Of the 188 horses slaughtered in British Columbia,

8 were at the Pacific Coast.

33 " in Eastern British Columbia.

24 " in Okanagan Valley.

123 " in Bulkley Valley district.

There was one ceased re-actor.

No horses are under control for re-test.

Yukon.

7 killed after 1st test, valued at \$1,050, at a cost of \$700.

2 showed clinical symptoms.

16 horses were tested, of which 7 re-acted and were destroyed, 2 of the re-actors showing clinical symptoms of glanders at or during the test. All the 7 horses killed were from the Forty-Mile district.

2 horses are under control for re-test.

There were no ceased re-actors.

GLANDERS STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1908.

Dominion.

During the year 1,324 horses were slaughtered, as hereunder shown.

1324	}	84 killed on inspection	} Valued at \$154,304.50.	
		1,127 " 1st test		} At a cost of \$102,868.65.
		98 " 2nd "		
		10 " 3rd "		
		5 " 4th "		

635 showed clinical symptoms.

11,428 horses were tested with mallein, of which 1,240 re-acted and were destroyed, of the 1,240 re-actors, 551 showed clinical symptoms at or during the test.

150 are being held for retest.

New Brunswick.

3 killed at first test, valued at \$315, at a cost of \$210.

2 showed clinical symptoms.

37 were tested with mallein, of which 3 re-acted and were destroyed.

All three horses slaughtered were in Carleton County.

Nova Scotia.

16 horses were tested all of which proved healthy.

Prince Edward Island.

3 horses were tested all of which proved healthy.

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Quebec.

64 { 2 killed on inspection. } Valued at \$7,770.00.
 { 62 killed at first test. } At a cost of \$5,179.95.
 39 showed clinical symptoms.

332 were tested with mallein, of which 62 re-acted and were destroyed.

Of the 62 re-actors 37 showed clinical symptoms of glanders at or during the test.

Of the 64 horses slaughtered in Quebec—

4	were in the district of	Richmond and Wolfe.
1	"	" Montreal.
1	"	" St. Johns and Iberville.
1	"	" Argenteuil.
8	"	" Terrebonne.
3	"	" Three Rivers and St. Maurice.
2	"	" Nicolet.
8	"	" Bellechasse.
4	"	" Yamaska.
2	"	" Joliette.
1	"	" Jacques Cartier.
1	"	" Shefford.
5	"	" L'Assomption.
2	"	" Megantic.
6	"	" Wright.
2	"	" Richelieu.
1	"	" Beauce.
1	"	" Pontiac.
2	"	" Temiscouata.
1	"	" Charlevoix.
7	"	" Quebec.
1	"	" Montmorency.

Ontario.

56 { 38 " at 1st test. } Valued at \$5,845.00.
 { 17 killed on inspection. } At a cost of \$3,896.61.
 { 1 " 2nd test. }

49 showed clinical symptoms.

476 horses were tested with mallein, of which 39 reacted and were destroyed.

Of the 39 re-actors, 32 showed clinical symptoms of glanders.

Of the 56 horses slaughtered—

2	were in the District of	Wentworth.
5	"	" Russell.
1	"	" Welland.
1	"	" Renfrew.
10	"	" Hastings, W.
1	"	" Ottawa.
1	"	" Muskoka.
2	"	" Toronto.
2	"	" York, C.
6	"	" Ontario, S.
5	"	" Thunder Bay and Rainy River.
9	"	" Lennox and Addington.
3	"	" Hastings, E.
5	"	" York, N.
3	"	" Nipissing.

Manitoba.

199 $\left\{ \begin{array}{l} 1 \text{ killed on inspection.} \\ 186 \text{ " at 1st test.} \\ 12 \text{ " " 2nd " } \end{array} \right\} \begin{array}{l} \text{Valued at } \$25,955.00. \\ \text{At a cost of } \$17,303.11. \end{array}$

99 showed clinical symptoms.

3065 horses were tested with mallein, of which 193 re-acted and were destroyed.

Of the 198 re-actors, 98 showed clinical symptoms of glanders.

One horse is under control for re-test.

Of the 199 horses slaughtered—

18	were in the District of Dauphin.
42	" " Lisgar.
57	" " Provencher.
27	" " Souris.
10	" " Brandon.
17	" " Macdonald.
21	" " Portage la Prairie.
1	" " Marquette.
4	" " Selkirk.
2	" " Winnipeg.

Saskatchewan.

819 $\left\{ \begin{array}{l} 50 \text{ killed on inspection} \\ 694 \text{ killed at 1st test.} \\ 69 \text{ " 2nd test.} \\ 1 \text{ " 3rd test.} \\ 5 \text{ " 4th test.} \end{array} \right\} \begin{array}{l} \text{Valued at } \$96,885.00. \\ \text{At a cost of } \$64,589.36. \end{array}$

370 showed clinical symptoms.

6263 horses were tested with mallein, of which 769 re-acted and were destroyed.

Of the 769 reactors, 320 showed clinical symptoms of glanders.

94 horses are under control for re-test.

Of the 819 horses slaughtered—

147	were in the district of Prince Albert and Saskatoon.
23	" " Battleford.
258	" " Regina.
42	" " Moosejaw.
218	" " Estevan.
57	" " Yorkton.
1	" " Wood Mountain.
31	" " Maple Creek.
42	" " Grenfell.

Alberta.

126 $\left\{ \begin{array}{l} 8 \text{ killed on inspection} \\ 106 \text{ " at 1st test} \\ 12 \text{ " at 2nd " } \end{array} \right\} \begin{array}{l} \text{Valued at } \$11,559.50. \\ \text{At a cost of } \$7,706.30. \end{array}$

45 showed clinical symptoms.

1,489 horses were tested with mallein, of which 118 re-acted and were destroyed.

Of the 118 reactors 37 showed clinical symptoms.

41 horses are still under control for re-test.

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Of the 126 horses slaughtered,

14	were in the district of	Medicine Hat.
27	" "	Macleod and Lethbridge.
40	" "	Calgary.
45	" "	Edmonton.

British Columbia.

12	}	5 killed on inspection	} Valued at \$1,625.00.	
		6 " at 1st test		} At a cost of \$1,083.32.
		1 " at 2nd "		

All 12 showed clinical symptoms.

740 horses were tested with mallein, of which 7 re-acted and were destroyed.

Of the 12 horses slaughtered,

8	were at the	Pacific Coast.
2	" in	Eastern British Columbia.
2	" in	Northern " "

Yukon.

45	}	1 killed on inspection.	} Valued at \$4,350.00.	
		32 " at 1st test.		} At a cost of \$2,900.00.
		3 " at 2nd "		
		9 " at 3rd "		

19 showed clinical symptoms.

295 horses were tested with mallein, of which 44 re-acted and were destroyed.

Of the 44 re-actors 18 showed clinical symptoms.

All the horses slaughtered were in the Dawson and Forty Mile district.

PICTOU CATTLE DISEASE.

The results of the experiments conducted at Antigonish, Nova Scotia, having, as reported last year, shown beyond question that the specific hepatic cirrhosis, locally known as Pictou Cattle Disease, is due to the continued eating of Ragwort or *Senecio Jacobea*, the work at this station would have been discontinued but for the wish to secure definite information as to the value of sheep and incidentally of other animals as agents in the extirpation of the weed in question.

Experimental work, with this object, has, as stated in previous reports, been for some time in progress and I am glad to be able to report that the results, are of the most gratifying nature. Sheep appear to eat the weed, both green and in a dried state, with perfect impunity. The work of eradicating the weed is thus greatly simplified, as much of the infested territory is of such a nature that the adoption of ordinary agricultural methods for weed extermination is a practical impossibility. While there is in the weedy area a great deal of excellent agricultural land, much of which has however been unfortunately allowed to run down, there is a considerable proportion of bush, also, many hills too steep and in some cases too rocky for cultivation. The weed is everywhere, in the fields, in the bush, on the hills, along the sea-shore and by the roadsides. It has secured such a foothold that ordinary methods will be powerless to eradicate it. It is apparently true that it is only injurious to cattle when fed in the dry state, as among hay or other fodder, this theory being confirmed from a practical point of view but of course weakened theoretically by the ascertained fact that these animals never, of their own accord, eat it when green if any other food is procurable. While this would seem to indicate that in order to

prevent the disease it is only necessary to effect its eradication from fields and hay meadows, it must be remembered that it is a free seeder and the seeds being light and furnished with down are carried long distances by the wind, to say nothing of other agencies. It will be seen therefore that unless the weed is eradicated or at least kept under control on the surrounding hills and road-sides, the residents of the infested area have before them an interminable task in attempting to keep their fields and hay meadows in a weed-free condition, while permitting it to grow elsewhere.

As we have succeeded in showing that sheep can eat the weed and continue to thrive, it will undoubtedly pay the farmers of the infested area to go into the sheep raising industry, more especially as there is not, to my knowledge, any district in Canada, with perhaps the exception of some part of the Eastern Townships, in which weed or no weed, richer returns from this particular branch of husbandry could reasonably be expected. The country is an ideal one for sheep raising, being capable of producing an abundance of winter feed, while the hilly pastures and other rough lands are admirably adapted to this class of stock. Wolves are unknown, and while there are yet a few bears in the deeper woods, they are not in sufficient numbers to constitute a serious menace to the flocks. The future of the sheep industry for many years to come is assured, inasmuch as the present supply is far from equal to the demand, which, in this particular district is very large and constantly increasing, the export trade to New England furnishing a regular and ready market. Wool is also rising in price, and if the proper breeds are selected there is no doubt but that this product also will return a large profit. Last, but by no means least important is the fact that if the sheep are properly handled so as to give the long cultivated and run down arable lands on each farm the benefit of their attentions from time to time, as can easily be arranged by the adoption of a simple system of rotation in which crops suitable for the purpose may be grown, the fertility of the crop worn fields will shortly be restored to the lasting advantage of their owners and of the district in general.

It must of course be admitted that while sheep are, beyond question one of the most profitable of farm products, they differ somewhat from cattle and even from swine, inasmuch as while animals of the two last-named species will, even when badly bred, poorly fed and ill-cared for, still pay for their keep and perhaps yield a small profit, the sheep require constant watchful care and many special attentions, which can only be given by men of practical knowledge and some skill.

Many farmers in Nova Scotia, as elsewhere in Canada, have hitherto paid but little attention to sheep, and this fact must be borne in mind and proper steps taken to supervise and safeguard the industry, otherwise disappointment and loss will be certain to follow, and the last state of the weedy district will be worse than the first.

The Government of Nova Scotia is, through the Provincial Department of Agriculture and the Agricultural College at Truro, carrying on a good deal of educational work with reference to the sheep industry as well as to other branches of farming, a task in which it is being assisted to a considerable extent by the Live Stock Branch of your department, which from time to time furnishes skilled and practical speakers for the various meetings held throughout the province. I would however respectfully suggest that this department might with advantage go somewhat farther and undertake on its own account to furnish the farmers of the weedy area with practical object lessons in sheep raising by the establishment of a few small experimental stations somewhat similar to that at Antigonish, on which, at a small cost, flocks could be maintained under the care of an expert practical shepherd. The station at Antigonish is visited by very large numbers of farmers from the surrounding country and although no special attempt has been made to demonstrate scientific farming or feeding, the attention of those in charge having been almost entirely directed to the conduct of the experiments already described, the systematic way in which the farm has been carried

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on and the results as shown by the condition in which the healthy animals have been turned off, have evoked much favourable comment and the example has had an excellent effect as is shown by the improved condition of many neighbouring farms. This fact is simply cited in support of the views which I have held ever since my first visit to the district for purposes of investigation, namely, that the Nova Scotia farmer, like many others of his class elsewhere, though perhaps owing to his long isolation to a much greater degree, is more likely to be benefited by practical ocular demonstration of fact than by the most erudite essays or eloquent addresses on farm topics. I am convinced that stations such as I have described can be carried on, if not at an actual profit, at least at very small expense, while the permanent benefits which would result from their establishment can scarcely be over-estimated, from the view point of local economics.

Immediately on the conclusion of the experiments, a full and complete bulletin on the results obtained was published and thoroughly disseminated throughout the Maritime Provinces, and as a result the population of that portion of the Dominion are now well aware of the easy and profitable method by which the pest may be overcome.

MANGE IN CATTLE.

I regret to report that this troublesome and highly contagious disease still prevails to a somewhat serious extent in Southern Alberta and South Western Saskatchewan. The compulsory dipping orders of 1904 and 1905, were, especially the latter, very generally and thoroughly enforced with most beneficial results. In fact so free from disease were the cattle of the quarantined area during the winter of 1905-6, that there was a very general feeling among the stock men interested that a repetition of the compulsory order was unnecessary, and, at the annual meeting of the Western Stock Growers' Association held at Macleod in May of 1906, a strongly worded resolution to that effect was unanimously carried. I may say that my own view of the case was somewhat different, but as circumstances rendered my attendance at the meeting impossible, and as it would have been a very difficult matter to enforce a compulsory dipping order against the wishes of and without the active co-operation of the large owners who had thus declared against it, it was decided to let one season pass without active measure further than the quarantining and treatment of all herds found to be affected. Every effort was therefore made to locate and deal with infected herds and until well on in the season, it appeared as if the results would be reasonably satisfactory. Shortly after winter set in however, the presence of the disease in a number of unsuspected and untreated herds became only too evident, and, as the weather precluded any attempt at curative measures, we had to content ourselves with endeavouring to keep under quarantine such animals as we knew to be affected or to have been exposed to infection. Under ordinary climatic conditions this policy might have been effective at least in confining the disease to the original infected herds but the winter which set in very early proved to be the most severe ever experienced since the settlement of the country, with the result that restrictive measures were utterly useless. Storms of exceptional severity were frequent and of long duration while the cold was intense and continuous. Cattle drifted for immense distances, fences were broken down or cut to prevent the storm-driven animals from piling, the diseased herds mixed freely with the others and through their huddling together for protection against the intense cold, the disease spread with extraordinary rapidity, until it was perhaps fully as prevalent, at least in some districts, as it was in 1904. Its effects combined with those of the unprecedentedly severe winter and consequent lack of feed caused heavy losses.

Psoroptic scabies among domestic cattle, where the animals of each individual owner are closely confined to his own premises either in buildings or behind proper fences, is anything but a serious malady, as the danger of its spread is reduced to a minimum, while it can always be detected in the incipient stages and effectively dealt with, yielding, as it does, to simple treatment. On the range it is a very different matter. It is not only very easily transmitted from the animals of one owner to those of another either by direct contact, or indirectly through inanimate objects which have become contaminated, but owing to the fact that, especially during the mild season, it has a well marked tendency to assume a latent form, taken in conjunction with the further fact that range animals are not kept under regular and frequent observation, it rapidly gets beyond control. The result is that herds, which during the summer may appear and in fact may actually be absolutely free from infection, having perhaps even been thoroughly treated, are not unfrequently found, on the arrival of cold weather, to be badly infected through contact or the range with the diseased stock of some other owner who possibly did not believe in treatment or was too careless or indolent to look after the health of his animals.

Under range conditions therefore, the policy likely to prove most effective in eradicating the disease is that which we have on three separate occasions endeavoured to enforce namely, the universal and, as far as possible, simultaneous treatment of all the cattle within the affected area, whether showing signs of the disease or not. That we have not been more successful is due very largely, in my opinion, to the fact that, as above stated, a considerable proportion of the smaller owners have, instead of co-operating heartily with us in our efforts to promote and safeguard their interests, assumed a more or less antagonistic attitude.

In the spring of 1907, it was obvious that compulsory dipping was absolutely essential and it was therefore proceeded with as rapidly as possible. The area involved was divided into districts, in charge of veterinary inspectors, and again subdivided into sub-districts under the charge of experienced cowmen. Thousands of bulletins containing full descriptions of the disease and the methods of combatting it, together with the terms of the compulsory order under which the operations were conducted, were distributed throughout the country and as a result 382,921 cattle were treated. It is unfortunate that the oil emulsion, authorized for use in addition to the lime and sulphur dip, and with which over 110,000 cattle were treated, did not prove satisfactory and its discontinuance under the auspices of the department was decided on as soon as the results were observed during the following winter.

Lime and sulphur is by far the best dip obtainable and the ranchers are now limited to its use when our officers supervise the treatment of their cattle.

STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1907.

In Saskatchewan, 332 cattle were quarantined on twenty-two premises.

In Alberta, forty bands of cattle were quarantined, involving the control of 15,699 cattle. Only 1,673 of these were, however, found to be affected.

STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1908.

In Ontario there were two outbreaks, 91 cattle being quarantined.

In Saskatchewan there were two outbreaks, 1,760 cattle being quarantined.

In Alberta 187 bands of cattle were quarantined, involving the control of 53,518 cattle. A large number of these were quarantined on account of their owners failing to dip, in accordance with the provisions of the Compulsory Mange Dipping Order.

382,921 cattle were treated, subdivided as follows:—

265,301 dipped once, of which 259,354 were dipped twice.

110,351 treated with oil emulsion.

7,269 hand treatment.

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MALADIE DU COIT.

A marked diminution in the number of animals slaughtered by reason of their being infected with this insidious malady is shown in the statistics for the two years covered by this report. In the previous seventeen months 412 horses had been destroyed, while in the past 24 months only 216 were found to be affected.

A number of animals of the doubtful class are being held in quarantine as suspects, and it can safely be said that, so far as is humanly possible, the disease is well under control. One animal was found to be diseased at Battleford, Sask., but all the other cases were discovered in Southern Alberta or in that part of Western Saskatchewan immediately adjacent thereto. The compensation involved in the last twelve months was under \$3,500.

A most interesting series of experiments has been under way at the branch experiment station at Lethbridge, in charge of Inspector E. A. Watson, and that officer, assisted by Inspector M. V. Gallivan has recently been successful in isolating the *Trypanosoma equiperdum*, in cases drawn from the infected district, thus demonstrating that the disease as found on this continent is similar to that of European and tropical countries.

STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1907.

167 animals valued at \$15,505 were slaughtered as being affected with this disease, at a cost of \$10,336.44, distributed as follows:—

Saskatchewan.

District.	Slaughtered.
Rush Lake	24
Battleford	1
	25

Value, \$2,850; compensation, \$1,899.90.

Alberta.

District.	Slaughtered.
Lethbridge	67
Medicine Hat	55
Calgary	20
	142

Value, \$12,655; compensation, \$8,436.54.

STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1908.

District.	Slaughtered.	Suspected and Quarantined.
Lethbridge	36	33
Mayton	3	42
Medicine Hat	7	47
Calgary	3	6
Red Deer	—	3
	49	131

49 horses were slaughtered, valued at \$5,175, at a cost of \$3,449.92.

MANGE IN HORSES.

This disease has been prevalent to a small extent in certain districts in Quebec, while a few cases are also dealt with in the provinces further west.

It is very difficult to entirely eradicate this disease when the modern facilities for transportation and the ease with which the infection is transmitted are considered. The outbreaks are however, isolated, and being detected early, and the disease promptly dealt with, very little opportunity is afforded for it to spread.

STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1907.

	Outbreaks.	Animals Affected
Quebec..	55	92
Ontario..	17	48
Manitoba..	11	53
Saskatchewan..	32	110
Alberta..	10	94
British Columbia..	2	4
	<hr/>	<hr/>
	127	401
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STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1908.

	Outbreaks.	Animals Affected
Quebec..	30	44
Ontario..	8	54
Manitoba..	21	80
Saskatchewan..	26	82
Alberta..	24	382
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	109	642
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SHEEP SCAB.

A number of cases of this disease were detected, all being confined to western Ontario. Middlesex county furnished the largest number of cases, and needless to say, prompt and effective measures were instituted with a view to eradicating the pest.

All sheep quarantined were dipped twice under the supervision of our inspectors, while frequent visits were made to infected premises before they were finally disinfected and released from quarantine restrictions.

STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1907.

In Ontario 455 animals were found to be affected with sheep scab, involving the quarantine of 1,678 sheep on 56 premises, distributed as follows:

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County.	Affected.	Quarantined.
Mainitoulin Island.	53	663
Lambton.	2	15
Grey.	17
Waterloo.	12	83
Middlesex.	344	519
Kent.	26	26
Ontario	18	344
Lincoln. . . . .	..	11
	<hr/>	<hr/>
	455	1,678

STATISTICS FOR THE TWELVE MONTHS ENDING MARCH 31, 1908.

In Ontario 514 animals were found to be affected with sheep scab, involving the quarantine of 1,611 sheep on 68 premises, distributed as follows:—

County.	Affected.	Quarantined.
Lambton.	154	634
Peel.	2	41
South Ontario. . . . .	..	5
Middlesex.	321	343
Wellington. . . . .	..	60
Bruce.	20	37
Kent. . . . .	..	10
Essex.	17	481
	<hr/>	<hr/>
	514	1,611

ANTHRAX.

Several outbreaks of this disease have been reported in the provinces of Ontario and Quebec, the disease having also appeared on one farm in New Brunswick.

In every case reported, an inspector has been promptly sent to make an investigation, and to take measures as effective as possible to prevent the spread of the disease. As a rule, all contact animals were inoculated with the preventive vaccine now manufactured at our laboratory, although for obvious reasons this work is not done by our own inspectors, but by veterinarians engaged by the owners themselves. The results are almost without exception of the most satisfactory nature, the spread of the disease being more immediately checked by this method than by any other. Much good, nevertheless results in other ways from the visit of the inspector. In more than one instance, human beings were found to have become infected, and to be in a dangerous condition, the disease not having been recognized by the attending physician who was unfamiliar with the disease or its symptoms.

In one instance, in which no animals were affected, but in regard to which I was notified, and sent an inspector to inquire into the circumstances, two men died of anthrax, becoming infected through unloading a car of South American hides.

In the event of an ordinary outbreak of anthrax among live stock, much depends upon prompt action in dealing with carcasses and debris. These if carelessly handled, rapidly spread the infection, one case thus being likely to give rise to many more. Our inspectors are instructed to see that all carcasses of infected animals, together with excreta, bedding, &c., are thoroughly destroyed, preferably by burning, although

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where this is not possible, deep burying with lime is practised. The handling of the carcasses and other articles mentioned is a matter of great importance as the infection is frequently spread over a considerable area by carelessness in this regard.

All stables, fences, troughs and other articles with which the diseased animals have been in contact are thoroughly cleansed and disinfected. As a rule, where any doubt exists as to the nature of the disease, specimens of blood are forwarded to the Biological Laboratory for confirmative microscopic diagnosis. 1,801 doses of anthrax vaccine have been supplied, during the past two years.

The following outbreaks were reported and dealt with in the twelve months ending March 31, 1907.

	Outbreaks.	Animals Died.
Quebec.	4	26
Ontario.	20	74
	24	100

The four outbreaks in Quebec were in the counties of Napierville, Three Rivers, Bagot and Berthier respectively.

In Ontario, eighteen outbreaks were in Dundas county, one in Durham and one in Renfrew county.

The following outbreaks were reported and dealt with during the year, ending March 31, 1908:

Province.	Outbreaks.	Animals Died.
New Brunswick.	1	4
Quebec.	5	12
Ontario.	5	13
	11	29

The New Brunswick outbreak was in Queen's county.

In Quebec, three outbreaks were in St. Hyacinthe county, one in Megantic and one in Quebec.

In Ontario, three outbreaks were in Simcoe county and two in Dufferin.

BLACK QUARTER.

Black quarter has, as usual, prevailed to a certain extent in different provinces. No statistics are available in regard to it as it is not dealt with under the Animal Contagious Diseases Act.

The practice of preventive inoculation is very generally adopted, 8,054 doses of blackleg vaccine being shipped from Ottawa in addition to that sold by druggists throughout the Dominion.

RABIES.

I regret to have to report that rabies has made its appearance in a number of different districts throughout the Dominion. Several outbreaks have taken place in the Niagara peninsula some of which have been directly traceable to dogs from the United States.

In Western Canada also, both in Manitoba and Saskatchewan outbreaks have occurred, in all probability due to infection derived from dogs brought in by settlers from the United States, in which country the disease prevails to a considerable extent.

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All outbreaks reported were promptly dealt with, and in the western provinces, considerable districts were placed under the operation of the muzzling order provided in the regulations a copy of which is printed herewith.

DOMINION OF CANADA.

REGULATIONS RELATING TO RABIES.

By Order in Council dated 10th August, 1905, in virtue of 'The Animal Contagious Diseases Act, 1903.'

1. No dog or other animal which is affected with or has been exposed to the infection of rabies, shall be permitted to run at large, or to come in contact with other animals.

2. Any veterinary inspector may declare to be an infected place within the meaning of 'The Animal Contagious Diseases Act, 1903,' any place or premises where the infection of rabies is known or suspected to exist.

3. Veterinary inspectors are hereby authorized to order the slaughter of any dog or other animal affected with rabies, or suspected of being so affected, and to order the disposition of the carcase of such animal.

4. Veterinary inspectors are hereby authorized to order dogs or other animals which have been exposed to the infection of rabies, to be detained, isolated or muzzled.

5. No dog or other animal, nor any part thereof, shall be removed out of an infected place without a license signed by an inspector.

6. Every yard, stable or outhouse, or other place or premises, and every wagon, cart, carriage, car or other vehicle, and every vessel and every utensil or other thing infected or suspected of being infected with rabies, shall be thoroughly cleansed and disinfected by and at the expense of the owner or occupier in a manner satisfactory to a veterinary inspector.

7. On receiving the report of an inspector to the effect that rabies is known or suspected to exist in any locality, the Minister of Agriculture may order that all dogs, or other animals, within such an area as he may determine or describe, shall be detained, isolated or muzzled during such period as he may see fit.

J. G. RUTHERFORD,
Veterinary Director General.

Health of Animals Branch,
Department of Agriculture,
Ottawa.

' LOCO ' POISONING.

In one or two districts in the West, the peculiar disease known, rightly or wrongly, as 'Loco' poisoning, has for a number of years existed to a greater or less extent.

The matter has always been one of interest to this Branch and Drs. Hargrave and Warnock, who are perhaps more familiar with Western conditions than the majority of our officers, have devoted considerable attention to it, as will be seen from previous reports.

Owing to representations made by stock owners in the affected districts, a thorough investigation has now been undertaken, and the Special Report of Dr. Hilton is published herewith.

A series of extensive experiments is being conducted at our Lethbridge Station. This work, which has never, so far as I know, been previously undertaken on exactly similar lines, will be not only interesting but possibly very valuable, especially if the findings of Mr. Albert C. Crawford, Govt. Pharmacologist at Washington, who attributes the condition known as 'Loco' poisoning to the introduction to the animal economy of salts of barium, for which it has been shown that the 'Loco' plant (*Oxytropis Lambertii*) has a marked affinity, is verified by our work.

BIOLOGICAL LABORATORY.

The work performed at the Biological Laboratory under Dr. C. H. Higgins has been very satisfactory. The routine work of supplying mallein, tuberculin, blackleg vaccine, reporting on specimens received, etc., has very largely increased. Dr. Hadwen, formerly in charge of the Experiment Station at Lethbridge, was transferred in 1906 to headquarters, being replaced by Dr. A. E. Watson.

The interesting report of Dr. Higgins gives full details of the work performed and the progress made at the Laboratory.

EXPORT INSPECTIONS.

Export inspections have, as heretofore, been conducted at Montreal, Bridgeburg, Toronto, Niagara Falls, Winnipeg, St. John and Halifax, while local shipments from Canada have been inspected at other points as circumstances warranted, a considerable number of animals passing through Bayfield and Mulgrave, N.S., Charlottetown, P.E.I., and Sydney, N.S.

The excessive severity of the winter of 1906-7, resulted in a serious diminution in the number of western cattle exported the following season.

All cars conveying cattle from the range country are thoroughly cleansed and disinfected after use, while the system of double inspection, by which all western cattle are unloaded and carefully inspected at Winnipeg, and again on arrival at Montreal some days later, renders it highly improbable that affected animals can leave Canada.

ANIMALS Inspected for Export from April 1, 1906, to March 31, 1907.

	Horses.	Cattle.	Sheep.	Swine.	Mules.
Montreal to Great Britain.....	303	129,448	10,314		
Inspected at Montreal for shipment to Great Britain, via Boston and Portland.....		34,738	29,631		
St. John, N.B., to Great Britain.....	73	32,352	3,532		
Bridgeburg to Great Britain.....		7,877	925		
Toronto to Great Britain.....		8,254	1,738		
Niagara Falls to Great Britain.....		1,335			
Montreal to South Africa.....	148	30	153		200
Charlottetown to Newfoundland.....	29	1,395	2,312	86	
Bayfield to Newfoundland.....	10	130	23		
Halifax to Newfoundland.....	3				
Mulgrave to Newfoundland.....	10	703	100		
Sydney, N.S., to Newfoundland.....	42	254	51	19	
" St. Pierre and Miquelon.....		83	162	3	
Halifax, N.S., to St. Pierre and Miquelon.....		14	32	26	
" Bermuda.....	3	7			
" Jamaica.....		16	462		
" West Indies.....	1	1	3		
" Trinidad.....	6				
" Barbadoes.....	14	8	10		
Montreal to France.....		1,400			
" United States.....			443		
Lacolle to United States.....			9,331		
Bridgeburg to United States.....			83,263		
Toronto to United States.....			11,781		
Ontario-General to United States.....			28,891		
Prescott to United States.....			3,230		
Cornwall to United States.....			1,023		
Brockville to United States.....			855		
Total.....	642	218,045	180,265	134	200

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EXPORT Animals Rejected at Following Ports from April 1, 1906, to March 31, 1907.

Port.	Horses.	Cattle.	Sheep.
Montreal.....	1	369	122
St. John, N.B.....		22	1
Charlottetown, P.E.I.		1	
Total.....	1	392	123

Of the above, 112 cattle at Montreal and 2 at St. John were rejected for actinomycosis, and 8 cattle at Montreal for mange, 1 head of cattle at Montreal and 1 at Charlottetown were rejected on account of tuberculosis.

The one horse was rejected on account of strangles.

The rest of the animals rejected were suffering from lameness, or injuries received during transportation and showed no indication of contagious or infectious disease.

EXPORT Inspections for the Twelve Months ending March 31, 1908.

	Horses.	Cattle.	Sheep.	Swine.
Montreal to Great Britain.....	174	96,763	11,942	
Inspected at Montreal for shipment to Great Britain via Boston and Portland.....		17,543	28,939	
Montreal to South Africa.....			112	17
" Newfoundland.....		285	60	1
Halifax to Turks Island.....			10	
" St. Vincent.....			10	
" Jamaica.....		9	341	
" Bermuda.....	49	145	385	21
" Barbadoes.....	16			
" St. Pierre and Miquelon.....	1	60	66	22
" Newfoundland.....			5	11
" Trinidad.....		1	2	1
St. John, N.B., to Great Britain.....	39	23,129	4,167	
Sydney to Newfoundland.....	168	157	88	1
" St. Pierre and Miquelon.....	1	146	160	20
Charlottetown, P.E.I., to Newfoundland.....	38	1,165	1,934	177
Bridgeburg to United States.....			59,314	
" Great Britain, via United States.....		5,391		
Toronto to Great Britain.....		3,613		
" United States.....			8,336	
Bayfield and Mulgrave to Newfoundland.....	49	1,035	321	1
Total.....	535	149,447	116,207	272

ANIMALS REJECTED.

	Cattle.	Sheep.
St. John.....		
Montreal.....	240	125

Eighty-nine were rejected on account of actinomycosis, 2 suspected mange, and the balance for lameness or injury received.

IMPORTATIONS.

For the year ending March 31, 1907, the number of horses imported into Canada almost doubled any previous year, while large increases were observed in the numbers of cattle and sheep. The imposition of a thirty-day quarantine on hogs has resulted in an almost total cessation of the importation of this class of animal, with the result that the danger of hog cholera being imported other than by illegal methods, a much-dreaded possibility in view of our previous experience of this disease, is almost nil.

An interesting return is shown hereunder, which gives the number of animals refused admission to Canada during the past twelve months on account of the existence of disease. The results which would accrue from the admission of these animals may readily be realized, and the figures given are ample justification for the organization of a thorough and effective quarantine service along our southern boundary.

IMPORT Inspections from United States from April 1, 1906 to March 31, 1907.

Port.	Horses.	Mules.	Cattle.	Sheep.	Swine.	Goats.	Buffalo.
Halifax, N.S.	15						
Yarmouth	2		5			5	
St. John, N.B.	417	1	5	7	4		
Woodstock	3		1				
McAdam Junction			2				
Quebec, P.Q.	4						
St. Johns	3		3	1			
Stanstead Junction			5				
Sherbrooke			1				
Mansonville			1				
Athelstane and Dundee			2				
Cornwall, Ont.	3		4	3			
Prescott			1				
Ottawa			3				
Brockville	1	1	25				
Niagara Falls	11		16	19	8	1	
Bridgeburg	19	1	8	1,278		7	
Windsor	84		81		15		
Sarnia	74	1	45	508	1	8	2
Sault Ste. Marie			4				
Fort Frances	2		1				
Rainy River	14		13				
Emerson, Man.	3,400	133	985	24			
Winnipeg	5,447	241	4,037	57			
Gretna	288	66	56	1			
Killarney	647	40	196	2			
Morden	13		2				
Crystal City	45		77				
Mowbray	379	2	456	10			
Deloraine	385	27	314				
Melita	389		50				
North Portal, Sask.	12,433	504	8,112		13		
Wood Mountain	2,167	9	120	785			
Maple Creek	12						
Willow Creek	3,019	2	4,081	22,239			
Pendant d'Oreille, Alta.	3,627	17	185				
Medicine Hat	8						
Coutts	3,971	16	3,187	6,748			
Macleod	6						
Twin Lakes	1,331	8	736				
Stettler	15						
Gateway, B.C., and Rykerts	2,196	10	356				
Kingsgate	146	14	7				
Nelson	302	12	265	4,522	5		
Rossland	65		176	1,152	6		
Grand Forks	264	3	353	102			

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IMPORT Inspections from United States from April 1, 1906 to March 31, 1907—Con.

Port.	Horses.	Mules.	Cattle.	Sheep.	Swine.	Goats.	Buffalo.
Midway.....	586	4	343	2,320	2	..	..
Osoyoos.....	447	..	48	952	..	..	..
Myncaster.....	34	..	..	..	..	..	..
New Westminster.....	397	8	223	3,572	1	30	..
Vancouver.....	149	1	1	29,159	..	..	..
Victoria.....	176	79	11	19,390	1	1	..
Whitehorse, Y.T.....	168	..	1,545	3,061	81	..	..
Total.....	42,234	1,260	26,147	95,903	137	52	2

IMPORT Inspections from United States for year ending March 31, 1908.

Port.	Horses.	Cattle.	Sheep.	Swine.	Mules.	Goats.	Buffalo.
Halifax, N.S.....	4	..	..	..	..	..	..
Sydney.....	2	..	..	..	..	..	..
Yarmouth.....	9	1	..	..	..	..	..
Charlottetown, P.E.I.....	4	..	..	..	..	..	..
Woodstock, N.B.....	2	..	..	..	..	..	..
McAdam Junction, N.B.....	2	..	..	..	..	..	..
New Brunswick—General.....	6	..	..	..	..	..	..
St. John, N.B.....	125	14	..	3	7	..	..
Sherbrooke, Que.....	224	30	105	6	..	..	..
Athelstane and Dundee, Que.....	19	13	..	..	..	..	..
St. Johns, Que.....	252	8	14	..	..	6	..
Quebec, Que.....	..	..	..	1	..	..	..
Cornwall, Ont.....	19	1	..	..	..	..	..
Prescott, Ont.....	58	4	..	..	..	..	..
Brockville, Ont.....	24	20	..	..	..	..	..
Toronto, Ont.....	5	..	..	..	..	..	..
Niagara Falls, Ont.....	432	21	1	..	2	..	..
Windsor, Ont.....	623	96	95	11	3	3	..
Sarnia, Ont.....	205	65	556	3	1	2	..
Bridgeburg, Ont.....	788	70	55	16	18	4	..
Sault Ste. Marie, Ont.....	4	..	..	..	..	..	..
Rainy River, Ont.....	4	6	..	..	..	..	..
Fort Francis, Ont.....	15	1	..	..	..	..	..
Ontario—General.....	1	..	..	..	..	..	..
Emerson, Man.....	5,907	3,068	73	15	708	10	..
Gretna, Man.....	1,424	831	17	..	45	4	..
Bannerman, Man.....	403	146	..	..	12	..	..
Manitoba—General.....	218	253	4	..	45	..	..
North Portal, Sask.....	8,788	5,104	152	7	517	..	..
Wood Mtn., Sask.....	437	..	..	..	9	..	..
Willow Creek, Sask.....	265	..	..	..	..	..	..
Saskatchewan—General.....	4	..	..	..	..	..	..
Pendant d'Oreille, Alta.....	228	91	1,415	..	4	..	..
Twin Lakes, Alta.....	241	..	..	..	..	..	..
Coutts, Alta.....	753	126	3,404	3	12	10	410
Alberta—General.....	9	..	..	..	..	..	..
Nelson, B.C.....	58	199	..	..	..	4	..
Rossland, B.C.....	25	201	..	..	..	..	..
Gateway, B.C.....	631	18	..	..	1	3	..
Kingsgate, B.C.....	537	259	..	..	4	..	..
Grand Forks, B.C.....	150	248	103	39	4	..	..
Midway, B.C.....	48	40	1,992	..	..	..	..
Myncaster, B.C.....	141	66	2,000	..	..	..	..
Bridesville, B.C.....	30	215	1,315	..	..	..	..
Chopaka, B.C.....	19	..	332	..	..	..	..
Osoyoos, B.C.....	171	18	1,000	..	1	..	..
New Westminster, B.C.....	634	111	3,733	4	10	173	..
Vancouver, B.C.....	183	4	16,775	..	..	..	..
Victoria, B.C.....	193	4	18,564	2	38
Whitehorse, Y.T.....	80	582	1,689	222
Total.....	24,404	11,924	53,424	332	1,441	219	410

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IMPORT Inspections from countries other than the United States from April 1, 1906, to March 31, 1907.

	Horses.	Cattle.	Sheep.	Swine.	Asses.
St. John, N.B.	544	9			
Coaticook, Que.	11				
Montreal	1,251				
Lévis Quarantine Station	50	166	1,122	52	
Niagara Falls, Ont.	39				
Sydney, N.S.	*59	*1			
Halifax, N.S.					1
Total	1,954	176	1,122	52	1

* From Newfoundland. All others from Europe.

IMPORT Inspections from countries other than the United States during the Twelve Months ending March 31, 1908.

	Horses.	Cattle.	Sheep.	Swine.	Donkeys and Mules.
Halifax, N.S.	*1	3			
Sydney, N.S.	*52	*6			2 mules.
St. John, N.B.	174	32	187	88	
Montreal, Que.	1,058				
Quebec, Que.	101	242	2,603	75	1
Sherbrooke, Que.	4				
Niagara Falls, Ont.	42				
Bridgeburg, Ont.	24				
Total	1,456	283	2,790	163	3

* From Newfoundland. All others from Europe.

One horse entered Halifax from Jamaica and one mule from Antigua.

IMPORT TESTING.

Three thousand six hundred and thirty-three horses were tested on arrival from the United States, during the twelve months ending March 31, 1908, distributed as follows:—

Halifax, N.S.	7	North Portal, Sask.	430
Yarmouth, N.S.	8	Wood Mountain, Sask.	121
St. John, N.B.	19	Willow Creek, Sask.	77
Woodstock, N.B.	2	Saskatchewan—General	4
McAdam Junction, N.B.	3	Twin Lakes, Alta.	131
New Brunswick—General	3	Couits, Alta.	185
Charlottetown, P.E.I.	3	Pendant d'Oreille, Alta.	34
Sherbrooke, P.Q.	105	Alberta—General	3
St. Johns, P.Q.	15	Gateway, B.C.	203
Athelstan and Dundee, P.Q.	4	Kingsgate, B.C.	43
Prescott, Ont.	17	Nelson, B.C.	13
Brockville, Ont.	2	Rossland, B.C.	20
Toronto, Ont.	3	Grand Forks, B.C.	44
Niagara Falls, Ont.	43	Midway, B.C.	33
Bridgeburg, Ont.	80	Myncaster, B.C.	55
Windsor, Ont.	79	Bridesville, B.C.	26
Sarnia, Ont.	55	Osoyoos, B.C.	22
Sault Ste. Marie, Ont.	1	New Westminster, B.C.	30
Fort Francis, Ont.	12	Vancouver, B.C.	30
Rainy River, Ont.	4	Victoria, B.C.	85
Ontario—General	1	Chopaka, B.C.	19
Emerson, Man.	1,154	Whitehorse, Y.T.	12
Gretna, Man.	227		
Bannerman, Man.	117		
Manitoba—General	49		
			3,633

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DISEASED Imports during the Twelve Months ending March 31, 1908.

Port.	No. of Horses in Infected Shipments	No. of Shipments	No. of Horses Diseased.	Country of Origin.	Action.
New Brunswick, General.	1	1	1	U.S.	Returned.
Sherbrooke, Que	57	5	5	"	"
St. Johns, Que	5	2	4	"	"
Sarnia, Ont.	6	3	4	"	"
Rainy River, Ont.	1	1	1	"	"
Emerson, Man.	77	9	14	"	"
Gretna, Man	16	2	6	"	"
Bannerman, Man	5	1	1	"	"
Manitoba—General	11	2	2	"	1 destroy'd 1 returned
North Portal, Sask.	7	3	4	"	Returned.
Willow Creek, Sask.	30	3	3	"	"
Twin Lakes, Alta.	6	4	4	"	"
Rossland, B.C.	2	1	1	"	"
Midway, B.C.	2	1	1	"	"
Bridesville, B.C.	1	1	1	"	"
Whitehorse, Y.T.	20	1	2	"	"
Total	247	40	54		

Two swine and one cow were refused admission from the United States at Emerson, being affected with hog cholera and tuberculosis respectively.

PURE Bred Imports during the year ending March 31, 1908.

HORSES AND ASSES.

Breed.	Great Britain.	United States.	Elsewhere.	Total.
Clydesdale	826	21		847
Shire	112	14		126
Shetland	229	2		231
Hackney	65	3		68
Welsh Pony	18			18
Percheron	33	107	16	156
Donkey	3			3
Thoroughbred	25	29	1	55
Belgian	7	24		31
Suffolk Punch	6	1		7
Highland	1			1
Norman	2			2
Coach	1	5		6
Standard Bred		139		139
German Coach		6		6
French Draft		1		1
Jackass		1		1
French Coach		5		5
Total	1,328	358	17	1,703

PURE Bred Imports during the year ending March 31, 1908—*Continued.*

CATTLE.

Breed.	Great Britain.	United States.	Total.
Guernseys.....	3	6	9
Jerseys.....	63	24	87
Ayrshires.....	120	5	125
Shorthorns.....	47	13	60
Galloways.....	11		11
Holsteins.....		142	142
Red Polled.....		151	151
Aberdeen Angus.....		4	4
		34	34
Total.....	244	379	623

SHEEP AND GOATS.

Breed.	Great Britain.	United States.	Total.
Shropshire.....	1,702	5	1,707
Dorset.....	85	1	86
Hampshire.....	623	6	629
Cotswold.....	132	1	133
Leicester.....	16		16
Suffolk.....	39		39
Oxford.....	108		108
Southdown.....	47	2	49
Lincoln.....	15	45	60
Ryeland.....	7		7
Cheviot.....	4		4
W. Highland.....	8		8
Welsh.....	4		4
Rambouillet.....		2	2
Angora Goats.....		23	23
Total.....	2,790	85	2,875

SWINE.

Breed.	Great Britain.	United States.	Total.
Berkshire.....	114	6	120
English Black.....	13		13
Tamworth.....	10		10
Yorkshire.....	13	3	16
Duroc Jersey.....		11	11
Poland China.....		12	12
Chester White.....		1	1
Total.....	150	33	183

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QUARANTINE.

In the light of six years experience as the chief veterinary officer of your department and of that gained during a very much longer period as a Canadian practitioner and provincial inspector, and after very full and careful consideration of the whole question of the exclusion of animal diseases, I, in 1906, recommended to you the addition of certain further changes in the quarantine regulations. These, meeting with your approval, were accordingly in January, 1907, adopted by Order in Council and brought into force on March 1.

The most important of these amendments forbids altogether the introduction of unbroken range horses, while at the same time providing for the testing with mallein of all horses imported from the United States. A regulation of this kind is naturally somewhat irritating and difficult of enforcement, but its absolute necessity was very clearly shown by the reports of our inspectors engaged in dealing with glanders, especially in the west, these indicating that a large percentage of the outbreaks of that disease were directly due to horses imported from the United States. The danger to Canadian horses was largely increased by the fact that while some few of the state governments are trying to deal with glanders in more or less effective ways, the federal authorities have not, as yet, adopted any systematic general policy looking towards its control or eradication. These conditions, taken in conjunction with the fact that the government of Canada is paying generously for horses slaughtered as being affected, a policy followed only in one or two states and in these to a very limited extent, rendered almost imperative the taking of prompt measures to protect our own interests. The new arrangement is, I am glad to say, working in an exceedingly satisfactory manner, although it has, of course, been subjected to more or less adverse criticism by those directly affected. It has, however, imposed a large amount of additional work on this branch of the department, besides rendering necessary the erection of a number of extra buildings, both at quarantine stations already existing and at those more recently established.

It having been found necessary in 1905 to increase the period of quarantine on American swine from fifteen to thirty days, it was deemed advisable to apply the same rule to animals of this species imported from Europe. The period of detention in the case of the latter is reckoned from the clearance of the ship from her European port. In order to avoid confusion the same rule was, in the new regulations, made applicable to sheep imported from Europe. The new ruling may, in some cases, be the means of increasing, by two or three days, the period of quarantine formerly imposed on sheep, namely fifteen days from the date of landing. The period is now a definite thirty days, which is none too long to ensure safety to Canadian flock-masters.

The excellent modern and conveniently situated quarantine stations mentioned in my last report as being in course of construction at St. John, New Brunswick, and Halifax, Nova Scotia, were completed early last summer and are now in full working order.

At Lennoxville, Quebec, which owing to its prominence as a railway centre was some time ago selected as a suitable location for a quarantine station, small but convenient buildings have been erected.

At Bridgeburg, Ontario, a building will shortly be erected for the accommodation of stock to be held for inspection or quarantine. Meanwhile, a small stable has been leased for this purpose.

At Emerson, Manitoba, it has been found necessary to enlarge the accommodation for incoming live stock and work with this end in view is now in progress.

At Gretna and Bannerman, the points where the new lines of the Hill system cross the boundary between Dakota and Manitoba and at the former of which there

is also a Canadian Pacific Railway connection, new stations, have been arranged for. Meanwhile, as also at Emerson, rented stables, conveniently located, are in use.

In Saskatchewan, greatly needed further accommodation has been furnished at North Portal, Wood Mountain and Willow Creek.

Similar additions have been made to our stations in Alberta which are situated at Pendant d'Oreille, Coutts and Twin Lakes.

In British Columbia the stations at Gateway and Midway have been completed by the addition of stables to the existing corrals, while at Nelson, a building already owned by the department has been fitted up for similar use.

The completion of the Canadian Pacific line from Spokane has necessitated the establishment of an entirely new quarantine station at Kingsgate, the point where it enters Canadian territory. Owing to unavoidable difficulty in the acquisition of a site, construction work on this station was somewhat delayed but was finally brought to a successful conclusion. It is anticipated that the traffic over this line will be very heavy and that as a result, the number of animals entering at Gateway and Nelson will be greatly lessened. Temporary arrangements have been made for the protection of that portion of the boundary lying between Midway and the Similkameen valley, this territory being now traversed by the Victoria, Vancouver and Eastern Railway, forming part of the Hill system. Owing however to uncertainty as to the locations of future towns and customs ports, no buildings have, as yet, been erected, although some slight improvements have been made at Osoyoos, where, for some years, an inspector has been stationed to guard against the entry of diseased stock by trail to the Okanagan and Similkameen valleys.

The quarantine station at Victoria has been greatly improved and is now well adapted for quarantine purposes. Strenuous efforts in the direction of systematizing and rendering more effective the work of our inspectors at boundary points have been continued and I am pleased to be able to report that these gentlemen, with but few exceptions, appear to realize the importance of their positions and the responsibility resting upon them, with the result that their duties, often arduous and sometimes anything but pleasant, are now performed in a very thorough and satisfactory manner.

CAR INSPECTION AND STOCK YARDS.

Special attention is paid to the condition of cars containing hogs entering Canada in connection with the transit trade between Detroit and Buffalo. Inspectors are detailed specially, to watch this traffic with the result that it is conducted under conditions which are as satisfactory as can be expected.

Mr. J. F. Robb has been appointed as car and yard inspector and as such has travelled extensively throughout Western Canada with the result that considerable improvements have been made to the conditions existing in regard to facilities provided for the accommodation of stock.

All stock cars reaching Montreal from the range country and those reaching Winnipeg and held there, are cleansed and disinfected under the supervision of our inspectors.

All stock yards have been ordered cleaned whenever such action was deemed necessary by our inspectors, while the markets at Toronto and Montreal are visited daily by officers detailed for that purpose.

MEAT INSPECTION.

The inauguration of the Inspection Service under the provisions of the Meat and Canned Foods Act which was passed in 1907, is perhaps the most noteworthy matter dealt with in this report. This new legislation not only adds very considerably to the

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work as well as to the importance of the Health of Animals Branch, but marks for the Dominion a distinct forward step in the practical application of sanitary science.

The results of the work as shown in the detailed report published herewith are such as to indicate that it was undertaken none too soon. It is regrettable that, as matters stand, it is only possible to apply the operation of the Act to those establishments which are engaged in export or interprovincial trade, and it is to be hoped that ere long municipal authorities throughout the Dominion will be roused by the conditions shown to exist and will inaugurate similar systems of dealing with food products. This can be done in most communities by the abolition of the private slaughter house with all its abominations, and the establishment of municipal abattoirs conducted under a system of inspection similar to that now enforced by this department in the export houses.

At the time of the passing of the Act there were absolutely no trained meat inspectors in Canada, and it therefore became necessary to provide without delay the nucleus of an inspection staff. This was done by arranging for a special course in meat inspection and kindred branches of knowledge at the Chicago Veterinary College, to which through the kindness of the United States authorities was added the great privilege of a course of practical work in the large packing establishments in that city. Sixty-four Canadian veterinarians were authorized to take this course, which lasted five weeks, on the understanding that if they were successful in passing the examination to be held at its close, they would receive a bonus of \$100 and be eligible for appointment to the Canadian meat inspection service.

Fifty-nine of those gentlemen availed themselves of the opportunity above mentioned, and 46 succeeded in passing the examination. The course was concluded in April, but as some time was required to draft the regulations and make other preparations necessary for the inauguration of the service, it was not until September 3, 1907, that the Act was actually brought into operation. On that date 39 veterinary inspectors were distributed according to the size and importance of the plants, throughout 27 establishments engaged in the slaughter and packing of meat food products for export or interprovincial trade.

The number of inspectors being shortly found insufficient, a number of those who failed to pass the examination in Chicago were given another opportunity to qualify themselves for appointment. Several other veterinarians who were anxious to engage in the work were also subjected to examination and placed on duty as probationers, with the prospect of being advanced to the rank of inspector after acquiring sufficient practical knowledge to warrant their engagement in that capacity. The supply being found yet inadequate, it has been decided to hold in the near future an examination covering the principal points in the Dominion at which any veterinarian may present himself on the understanding that if he succeeds in passing, his name will be placed on the list of those eligible for appointment to the service.

In view of the possibility that it may be necessary from time to time to exchange inspectors between the diseases of animals and the meat inspection divisions, it has been considered advisable, with your authority, to insist that all veterinarians desiring engagement in the first mentioned division shall also pass this examination. This arrangement will render it possible to exchange inspectors between the two divisions, the passing of the examination being compulsory under the Meat and Canned Foods Act.

Since its inauguration, the work has, all things considered, progressed in a very satisfactory manner. There has been of course more or less friction here and there but this is not a matter of surprise in view of the large interests involved and the serious interference not only in the methods of work but in the premises of the packers brought about by the application of the Act and the introduction of our officers into their establishments.

The report of Dr. Ward who has been in charge of the work since its inauguration, will be found most interesting giving as it does a number of details which it is not possible to deal with here.

I cannot, however, leave this subject without expressing my very high appreciation of the excellent spirit shown by the members of the inspection staff. These gentlemen have almost without exception performed their duties, often arduous and severe, in a most satisfactory manner and have displayed so much enthusiasm and ambition as to afford the best grounds for the belief that in the near future our Meat Inspection Service will not be surpassed, even if it is equalled, by that of any other country.

Dr. Ward himself has been most energetic, and has shown a remarkable capacity for organization and attention to detail.

The work of Dr. Barnes as travelling inspector is all that could be desired. Dr. Kellam who is in charge of the Montreal staff, and Dr. Wilson who, on the promotion of Dr. Barnes, succeeded the latter in a similar capacity in Toronto have both shown themselves to be capable and energetic officers.

So far as the others are concerned, their work, generally speaking, has been so satisfactory that it would be invidious and unfair to make special mention of any. I therefore simply append a list of the establishments at present under inspection and of the officers engaged in each.

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ESTABLISHMENTS under Inspection March 31, 1908.

Number.	Name.	Place.	Inspectors.
1	Fowlers Canadian Co.....	Hamilton.....	H. H. Ross, V.S. H. E. Marshall, V.S. J. Edgecome.
2A	Geo. Mathews Co., Ltd.....	Hull. P.Q.....	T. H. Richards, V.S. J. Terrance.
2B	" ".....	Brantford.....	F. A. Walsh, V.S.
2C	" ".....	Peterborough.....	S. Ransom, V.S. J. H. Purdy, V.S. M. J. Kellam, V.S.
25	Montreal Abattoir Co.....	Montreal..	J. C. Reid, V.S. A. W. Beach, V.S. C. E. Derome, V.S. W. Kime, V.S.
4B	Davies, Ltd.....	".....	J. Briere. W. J. Morgan, V.S. J. W. Symes, V.S.
5	Laing Packing and Provision Co.	".....	E. J. Lemieux, V.S. G. Brown.
24	Wm. Clark Co.....	".....	H. Macey. C. D. Bancroft, D.V.S. L. A. Willson, V.S.
A	Wm. Davies Co., Ltd.....	Toronto.....	I. Christian, V.S. A. R. Torrie, V.S. M. W. Everett. J. R. Young.
6	Park Blackwell Co.....	".....	C. E. Edgett, V.S. J. E. Morse, V.S. J. B. White, V.S.
7	Harris Abattoir Co.....	".....	R. E. Murray, V.S. A. C. Walker, V.S. J. H. George, V.S.
8	D. B. Martin Co.....	West Toronto.....	F. Fisher, V.S. W. A. Hodgins.
9	Guuns, Limited.....	".....	J. A. McLeish, V.S. S. S. Dickinson, V.S.
4C	Davies Packing Co.....	Harriston.....	C. J. Johannes, V.S.
10	F. W. Fearnan Co.....	Hamilton.....	E. A. Bruce, V.S. Wm. Alexander.
11	Ingersoll Packing Co.....	Ingersoll.....	F. H. S. Lowrey, V.S. W. A. Morrin, D.V.S.
12	Canadian Packing Co.....	London.....	T. H. Pine, V.S. Denis Brown.
13	Whyte Packing Co.....	Stratford.....	A. R. Crooks, V.S.
14	Collingwood Meat Co.....	Collingwood.....	J. R. Thompson, V.S.
15	Joseph O'Mara.....	Palmerston.....	W. A. Henderson, V.S.
16	Wm. Ryan Co.....	Fergus.....	D. S. Tennent, V.S.
17	H. Coleman.....	Kincardine.....	J. D. Irvine, V.S.
27	London Packing Co.....	Paisley.....	D. A. Irvine, V.S.
19	Gordon, Ironside & Fares.....	Winnipeg.....	C. C. Evely, V.S. A. Hobbs, V.S.
18	J. Y. Griffin Co.....	".....	A. R. Walsh, V.S. W. R. Bell, V.S.
20	Gallagher, Holman Co.....	".....	J. D. Ross, V.S.
21	Western Packing Co.....	".....	W. H. James, V.S. J. H. Snider, V.S.
23	P. Burns Co.....	Calgary.....	W. A. McGill, V.S. C. W. S. Haworth, V.S. T. J. McClelland

DISEASES found on Post-Mortem Inspection and number of Animals and portions condemned September 3, 1907, to March 31, 1908.

DISEASE.	- CONDEMNED.									
	CATTLE.			SWINE.			SHEEP.			Poultry.
	Carcases	Portions	Lbs.	Carcases	Portions	Lbs.	Carcases	Portions	Lbs.	
Abscess.....	19	4,751		23	1,009		11	2,941		
Actinomycosis.....	19	548		2	303					
Adenoma.....								4		
Anæmia.....	2									
Angeoma.....		1								
Ascites.....							1			
Asphyxiation.....				1						
Atrophy.....		21								
Bruises.....	109	1,732	1,030	35	991	6,558	19	70		
Carcinoma.....	1									
Caseous lymphadenitis.....							2			
Cirrhosis.....		3			11					
Congestion.....		2								
Cripples.....	5	45	10	13	1,364	77	5	7		
Cryptorchid.....				4						
Cysts.....		15		5	29			3		
Cysticercus bovis.....	1									
Cysticercus cellulose.....				12	1					
Cysticercus tenuicollis.....								14		
Decomposition.....			1,207			2,999			60	240
Degeneration of liver.....				1						
Diamond skin disease.....					5					
Dirty.....		1	70							
Downer.....	2	3		2	28		8	29		
Dropsy.....	2									
Emaciation.....	83	721		37	70		89	41		
Emphysema.....		1								
Endotheliomata.....	1									
Enteritis.....	1			31	54		3			
Erysipelas.....				1						
Fatty degeneration.....	1	21		1	1					
Flukes.....		2			14			290		
Found dying.....	1						1			
Frozen.....				1	1					
Fungus hematodes.....		1								
Hæmorrhoid.....					1					
Hepatitis.....	2	12		5	19	130	1			
Hernia.....	1			3	34		1	2		
Hog cholera.....				1						
Hypertrophy.....		1			9					
Immaturity.....	1,481						1			
Imperfect bleeding.....	1			1			3			
Induration.....		8			7					
Infiltration.....					62					
Inflammation.....		2		4	3					
Influenza.....								1		
Jaundice.....	6	2		7			5	1		
Laceration.....					1					
Leukemia.....	2									
Lymphadenitis.....							22	321		
Mammitis.....					7		1			
Malnutrition.....				1						
Melanosis.....				1						
Metritis.....				4	3		1			
S. multilocularis.....	4				1					
Necrosis.....	2							4		
Nephritis.....		1		13	5					
Nodules.....	2	443						1,766		
Orchitis.....				1	1					

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DISEASES found on Post-Mortem Inspection, &c.—Continued.

DISEASE.	CONDEMNED.									
	CATTLE.			SWINE.			SHEEP.			Poultry.
	Carcases	Portions	Lbs.	Carcases	Portions	Lbs.	Carcases	Portions.	Lbs.	
Paralysis.....				2						
Parasites.....		258		7	91		1	542		
Paresis.....	2									
Parotitis.....					1					
Pericarditis traumatic.....	4	7		2						
Peritonitis.....	4			8						
Pigmentation.....					1					
Pleuritis.....	7	202		25	326		15	11		
Pneumonia.....	14	20		127	32		29	43		
Pregnancy.....				2						
Pyemia.....	50	38		87	49		17	1		
Renal calculus.....				1	1					
Rupture.....		2		1						
Sarcoma.....		2								
Scab.....								85		
Scalded alive.....				1						
Scorched.....						2,000				
Sexual smell.....			311	226	80		6			
Skin eruptions.....				2	1					
Sooty mange.....				7						
Sour, stale.....		4	26,041		8	87,755		1	3,177	
Splenitis.....				3						
Synovitis.....					2					
Swine plague.....					1					
Tape worm cysts.....							32	339		
Tuberculosis.....	763	1,229	480	1,670	48,519	39				
Tumour.....	2	6		5	25			76		
Uremia.....	1			10						
Various.....								20		
Total.....	2,595	10,105	29,149	2,395	53,172	99,558	274	6,612	3,237	240
Found dead.....	139			552			182			
	2,734	10,105	29,149	2,947	53,172	99,558	456	6,612	3,237	240

The following summary shows the result of postmortem inspection of cattle swine and sheep, from September 3, 1907, to March 31, 1908:

Cattle marked 'Canada approved'.....	129,065
Carcase of cattle 'condemned'.....	2,595
Percentage of cattle 'condemned'.....	1.97
Portions of cattle 'condemned'.....	10,104
Swine marked 'Canada approved'.....	859,594
Carcases of swine 'condemned'.....	2,395
Percentage of swine 'condemned'.....	.277
Portions of swine 'condemned'.....	53,172
Sheep marked 'Canada approved'.....	85,775
Carcases of sheep 'condemned'.....	274
Percentage of sheep 'condemned'.....	.313
Portions of sheep 'condemned'.....	6,612
Total number of carcasses 'passed'.....	1,074,434
Total number of carcasses 'condemned'.....	5,264
Total number of portions 'condemned'.....	69,888
Percentage of carcasses 'condemned'.....	.49

During the course of re-inspection, the following meats were condemned:—

	Cattle.	Swine.	Sheep.	Poultry.
Sour	26,041	87,755	3,177	
Decomposed	1,207	2,999	60	240
Dirty	70			
Total	27,318	90,754	3,237	240

Total amount condemned on reinspection..... 121,549 lbs

THE LIVE STOCK BRANCH.

Since the union in July, 1906, of the Live Stock Branch with the Health of Animals Branch, under my supervision as Veterinary Director General and Live Stock Commissioner, a number of new lines of work have been inaugurated and pursued.

With a view to learning the exact condition of the commercial live stock industry of the western provinces and the transportation facilities from the west to the seaboard, a special officer, Mr. J. F. Robb, has been occupied in examining the industry in its various phases. Much valuable information gathered by this officer appears in his official report, which is published herewith. This work will be continued and extended with the object of bringing about in the near future a marked improvement in existing methods.

In co-operation with a number of record associations for cattle of dairy breeds, the record of performance, which was inaugurated shortly before I assumed control, has been put into successful operation.

The education work which has been a prominent feature in the branch ever since its inception, and which comprises encouragement and assistance to winter fairs and co-operation with provincial Departments of Agriculture and other organizations in supplying expert judges of live stock and holding live stock judging schools and farmers' institute meetings, has been continued and expanded. The better distribution of pure bred males; the expansion of the National Live Stock record system; the reform of the record for French Canadian horses; the removal of the grievances of the sheep-breeders of Quebec; the holding of a National Live Stock Convention; the preparation and publication of bulletins upon various branches of the live stock industry, have all received attention.

COMMERCIAL LIVE STOCK INDUSTRY OF WESTERN CANADA.

In June, 1907, Mr. James Robb began his investigation of commercial live stock conditions in the west and the transportation of animals destined for export. After making full inquiry into the conditions affecting the meat supply of British Columbia, both in the coast cities and at interior points, he devoted considerable time to the study of live stock and meat markets in Alberta, Saskatchewan and Manitoba, and was successful in obtaining a great deal of most valuable information in regard to a number of matters which have hitherto received but little attention from any one except those directly engaged in the trade. As soon as the shipment of range cattle eastward commenced, Mr. Robb devoted his time to the close observation of

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the methods of handling and transportation of this class of stock. He not only kept the whole trade under general observation, but followed individual shipments from point to point, noting carefully all circumstances having any bearing on the trade. Towards the end of the season he accompanied a trainload of cattle from Winnipeg to Montreal, paying special attention to the manner in which they were handled and the conditions at the various points where they were unloaded for feed and water. He also visited the Chicago stock yards, to which shipments of cattle were made last season for the first time in the history of our western cattle trade. His notes on the above points, as also on the comparative returns obtained in the different markets, will be found most interesting reading.

In January and February, 1908, he spent some time investigating the conditions affecting the winter feeding of live stock in the west.

The work outlined above, which is fully detailed in his report, is the first step in the direction of obtaining, as far as may be possible, full and reliable information as to our commercial live stock trade. Once this is obtained, which will, I trust, be in the very near future, the department will be in a position to deal intelligently with the whole question, and to inaugurate such reforms, whether by legislation or otherwise, as will improve existing conditions.

THE RECORD OF PERFORMANCE.

The yearly testing of pure bred dairy cows in connection with the record of performance commenced in the spring of 1906. Under the arrangement agreed upon between you as minister and the several record associations for dairy breeds of cattle the testing of the animals is supervised by officers of this branch. The associations co-operating in this work agree to certain regulations, and to publish as an appendix to their several herd books the records of cows that reach the standard for registration in the record of performance. The regulations imposed by the branch require, among other things, that a cow to qualify for registration must be a regular breeder. That is to say, if mature she must have two calves at separate births within fifteen months of the time she freshened for the test year; and cows must again calve within fifteen months of the same freshening date. This regulation guards against abnormal records made at the expense of regular breeding, and insures the year to year excellence of all cows duly registered in the Record of Performance.

The standards of production for registration differ for the various breeds according to the decision of each respective record association. Applications for entry of animals are made by owners through the secretaries of the associations, for the several breeds. The various forms used in the work are supplied on application. The weights of milkings are recorded by the owner of the cows and reported at the end of each month, and a final, complete report, sworn to before a proper legal officer, is supplied by the owner at the end of the milking period. The weights of milk are verified by officers of the branch who visit the farms at irregular intervals and unannounced, at least eight times a year, to weigh all the milkings of two successive days, and by comparison with these verify the weights of previous milkings recorded by the owner. In addition, the inspecting officers make fat tests, by the Babcock method, of all the milk drawn during each official visit.

Up to the end of the fiscal year ending March 31, 1908, about three hundred cows have been accepted for test. Of this number, which includes Ayrshires, Holsteins and French Canadians, thirty had completed their year's test, and their records had been duly registered in the record of performance.

The records of these cows, rules governing the tests and other information bearing upon the work appear in a separate publication, which may be obtained on application to this office.

The rapid extensions of the operations of the branch in this line having rendered it impossible for Mr. Drummond, who was the first officer employed, to cover the ground, it became necessary in May, 1907, to obtain further assistance, and Mr G. W. Clemons was accordingly appointed to co-operate with him.

EXPERT JUDGES FOR FAIRS.

During the months of the year when the agricultural fairs are in progress many requests for expert judges of the several classes of live stock from the different provinces have been complied with. In doing this it is felt that a valuable service is bestowed on the live stock industry, not only in encouraging competition by securing for each exhibitor justice in the show ring but also the further reaching benefit of teaching the observing public the correct ideals to be striven for in purchasing and breeding farm animals. Judges have been supplied for winter fairs, fat stock shows, horse shows and the summer and fall agricultural fairs held in the various provinces.

For the winter fairs, in connection with which series of lectures are given, such expert judges are supplied as are able to deliver authoritative lectures upon the practical application of the scientific principles of breeding, feeding and care of live stock. At these fairs block tests of many of the prize winning animals are made and as a rule the carcasses are judged and lectures delivered upon them by the men supplied by this branch.

In December, 1906, and December, 1907, expert judges and lecturers were supplied for the Maritime Winter Fair, which is held each year at Amherst, N.S., and during each of these years a grant of \$1,000 was made towards the development and maintenance of the educational features of this exhibition.

Judges and lectures were supplied in 1907 for the summer and fall fairs and fat stock shows held in Manitoba, Saskatchewan, Alberta and British Columbia. In the spring of 1908 speakers and judges were supplied for the Manitoba, Saskatchewan and Alberta fat stock and horse shows, in conjunction with which were held the annual conventions of the several provincial live stock associations.

Delegations of judges were supplied in the summer and autumn of the years 1906 and 1907 for circuits of agricultural fairs held in Saskatchewan, Alberta and British Columbia. The delegations consisted of from two to three men, each member being qualified to judge two or more classes of stock. Frequently the same person judges heavy horses, beef, cattle and perhaps sheep. The judges of dairy cattle can usually judge swine, while the light horse judges selected are generally able to assist with some of the other classes. The circuits, which are arranged by the Provincial Departments of Agriculture, usually last from three to four weeks. This branch engages the judges and pays their salaries and travelling expenses until they reach the province in which they are to work, and also for the return journey, the provincial departments defraying these bills during the terms of the circuits.

In the autumn of 1906, a similar arrangement was entered into with the province of New Brunswick and in that year judges were also supplied for the Charlottetown exhibition and the fair held at Yarmouth, Nova Scotia. In 1907 the Provincial Exhibitions of New Brunswick and Prince Edward Island were similarly served.

In the province of Quebec the fairs are not arranged in circuits each association or society separately arranging its own dates. This arrangement renders it difficult to afford the assistance that might with advantage be given to the fairs in this province. During the past two years, however, judges have been supplied for a large number of exhibitions. This work was commenced in Quebec several years ago and each year the judges returning from their work report great improvement in the classification and condition of the exhibits. Many societies that formerly awarded prizes to grade sires

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have come to see the error of such classification. Great improvement is noted also in the soundness of horses exhibited, it being learned that an unsoundness of hereditary character is not overlooked by competent judges even in animals of better appearance than sound prize winners.

Whenever practicable, judges supplied by the branch explain to the spectators the reasons for their decisions. This is done in the ring before the competing animals are returned to their stalls. Keen interest is taken in this branch of the work which is year by year doing much to enlighten especially the younger stockmen who have thus clearly demonstrated to them the distinguishing marks of quality in animals as seen by experts who judge for utility and breed type. These characteristics, as compared with unusual size and fatness, are being recognized in their true relationship wherever the expert judges supplied by the Live Stock Branch have an opportunity of teaching these lessons.

FARMERS' INSTITUTES, JUDGING SCHOOLS.

The several provincial Departments of Agriculture depend upon this branch to supply expert teachers for special meetings and classes devoted to animal husbandry. Most of the provinces hold separate series of Farmers' Institutes and Stock Judging Schools, the former as a rule during the summer and fall, the latter usually during winter months. In some cases the meetings are composite in character, that is live animals are used at institute meetings by the speakers to demonstrate desirable and undesirable formation.

In 1906, and again in 1907, two delegations of two men each were supplied to the province of Prince Edward Island. Each year general institute meetings were held in June and July and judging schools in November. At the former the subjects taken up related closely to the practice of mixed farming with the keeping of live stock as the chief factor. In the autumn meetings the judging, breeding and feeding of live stock were the topics taken up. In 1906, a car of high-class animals of different breeds accompanied the speakers about the country, while in 1907 the animals required were wherever possible secured from local breeders. The meetings or schools, were of from one to two days' duration and were in every case well attended.

In Nova Scotia two series of meetings were held each year and in New Brunswick one series covering the agricultural sections of the province. In the former province the meetings were held in June and July, and again in November and December. Many of the summer meetings were held in conjunction with farmers' picnics. The New Brunswick meetings were held each year in September, October and November. The topics discussed in Nova Scotia were general live stock improvement with special reference to horses, dairy cattle and sheep. In New Brunswick, horses and dairy cattle were given most attention. The delegations sent to Nova Scotia usually consisted of two men while three were each year sent to New Brunswick.

In the province of Quebec owing to the lack of a provincial farmers' institute system the institute work accomplished by this branch in that province has to be arranged for and carried out by officials of your department. The local agricultural societies and farmers clubs co-operate with the department in providing halls and advertising the meetings which are arranged in circuits. In this way a very large number of farmers are addressed each year by expert teachers at comparatively little expense.

In the winter of 1907 and again in 1908, series of meetings were held during a portion of February and March. Each year five series were held—three in French and two in English speaking districts. The delegations consisted of from two to three men. For the French delegations most of the men employed were French speaking

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ex-students of the Ontario Agricultural College the others being successful stock farmers of the province. The English speaking delegations were prominent institute workers such as are sent to other provinces. The estimated attendance each year was about twelve thousand in the French counties and four thousand in the English. The subjects discussed were chiefly advanced dairy farming, hog raising, and the breeding and rearing of sound, serviceable draft horses. The speakers reported a manifestation of the keenest interest at practically all of the meetings. In Saskatchewan and Alberta, both summer and winter meetings were attended by lecturers supplied by this branch. The summer meetings, as in the eastern provinces, were general farmers' institute meetings while the winter meetings were chiefly judging schools. The Alberta winter series of 1907 was of almost three months duration. Eight points on the main lines of railway were given visits of from four days to two weeks. Two carloads of live stock of superior quality representing various classes and types were carried along for demonstration purposes. A block test was a valuable feature of each school. The live stock was contributed for the use of the schools by public spirited breeders in the province. Most of the teachers were supplied by this branch.

Practically the same service was given in British Columbia as in the other western provinces. Speakers and judging school teachers were placed at the disposal of the province at different periods of each year for series of meetings arranged by the province.

The services of Mr. C. M. McRae, who is a permanent officer of the branch, were much in demand, as judge, speaker and teacher at judging schools especially in the western provinces, and his time has therefore been largely occupied in this way.

Many outsiders were also engaged, their fitness in the special duties required being always carefully considered prior to their being employed.

DISTRIBUTION OF IMPROVED BREEDING STOCK.

The better distribution of pure-bred live stock for breeding purposes continues to receive much attention. The work is undertaken in two principal ways; first, by direct grants to provincial live stock associations to assist in holding co-operative sales of pure bred stock, and second by organized distribution of breeding animals.

In the year 1906-7, a grant of \$650 was made towards a co-operative sale in each of the provinces of Manitoba, Saskatchewan, Alberta and British Columbia. In all of these provinces, except Manitoba, fat stock shows were held in conjunction with the cattle sales. Towards a similar sale held in Nova Scotia that year a grant of \$200 was made. For the year ending March 31, 1908, grants for sales were given to Manitoba, Saskatchewan and Alberta, neither Nova Scotia nor British Columbia holding sales that year.

Through these sales large numbers of pure bred males were disposed of, as affording a market for the produce of pure bred herds, as well as a source of supply for ranchmen and others requiring males to improve and females to strengthen their herds. By means of the co-operative system, the quality of the offerings is safeguarded by a rigid inspection, and the expense of advertising and transportation is reduced to a minimum. It is the intention, although it is not thus specified, that the grants given shall be used to cover the expenses of advertising, transportation and selling, thus eliminating for the purchaser and breeder the item of distance which so frequently precludes business. Until recently each of the western associations has closed its sale to animals outside of the province in which it is held. In my opinion, to continue federal financial assistance towards purely provincial sales, excluding improved blood from other provinces, is inconsistent. Accordingly a

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removal of provincial barriers is being insisted upon if the grant is to be continued. This the Manitoba association has complied with, and the rules in the other provinces are being similarly amended, otherwise the grant to each will in future years be withheld.

SALES OF STOCK CONDUCTED BY THE BRANCH.

Two series of sales of pure bred hogs of the breeds suitable for the production of bacon have been held in the province of Quebec. These sales were held at eight points—four in the spring and four in the fall months of 1906. The animals were selected from leading breeders in the provinces of Ontario and Quebec. In the two series upwards of 200 hogs—about 70 per cent of which were boars and about 20 per cent sows in farrow—were distributed. The districts in which the sales were held were selected by the large pork packers of Montreal, who were conversant with the character of the hogs reared in the various districts. The packers, as also the Quebec Department of Agriculture, contributed towards the expenses of the sales. In the English-speaking sections, in which half of the sales were held, most of the animals were purchased by individual farmers, while in the French-speaking districts most of the sales were made to farmers' clubs for use in the herds of their several members. As a result of these sales, the quality of the hogs now raised in these sections is much better than it was previously.

At the present time preparations are being made to select and purchase a shipment of pure bred rams to be pastured on the Experiment Station Farm at Antigonish, Nova Scotia, during the summer months and in the autumn to be sold at auction to mutton-raisers in the maritime provinces. Apart from the purpose of improving the quality of the sheep stock of these provinces, this work has also the object of assisting the development of the sheep-raising industry, which is recognized as the salvation of agriculture in the districts infested with ragwort, the weed which our experiments have now shown to be the undoubted cause of the malady locally known as Pictou cattle disease.

THE NATIONAL LIVE STOCK RECORDS.

The National Live Stock Records continue to receive much assistance from the department. This combination of pedigree registers for all breeds of live stock in Canada except Holstein Friesian cattle, which was originated by my predecessor the late live stock commissioner, is conducted as an entirely separate and independent organization, although in a manner, under the wing of the branch.

According to the agreement between yourself as minister and the several record associations, as each comes into the National Records system, the branch provides office accommodation and supplies office furnishings and stationery, and in addition, certain financial assistance to the newer and weaker associations which later under the national system are expected to become self-supporting. An annual grant of between four and five thousand dollars is also given for the purpose of defraying the expenses of the National Record Committee, the executive body of the National Record Board.

The branch also renders assistance through its officers in the organization of new record associations. During the past two fiscal years it has assisted in the organizing of record associations for Thoroughbred, French Canadian, Belgian draft and Percheron horses, the several breeds of ponies, and Red polled and Aberdeen Angus cattle. For each of these as well as the several breeds of sheep, national records have been opened.

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Under the National Records system records are opened for the following classes and breeds of stock:—

Horses.—Clydesdales, Shire, Percheron, Belgian Draft, Hackney, Thoroughbred, French Canadian.

Ponies.—Shetland, Welsh, New Forest, Polo and Riding, Exmoor, Connemara Hackney.

Cattle.—Shorthorn, Hereford, Aberdeen Angus, Galloway, Guernsey, Jersey, Ayrshire, French Canadian and Red Polled.

Sheep.—Shropshire, Oxford, Leicester, Cotswold, Lincoln, Dorset, Hampshire, Southdown.

Swine.—Yorkshire, Berkshire, Tamworth, Chester White, Poland China Duroc Jersey, Essex.

Of pedigree certificates of the above breeds there were issued during the years 1906 and 1907, 25,962 and 31,909 respectively. These certificates were examined by an officer of this branch and when found to correspond with the applications and the office records were signed by him on your behalf and the seal of the department affixed to each.

REFORM OF THE RECORD FOR FRENCH CANADIAN HORSES.

Special work in connection with a portion of these records has been done. The Stud Book for French Canadian horses which was taken over from the General Breeders' Association of Quebec for nationalization was found to contain pedigrees of horses that on account of breeding and other characteristics, did not conform to the original Canadian horse. The old book was accordingly closed and a new one opened under the National system with inspected foundation stock of approved type, quality and breeding. Co-operating with the French Canadian Horse Breeders' Association, the branch carried out the inspection which was done by a commission of five men, two representing the association, two representing the branch, and a veterinary inspector of the Health of Animals Branch, who also acted as secretary.

This commission has made tours of inspection into most of the counties of the province where French Canadian horses are being reared, and is to complete the work in 1908. Inspections are made of animals recorded in the old book and such others three years old and over as are presented before the commission. The total number which have passed the inspection is about 750 head and such of these as are presented for registration, will form the basis of the National French Canadian Stud Book.

REGISTRATION OF SHEEP FROM THE PROVINCE OF QUEBEC.

The branch has also carried out an inspection of the sheep recorded in the old Quebec record, for which registration in the National Records was desired. As in the Horse Record, it was discovered that certain flocks of sheep recorded at Quebec could not without investigation be recorded in the National Sheep Record. In order to avoid hardship to Quebec breeders and to safeguard the records by reason of the transfer, a commission consisting of an experienced Ontario sheep breeder and one of our French Canadian veterinary inspectors was appointed by the branch to examine the flocks recorded in the Quebec books, in regard to the eligibility of which any doubt existed. Those which were good specimens of the breeds to which they belonged were ear-tagged and such of those tagged as conformed in breeding to the rules of entry, as laid down by the Dominion Sheep Breeders' Association, have been accepted for registration.

NATIONAL LIVE STOCK CONVENTION.

In accordance with your policy of calling together from time to time the leading men in the Dominion connected with the several branches of agriculture, the

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National Live Stock Association was convened at Ottawa on February 5th, 6th and 7th, 1908.

This association is composed of provincial Ministers of Agriculture, representative officers and elected members of provincial Live Stock Associations, Record Associations and Agricultural Societies. The attendance at the convention was about one hundred and fifty, and included stockmen from every province, duly delegated to represent every provincial Live Stock Association and every incorporated Record Association in Canada.

The programme prepared included exhaustive reviews of the live stock conditions in each province, the transportation and marketing of all classes of live stock, the export trade, the import trade, customs regulations, and many other subjects that bear on the live stock industry of Canada. On a number of subjects keen discussions took place, and strong resolutions were passed, some of these as acted upon having far reaching influence on the live stock industry of Canada. One result will probably be the amendment of the regulations governing the free admission to Canada of pure bred live stock. Under the old regulations which have been in force since 1887, much stock of questionable breeding was admitted duty free. In the future free entry is likely to be granted only for such animals as are accompanied either by a Canadian certificate of registration, or, where no Canadian record exists, by an import certificate issued by the Accountant of the Canadian National Records, after he has ascertained by an examination of the foreign certificate of registration that the animal has its pedigree recorded in a reliable record in the country of origin of the breed.

A full report of the convention is published as a separate volume and may be secured on application.

PUBLICATIONS.

During the two past fiscal years, several publications have been issued. A large edition of Bulletin No. 10, 'The Production of Bacon for the British market,' issued in 1905, became exhausted early the following year and had to be re-issued. This was done in 1907 after a thorough revision and with the addition of a number of new sections and an almost entirely new set of illustrations.

Bulletin No. 11, 'The Leading Breeds of Swine,' was issued in 1907. This work gives in concise form the history, chief characteristics and standards of excellence of the six leading breeds of swine reared in Canada. Each breed is represented by distinct photogravures of typical animals.

A very exhaustive treatise on sheep raising has been prepared and will shortly be issued as Bulletin No. 12, 'Sheep Husbandry in Canada.' This work covers for sheep somewhat the same ground as Bulletins Nos. 10 and 11 do for swine, with such variations as become the subject. It comprises about 150 pages replete with illustrations which will add greatly to an understanding of the reading matter.

These valuable bulletins have been compiled by Mr. J. B. Spencer, B.S.A., who combines with a thorough practical and scientific knowledge of animal husbandry, the faculty of placing his views and those of others before the public in a manner at once remarkably lucid and attractive.

I have the honour to be,

Sir,

Your obedient servant,

J. G. RUTHERFORD,

Veterinary Director General and Live Stock Commissioner.

The Honourable
The Minister of Agriculture,
Ottawa.

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GEORGE HILTON, V.S.

REGINA, SASK., March 31, 1908.

SIR,—I have the honour to submit herewith my report for years ending March 31, 1907 and 1908.

During the first period my services were principally engaged in connection with the work in your head office. I, however, investigated a few reported cases of glanders in the counties of Haldimand, Frontenac and Lincoln, in Ontario, and Wright, in Quebec. This necessitated the testing of 29 horses with mallein, six of which reacted, and were dealt with in accordance with the regulations. I also applied the tuberculin test to four pure bred cattle sold for export to the United States, with negative results. It was further my duty wherever possible to visit the tuberculosis experiment station at Hull to observe and note any change in the condition and symptoms of the individual animals comprising the herd.

During the first three months of the latter period my work was confined to your office. I left Ottawa, however, for Regina on June 26, 1907, in accordance with your instructions, to take over the work of this branch in the provinces of Alberta and Saskatchewan, which had hitherto been conducted under the supervision of Commissioner Perry, of the Royal Northwest Mounted Police.

Upon my arrival there I found Dr. Higgins awaiting me, having returned to Regina from the mange area in Alberta, where he had been engaged in checking dips and solving difficulties in connection with the emulsifying of oil preparations. On July 2 he accompanied me to the police barracks, where we met the Commissioner, who, after consultation, kindly assisted us by placing at our disposal facilities for the transference of the departmental supplies to these offices. Steps were then immediately taken to place the work of the branch on lines similar to those carried out by you in the other provinces of the Dominion, with a clerical staff consisting of Miss Cresswell as stenographer, and Inspector Ayre as clerk. The latter having had considerable experience in this particular work in the office under the Commissioner, gave valuable assistance.

Dr. Burnett, chief veterinary officer of the R.N.W.M.P., who had previously given excellent service to this branch, naturally preferred to remain with the force, but arrangements with the Commissioner for the transference of the veterinary staff sergeants, resulted in all except one taking appointments as veterinary inspectors, thus making a total available force of 24 officers, in addition to three veterinary inspectors, whose duties were, and have been, limited to the local inspection of shipments of stock in the mange area. The force, although apparently adequate, has been taxed to its utmost; six of its members being stationed permanently at boundary points, have not been available for other work unless it has been in the immediate vicinity of their stations. Eleven other inspectors were restricted during the summer and fall months to mange districts, where the work in connection with the eradication of this disease occupied their undivided attention. The remaining seven had to contend with reported cases of contagious diseases, and as these were very numerous, and many originating from remote parts, considerable difficulty was experienced in attending to them as promptly as the nature of the work demanded. The force was, however, strengthened by the appointment of Dr. E. A. Meakings, who had previous experience under the police, and it was also found necessary, owing to the fact that the rush of work required Inspector Ayre's absence from Regina, to increase the office staff, and Mr. T. P. Spanner was accordingly appointed through your instructions.

In order to expedite the work and carry it on to the best possible advantage it was found necessary to assign inspectors to definite locations. This was not possible, however, until the compulsory dipping was completed; immediately this was accomplished inspectors were stationed at the most suitable points, as follows:—Inspector Ovens was

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moved from Southern Alberta to Yorkton, Inspector Paxton from Claresholm to Edmonton, Inspector Gray from the northern boundary of the mange area to Saskatoon, from which point he was later transferred to the Willow Creek Boundary Station, this being necessary owing to an extended leave of absence having been given to Inspector Douglas. Inspector Olsen was removed from Wood Mountain to Saskatoon, Inspector Meakings replacing him. The headquarters of the other inspectors were not changed, their distribution appearing to be quite satisfactory. In view of the large number of inspections needing daily attention at various points along the railways in the Calgary division, also to the required inspection of a large number of premises in quarantine for cattle mange, and the placing of restrictions on others where the owners had neglected to comply with the compulsory mange dipping order, it was necessary to keep four inspectors working from this point. Directly it was possible, however, Inspector Busselle was sent to the Lethbridge quarantine station to familiarize himself with the existing conditions in Dourine patients under Dr. Watson, in order that his services might be available in investigating that disease. He was later stationed at Macleod, where the control of contagious diseases and the frequent inspections of stock for shipment, and of stock cars used in the carriage of cattle to various points in Southern Alberta necessitated the stationing of an inspector at that point. Inspectors Head, McMurry and Gebbie, have been working from Regina, their attention being directed principally to the control of glanders along the Soo and Arcola lines, the main line east and west and the country traversed by the Kirkella branch of the Canadian Pacific Railway.

Due to dissatisfaction occurring among a number of cattle owners along the northern boundary in the mange described area in Alberta, it was found necessary to employ Dr. Hobbs, of Strathmore, and Dr. Talbot of Lacombe temporarily, for the purpose of making a special inspection of cattle in the townships lying along and south of the extreme northern boundary of the mange area. The nature of the country, together with the lack of transportation facilities, resulted in considerable time being expended in this investigation, and before satisfactory information was available it was necessary to send Inspector Riddell to assist in this work. Upon receiving a report as to the conditions found, it was possible to recommend exemption of a portion of the territory under consideration.

Although I fully appreciate the advantages to be gained by personal visits to infected centres, the inauguration of the work demanded my presence here, and therefore with the exception of my investigation, together with Dr. Warnock, of suspected loco poisoning in animals on the Porcupine Slopes, and of the outbreak of rabies in the Moosomin district, in which Dr. McGilvray co-operated with me, and also my recent visit to Ottawa, my duties have been confined to executive work in this office.

Fortunately in Saskatchewan, glanders is apparently the only disease, with which this branch deals, existing to any serious extent, and while mange in horses and cattle is not by any means absent, it is limited very largely to the southwest quarter of this province, and I have reason to believe can be practically exterminated during the coming season, if thorough measures are adopted for the treatment of infected stock, and especially so, if re-infection can be prevented from the province to the west.

The control of Glanders in this province is still a serious problem, notwithstanding the fact that all possible steps have been vigorously taken for its eradication. It is interesting to note that the most badly infected centres have been in districts lying along the railway route to the south, and I firmly believe that your action demanding the malleination of all import horses, and forbidding the introduction of unbroken equines, is the only solution of the probable extermination of glanders and makes the possibility of riding these provinces from this troublesome disease practical, so long as your policy in dealing with this malady is strictly carried out. The past and existing rapid development of the country has been the means of

introducing this disease into remote parts of this province, and while a large number of horse owners appear quite willing to co-operate with our officers in stamping out this malady, there are also unfortunately a large number who appear to be grossly ignorant of the nature of the disease, and are quite unable to realize its presence, until very serious results are vividly apparent. Several large outbreaks have been directly the result of this lack of knowledge. Cases have been reported persistently and have been so numerous that it has not yet been possible to make a systematic inspection throughout the province. It was deemed advisable to keep inspectors in districts where Glanders was found to exist, until all possible steps had been taken to ensure the testing of all contact animals, with a view of effectively stamping out the disease, and cleaning up such districts, that progress might be made.

Your instructions regarding the necessity of holding for retest all contacts with clinical cases, have proven to be quite justifiable, reactors having been found upon second test, where only non-clinicals were destroyed previously. More or less inconvenience naturally results to the owners by holding such animals until a sufficient time has expired to make a second malleination reliable, but I believe that such action is essential for a successful issue. A great deal of care, however, and good judgment, is required on the part of the inspector in charge of an outbreak, and it is therefore most important that only men are employed who possess these qualities, in addition to the others required in public work, as the possibility of non-clinical reactors infecting contacts is apparently largely influenced by existing conditions, and appears to exist in ratio to the gross unsanitary conditions, or otherwise, in which the reacting animals have been housed. While the second test reactors are not numerous, they are sufficiently so to warrant serious and careful attention, as they are often the cause of fresh outbreaks in districts where suspicion had been apparently removed.

The following figures give the total number of horses tested with mallein, as also the number destroyed in this province during the past fiscal year.

Number tested, 6,263. Number destroyed, 819.

MANGE.

Mange in cattle, as previously mentioned, does not exist to any serious extent in Saskatchewan. During the past compulsory dipping period the restricted area was divided, as in previous years, into three districts, each of which was placed in charge of a veterinary inspector, under whom a number of deputy mange inspectors were employed. The dipping in the two western districts progressed rapidly and satisfactorily, owing to the co-operation of the stock owners who appeared to be without exception quite anxious to conform with the terms of the order. The dipping in the eastern district was not accomplished as rapidly, owing to the fact that only one vat, the property of the branch, is located therein, and consequently the majority of the cattle were treated by sprayers with oil preparations.

RABIES.

A serious outbreak of Rabies occurred in the vicinity of Moosomin, and although all possible steps were taken to obtain evidence of direct infection they were not successful. While a few years ago a number of suspicious cases were reported and investigated in the Oxbow district a positive diagnosis was not obtained, and no further reports were received in this province until the outbreak in question, which was reported during the latter part of July, when one of our inspectors was immediately detailed to investigate. Unfortunately upon his arrival the suspected cases had been disposed of, but upon information gathered the circumstances were very suggestive.

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and consequently instructions were given to report any further suspicions direct to this office. Shortly afterwards a report was received, and I proceeded to Moosomin, at which point I was met by Dr. McGilvray, who had had experience with this disease in Manitoba. On our arrival we found one dog exhibiting characteristic symptoms, and after its death the brain was removed and forwarded to the Biological Laboratory and our diagnosis later confirmed. Upon looking over the ground carefully it was found advisable to recommend the issue of a Rabies muzzling order covering twelve townships, including, and adjacent to, the Village of Moosomin. For the enforcement of this order, it was further necessary to employ two men to ride the townships in question. A large number of dogs were destroyed by owners within the mentioned territory, no doubt for causes other than Rabies, the owners assuming a natural suspicion regarding any dog developing abnormal symptoms. This action was no doubt responsible for the few suspicious cases detected by the inspectors, and also largely assisted in the control of this disease in that locality.

A rather peculiar fact observed during the enforcement of the muzzling order in this vicinity, and Manitoba, was the total absence of any suspected cases outside of the respective areas although the inspectors in charge of these outbreaks were specially instructed to obtain, and look for, any such information. We were, therefore, unable to find any positive or even suspicious knowledge of suspected cases which might connect the two outbreaks.

Although five months have elapsed since the removal of the Rabies order in this province no suspected cases have been reported, and it would therefore appear that we are justified in assuming that this disease has been successfully coped with and fortunately without any fatality to human life.

TUBERCULOSIS.

Owing to the lack of interest so far shown by cattle owners in this province in connection with this disease it is not possible to give satisfactory information regarding the extent to which it exists.

Seventy-two (72) head of cattle comprising one consignment were tested with tuberculin, by one of our officers, having been sold for export to the United States, all of which proved to be free from the disease in question.

BLACK QUARTER.

Judging from suspected cases reported at this office, black quarter has not been very prevalent during the last fiscal period. Stock owners are, however, fully alive to the benefits resulting from preventive treatment with Blackleg vaccine, which together with the prairie fires which swept large grazing areas last fall, have no doubt played an important part in the control of this malady.

QUARANTINE STATIONS.

No alterations have been made at any of the quarantine stations in this province since my arrival at Regina, with the exception of a few necessary repairs. The station at North Portal is still in charge of Inspector Mitchell, and is the point taken advantage of by the majority of settlers and importers. Inspector Meakings is in charge of the station at Wood Mountain and Inspector Gray in charge of the one at Willow Creek.

STOCK AND STOCK CAR INSPECTIONS.

The inspection of consignments of cattle in this province is limited to points on the main line in the mange area, the majority of the shipments being made at Maple Creek and Swift Current. During the active shipping seasons it has been

necessary to station an inspector at the former point in order that no undue delay and inconvenience might result to the shipper.

The inspection of stock cars has taken up considerable time, and a great deal of difficulty was experienced during the fall months in connection with the holding and disinfection of such cars owing, in many cases, to the apparent indifference of the subordinate railway officials. They are now, however, alive to the situation, and this important feature of the work is receiving the attention it deserves.

GLANDERS (ALBERTA).

Glanders in the province of Alberta has not so far been detected to as serious an extent as within the limits of Saskatchewan. This, however, owing to totally different existing conditions, is not conclusive proof that this disease does not actually exist to a greater degree. The fact that this province until recent years has been almost entirely devoted to ranching, precluding the same possible close habitation of its animals and the further close observance by the owners, may possibly explain the dearth of reported cases. Although all such cases have been investigated as promptly as the exigencies of the service would allow, and steps taken to trace and deal effectively with all contact animals, the constant demand upon the services of officers in dealing with mange in this province has been so urgent and persistent, that it has not been possible to keep an officer in an infected district for any length of time without transferring him to some other point, for the investigation of other urgent cases.

The following figures give the number of animals tested with mallein, as also the number destroyed for glanders in this province during the past fiscal year:—

Number tested.	1,489
Number destroyed.	126

MALADIE DU COIT.

Dourine is without doubt the most insidious disease with which this branch has to contend, and in view of the fact that its existence paralyses the horse breeding industry it requires persistent vigilance, and the utmost caution, and good judgment, on the part of the officers, who have been specially authorized for its investigation and control. The majority of horses in the suspected districts are only available for inspection at certain periods, and while the closest scrutiny is essential it is carried out under obvious difficulties. There is no doubt, therefore, that the only safe method to pursue in the control of this disease is the placing of restrictions on all suspected animals in districts where there is the least cause to suspect that dourine may possibly exist. While such a procedure results in more or less hardship to the owners and entails a serious drain upon their revenue, the horse breeders' interests at large demand such action.

Your decision in establishing an experimental station a few years ago at Lethbridge has been of inestimable value and has resulted in valuable achievements under Dr. Watson, the pathologist in charge, whose reports from time to time have contained full and minute information in connection with the peculiarities of this malady. The officers specially authorized to deal with this disease have all been given the opportunity to take advantage of Dr. Watson's experience and study under him the various conditions found at the quarantine station at Lethbridge, with its research advantages, and are therefore pre-eminently suited for satisfactory work. A great deal of credit is due to the officers in question, as this malady has, from our present knowledge, been kept well within the suspected vicinities. While many animals have been inspected, and then shipped from close lying districts, there has only been one report of a suspected case of dourine outside of the infected area.

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Range Rider Murphy's work is also worthy of special mention regarding the manner in which he has persistently ridden the range with good and effective results.

The following table gives the number of animals destroyed found affected with this disease during the past fiscal period, and although it is difficult, owing to the insidious nature of this malady, to determine positively the extent to which it exists, I have reason to believe that with one exception the limits of the infected areas have not increased.

Number destroyed, 49; number suspected and quarantined, 131.

MANGE.

Mange in horses exists to a limited but not serious extent, while in cattle it is the malady which predominates on the range, and has caused not only serious losses to owners and the cattle industry, but has been, as you are well aware, a continual source of worry, annoyance and expense to your branch. The infected area was as formerly divided into eleven districts, and as in Saskatchewan a veterinary inspector with deputy inspectors placed in charge of each. Considerable delay in commencing operations occurred in the majority of districts, due to the scarcity of sulphur, and the inspectors in charge therefore took all necessary steps to ensure that the owners of stock had made all efforts to place and procure their supplies. The intervening time was taken advantage of to visit the vats and make preparations to place all facilities into good working order, in order that no further delay might result. In only one or two districts in this province was dipping completed in the prescribed period, and the work carried on without the experience of considerable friction from the cattle owners. Unfortunately a large percentage of the ranchers appeared unwilling to co-operate with the officers, but preferred to use their influence with their neighbours to cause dissatisfaction, and apply for exemption where the conditions were not at all warrantable. For this reason, I found it only possible to recommend for your consideration, very few of the numerous applications forwarded to you through this office.

Compulsory mange dipping is without doubt a very feasible solution to the effective eradication of this disease, but in order to be successful requires the conscientious co-operation of all stock owners, without which, a successful issue cannot be made possible. Other difficulties in connection with such a measure, are caused by the tremendous range of open country, with its many coulees, and varied topographical characters, also by its climatic conditions, often accompanied by tormenting insects, with the resulting stampede of thousands of cattle into remote districts, therefore interfering with not only the roundups, but the actual enforcement of the order.

For the above reasons, although all possible measures are taken to make a clean round-up of cattle in the various districts, only too frequently this is impracticable, and has been the cause in many cases of the escape of animals after a round-up has been completed, and before treatment has been finished. It can, therefore, be easily appreciated, how essential it is, to receive the co-operation of every individual owner of cattle, in the mange area, if the best results are to be obtained and success expected.

Unfortunately it is evident that the oil preparations which were permitted and used by a number of ranchers were not effective, mange having been discovered in animals treated therewith, at various periods thereafter. It is quite probable, however, where the oil treatment proved ineffective, the fault may have been due, to, either, the quality of the oils used, or to the difficulty, or rather the impossibility, of obtaining soft water in such districts. Although Dr. Higgins after considerable trouble was able to produce emulsions, with the quality of water available, and personally instructed, and assisted, in making emulsions in these districts, and while in view of the fact that all possible steps were taken to keep reliable men supervising vats where oil was being used, it is quite probable that the urgency with which animals are treated, due to the difficulties already mentioned, was responsible for

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the imperfect emulsifying of the preparations. Lime and sulphur treatment when properly prepared has given excellent results, and is without doubt the ideal treatment for mange, and any rancher therefore alive to his own interests, would refuse to use any other preparation. Its chief disadvantage, however, is the necessity for its second application, and the difficulty experienced in keeping a large number of animals under control during the interim. There is no doubt, that the enforcement of the compulsory dipping order was not only beneficial, but had a marked tendency toward checking the disease for which it was enforced. A large number of prominent ranchers are to be commended for the manner in which they assisted your officers, but unfortunately there are a greater number who cannot be too strongly condemned for their attitude, by any one interested in the cattle industry of this province. Mange in cattle exists in the restricted area to a more or less serious extent, and demands careful and energetic attention together with the co-operation of cattle owners if success is to be expected.

Your instructions regarding the appointment of range riders for the purpose of riding the infected territory are being followed and will result in valuable accumulation of existing facts. I have no doubt that the continuing of such a policy will result favourably, not only in increasing the activity of the cattle owners in adopting suitable methods for the eradication of this disease, but in convincing many of them of their closeness to infected centres.

TUBERCULOSIS.

No particular interest has been shown by the stock owners regarding this disease, very few applications having been received for tuberculin, and I am not therefore in a position to form a safe estimate as to the distribution of this malady.

ANTHRAX.

Although a few cases of Anthrax have been reported, upon investigation they have been found to be common maladies to which stock are heir, no cases of this disease having been detected in this province during the fiscal period in question.

BLACK QUARTER.

This disease does not appear to have been prevalent, very few cases having been reported. The preventive vaccine now supplied from the Laboratory of the Branch at Ottawa has been largely used in the districts formerly affected and from the facts as stated above, apparently with excellent results.

SUSPECTED LOCO WEED POISONING.

In accordance with your instructions, I proceeded during the latter part of September to the Porcupine hills in Southern Alberta, where serious losses in horses and cattle had been experienced, and investigated with Inspector Warnock, the existing conditions and reported fully thereon. As stated in the report in question, the cause of such losses appeared from our observations to be due to the ingestion of the loco weed plant, which was found flourishing in the district where the disease under investigation predominated. A number of animals were obtained and sent to Lethbridge Quarantine Station for observation and research, the results of which have been forwarded to you from time to time by Dr. Watson, who is in charge of the investigation at the station in question.

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QUARANTINE STATIONS.

The quarantine stations in this province are in charge of Inspectors Patton at Courtts, Pinhorn at Pendant d'Oreille, and Christie at Twin Lakes. At the former station a new pump for the dipping vat was purchased and installed during the present year, but beyond necessary repairs no other alterations have been made at any of the stations mentioned.

INSPECTION OF STOCK AND STOCK CARS.

The inspection of shipments of stock in the restricted area to points in or out thereof, have been numerous and persistent, and although the services of three resident veterinarians appointed inspectors for this purpose only, have been taken full advantage of, at Macleod, Claresholm, High River and intermediate points, your other officers have been in continual demand.

The inspection of stock cars in this province has taken a great deal of the time of your officers, necessitating numerous visits to various points persistently. This work, together with the inspection of stock is most exacting, owing to the fact that during the shipping seasons delays are costly. I am pleased to state, however, that although considerable trouble was first experienced with the railway companies, they are now assisting your officers very materially.

I have the honour to be, sir,

Your obedient servant,

GEORGE HILTON,

Inspector.

The Veterinary Director General,
Ottawa.

C. H. HIGGINS, B.S., D.V.S., PATHOLOGIST.

March 31, 1907.

SIR,—I have the honour to transmit this my report as pathologist to the Department of Agriculture covering my work and the work of the Biological Laboratory from April 1, 1906, to March 31, 1907.

As formerly, a steady increase in the work of this laboratory is to be noted, and with this increase some new lines of work have been undertaken in the preparation of biological products as well as original research.

There have been examined 173 series of specimens during the course of the year, a somewhat smaller number than detailed in my last report which included autopsy findings in one hundred and sixteen cases of *Maladie du Coit*. From the nature of the specimens examined, I believe that our efforts to assist inspectors and others are more fully appreciated at this time than at any former period, and their method of preparation prior to shipment to the laboratory shows an increased understanding of the requirements with which it is necessary to conform in this respect.

A great deal of attention has been given during the year just ended to differential counts of the blood from various horses, having particular reference to the findings in cases of *Dourine*. The details of this work will be considered in a special report on *Dourine* now in preparation where it will be possible to present some very interesting and valuable data in this connection.

As the training of Dr. Watson has progressed his assistance has relieved me of many details. His transfer to the Lethbridge Quarantine Station in November last and his finding of the *Trypanosoma equiperdum* in collaboration with Dr. Gallivan has demonstrated the importance of special training for this particular work, he having been given an opportunity during his stay at this laboratory to thoroughly familiarize himself with the details of hæmatological technique and more particularly with the characteristics of the *Trypanosoma gambiense*, the parasite responsible for the disease known as sleeping sickness in Africa. Apart from the demonstration of the *Trypanosoma equiperdum* he has shown that trypanosomata occur in the blood of the 'Cotton Tail' rabbit (*Lepus sylvesticus*) and the field mouse, animals well known throughout the Northwest of Canada.

The transfer of Dr. Watson to the quarantine station at Lethbridge provided the opportunity for us to utilize the services of Dr. Hadwen at this laboratory where his knowledge of methods and technique enables him to assume some of the responsibility in connection with the routine work of this institution. An opportunity has also been afforded him to become familiar with trypanosomata, he having found the *Trypanosoma lewisi* in a rat on January 24 last and subsequently in quite a number procured from various sources in the city and suburbs.

The employment of Dr. A. Loir for six months (July 27, 1906, to January 27, 1907) and attaching him to the laboratory has of itself increased the work of the regular staff, undertaking as we have the preparation of two products under his direction, namely, Anthrax and Black-Leg vaccines. In this connection, while Dr. Loir demonstrated his methods of procedure, we, however, were responsible for the results obtained from their subsequent manufacture, therefore, it was necessary for us to thoroughly familiarize ourselves with all of the technical details in connection therewith, as well as to originate packages and methods of application suitable to the requirements of this country.

Apart from the assistance rendered in the preparation of the above mentioned vaccines, Dr. Loir has, by his intimate knowledge of the methods in vogue at the Pasteur Institute, of France, demonstrated to us many of the details in technique peculiar to that institution and the knowledge of these details cannot fail to be of assistance for many years to come, furnishing as they have a stimulus to all our work.

Undoubtedly the greatest need of this laboratory at this time in additional assistance, for, as the work broadens greater specialization is necessary that the opinions given and the products manufactured may possess the highest possible merit.

Without further preliminary remarks I will proceed to enumerate under a few headings some of the features connected with the work of this laboratory which are of more than passing interest.

TUBERCULIN.

The amount of tuberculin disbursed from the laboratory by your order shows but a slight increase over the amounts sent out in previous years and totals 3,430 doses. For the purpose of comparison the following table indicates the total amounts disbursed during this and preceding years.

1903-04	1904-05	1905-06	1906-07
		Five months only	
2,649	3,145	1,967	3,430

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A detailed month statement of the amount sent out during the past year is as follows:—

April	267
May	349
June	160
July	184
August	161
September	254
October	118
November	423
December	336
January	589
February	437
March	152
Total	3,430

The printed circular which accompanies each shipment of this product is as follows:—

*Dominion of Canada—Department of Agriculture—Health of Animals Branch—
Biological Laboratory—Tuberculin, its Preparation and how to use it.
Preparation of Tuberculin.*

Tuberculin is the glycerinized extract of cultures of tubercle bacilli. During its preparation it is sterilized and contains no living germs, and therefore cannot communicate disease to a healthy animal.

Action of Tuberculin.

The injection of an appropriate dose of tuberculin under the skin of a tuberculous animal is followed by a specific febrile reaction which is characteristic.

Animals that are non-tuberculous suffer no inconvenience and present no reaction.

In advanced cases, where the disease has permeated the whole system, the reaction may be very slight or altogether absent.

How to Apply the Tuberculin Test.

To obtain the normal temperature of the animal to be tested, at least four temperatures, three hours apart, should be taken on the day the tuberculin is to be injected.

The requisite dose should be injected under the skin with a hypodermic syringe that has been previously sterilized. The skin at the point of the injection should be saturated with an antiseptic solution before the injection is made.

(The most convenient agents for the sterilization of the syringe and the saturation of the skin are, carbolic acid or creolin in solution. The solution is made by the addition of one part of carbolic acid or of creolin to twenty parts of water.)

The hypodermic needle should be dipped in the antiseptic solution after each injection before proceeding to again fill the syringe or inject another animal.

After injection, five temperatures should be taken at intervals of three hours, commencing with the tenth hour.

In cattle which have recently undergone a previous test the reaction begins much earlier, and it is then advisable to take the first temperature not more than two hours after injection and to continue taking temperatures every third hour thereafter up to the usual time.

The tuberculin as sent out is diluted ready for use. Each bottle is stamped with the amount of dilute tuberculin it contains.

Sixty minims is sufficient for a full-grown animal; thirty to forty minims for a younger animal, in proportion to age.

The date on each bottle indicates the limit of the time during which the contents should be considered reliable for diagnostic purposes.

GLANDERS.

The greater part of the work on the subject of glanders has been in connection with the preparation of mallein. Some new work, which is incomplete at this writing, has been undertaken with this affection.

MALLEIN.

Sufficient mallein has been forwarded from this laboratory at your request to test 14,303 head of horses, an amount which far exceeds that forwarded during any similar period. This entire amount was prepared at this laboratory. With the new facilities which are already installed there will be much less difficulty experienced in the preparation of this product than has formerly been the case. In preceding years mallein has been forward in the following amounts:—

1903-4.	3,153
1904-5.	7,819
*1905-6.	6,453
1906-7.	14,303

A monthly statement of the disbursements during the past year is as follows:—

April.	1,370
May.	702
June.	1,400
July.	1,645
August.	1,730
September.	1,786
October.	1,245
November.	598
December.	225
January.	712
February.	830
March.	2,060
Total.	14,303

The printed circular of instructions accompanying each shipment of mallein is as follows:—

Dominion of Canada—Department of Agriculture—Health of Animals Branch—Biological Laboratory.—Mallein, its Preparation and How to Use it.—Preparation of Mallein.

Mallein is the glycerinized extract of cultures of the bacillus mallein. During its preparation it is sterilized and contains no living germs, and, therefore, it cannot communicate disease to a healthy animal.

Action of Mallein.

The injection of an appropriate dose of mallein under the skin of an animal affected with glanders or farcy, is followed by a double reaction, either form of which

* Five months only.

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may be diagnostic, viz.:—A rise in temperature or a painful oedematous swelling at the point of inoculation, gradually increasing in size for a period of twenty-four hours or longer. Either form of reaction is usually accompanied by more or less debility.

Animals that are not affected with glanders or farcy suffer no inconvenience and present no reaction.

In advanced cases where the disease has permeated the whole system, the reaction may be very slight or altogether absent. It must be borne in mind that, in cases where there is abnormally high temperature and necessity prevents delay in applying the test, a lowering of the temperature should be considered as suspicious, and the animal held under observation for a re-test under normal conditions.

How to Apply the Mallein Test.

To obtain the normal temperature of the animal to be tested, at least two temperatures, three hours apart, should be taken on the day the mallein is to be injected.

The requisite dose should be injected under the skin with a hypodermic syringe that has been previously sterilized. The most convenient point of injection is the side of the neck, the local reaction being more prominent in this region. The skin at the point of injection should be saturated with an antiseptic solution before the injection is made.

(The most convenient agents for the sterilization of the syringe and the saturation of the skin are, carbolic acid or creolin in solution. The solution is made by the addition of one part of carbolic acid or of creolin to twenty parts of water.)

The hypodermic needle should be dipped in the antiseptic solution after each injection before proceeding to again fill the syringe or inject another animal.

After injection five temperatures should be taken at intervals of three hours commencing with the eighth hour.

The mallein solution as sent out is ready for use. Each bottle contains one dose of mallein solution, two an one-half cubic centimeters, or about forty minims.

The date on each bottle indicates the limit of time during which the contents should be considered reliable for diagnostic purposes.

ANTHRAX.

Anthrax has been positively diagnosed on several occasions during the past year and some of the material from suspected outbreaks has been in such a condition on its receipt at the laboratory that a positive diagnosis could not be made, therefore, it is necessary that greater care should be exercised in forwarding material for laboratory diagnosis as we can render but little assistance when the material is in an advanced state of decomposition due to improper preparation prior to forwarding.

The following was sent out from your office in September last to obviate the difficulties referred to above and while an improvement has since been noted there is still room for the exercise of greater care in this direction.

ANTHRAX (CHARBON)—BLACK-LEG (CHARBON SYMPTOMATIQUE).

In suspected cases of Anthrax (Charbon) the diagnosis can be positively confirmed by microscopic examination. A few drops of blood, placed on a clean piece of note paper, if allowed to thoroughly dry in the air before folding, will furnish sufficient material for diagnostic purposes.

In suspected cases of Black-leg (Charbon Symptomatique), the bloody serum from an affected portion of the animal, prepared in the manner above indicated for Anthrax will furnish material for a positive diagnosis.

Where it is impossible to exclude either of the diseases above mentioned and it is probable that death is due to one or the other, the placing of a small amount of

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blood in an equal amount of pure glycerine will enable a positive laboratory diagnosis. (A drachm of this blood-glycerine preparation is all that is required.)

Anthrax bacilli are always abundant in the blood of animals dying from this disease. The bacilli of Black-leg are found in small numbers only, but are sufficiently numerous to infect experimental animals.

Glycerine prevents the growth of putrefactive bacteria, but does not affect the spores of either Antrax or Black-leg.

Full information concerning history, clinical symptoms, &c., should be given.

Specimens should be addressed: Biological Laboratory, Ottawa, Ont.

Ottawa, Sept. 1, 1906.

ANTHRAX VACCINE.

We are now preparing the vaccines for the immunization of animals against anthrax, and are supplying it in sealed tubes similar to the method employed by its originator, M. Pasteur. That the work of inoculation may be facilitated, it is advisable when ordering this vaccine to indicate the number of farms or places where the vaccine is to be used that a sufficient number of tubes may be furnished, rendering a fresh one available at each farm or place. This, of course, refers to the use of the vaccine in small outbreaks where the infected territory is comparatively large and the number of animals quartered thereon is correspondingly small. This vaccine is supplied at 5 cents per dose and full instructions for its use accompany each package.

A detailed statement of the amounts sent from the laboratory during the past year is as follows:—

April.. . . . .	.....
May.. . . . .	.....
June.. . . . .	.....
July..	10
August..	350
September..	710
October..	200
November.. . . . .	.....
December.. . . . .	.....
January.. . . . .	.....
February.. . . . .	.....
March..	18*
Total..	1,318

BLACK-LEG.

It will be noted that reference is made to this disease in the circular mentioned under the subject of Anthrax to which the reader is referred for information concerning the forwarding of material for diagnosis.

BLACK-LEG VACCINE.

The preparation of black-leg vaccine has also been undertaken at this laboratory during the past year and we are now prepared to supply this product. This vaccine which is an attenuated virus is supplied on silk threads each of which constitutes a full dose and these threads are held in a brass clip of our own special design. The

* The amount was prepared at the laboratory. All other figures in this table refer to the product of the Pasteur Vaccine Company of Chicago, their vaccine having been used prior to our undertaking the preparation of this product.

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brass clips are so arranged that they can be attached to the cork of the vial in which they are to be forwarded from the laboratory. By this simple means we are enabled to inclose in one of these small vials as high as fifty doses of vaccine. The threads in the slip are held with sufficient pressure to prevent their being accidentally pulled out with other threads, or dropping out when handling. Further, this method of discharging provides an aseptic package of small size which will be found very convenient to large users of this material.

Black-leg vaccine is supplied at 5 cents per dose. Outfits for applying the same are also provided and can be obtained at 50 cents each. These outfits consist of a needle holder, two needles and a pair of forceps.

COITAL EXANTHEMA.

During the month of June two outbreaks of this affection were investigated by me, one in the vicinity of Simcoe, and the other at Campbellford, Ontario. In each instance the diagnosis was easily made. The investigation of the Simcoe outbreak afforded an opportunity for obtaining blood smears which gave the following differential counts:

HORSES EXAMINED JUNE 26 AND 27, 1908.

	III. Clyde Stallion, 5 years old. Ab reactions on sheath.	IV. B. D. Mare, 1,400 lbs.; slight vaginal discharge. Served June 14 and 15.	V. S. A. Mare Topsy. Served May 10. First symptoms May 23.	VI. S. A. Mare Kate. Served June 14. First symptoms six days after. Scars. Pigment re-appearing.
Total number cells counted.....	1,358	1,706	1,051	1,018
Polymorpho-nuclear neutrophiles.....	62.2	60.4	60.3	60.0
Eosinophiles.....	3.2	2.1	8.0	1.6
Mast cells.....	0.1	0.2	0.7	0.0
Lymphocytes, including large and small mononuclear cells.....	34.3	37.2	30.8	40.0

From these few counts it will be noted that there is no marked alteration from the normal in any of the cases cited.

MALADIE DU COIT.

In September last, accompanied by Dr. A. Loir, I proceeded to the Lethbridge quarantine station, where, in collaboration with Dr. Hadwen some special experimental work on Dourine was undertaken. Later, Dr. Loir and myself accompanied Dr. J. C. Hargrave of Medicine Hat, Alberta, to a ranch near Glischen, in the anticipation that the cases to be seen, some of which were of recent origin, would furnish suitable material for the demonstration of the *Trypanosoma equiperdum*. None of us however, found any body in the fresh and stained preparations of blood and other fluids examined from well marked cases of Maladie du Coit that resembled in the slightest degree the parasite for which we were searching. I was able, however, to obtain many smears from horses known to be free from Maladie du Coit or Dourine, as well as from animals affected in various stages of that disease, with which to continue the investigations connected with the differential counts of the leucocytes of the blood and the significance of their variations from the normal in this affection. In March, I again visited the Lethbridge quarantine station for the pur-

pose of verifying the finding by Drs. Watson and Gallivan of the *Trypanosoma equiperdum* and was able to detect the parasite in preparations taken by me from the vagina of the 'Tiffin' mare on the 21st, 23rd and 25th of that month. Up to February 11, 1907, the date of the first finding of the *Trypanosoma equiperdum* by Drs. Watson and Gallivan, this parasite has not been observed by any individual working with this disease in Canada, nor had it been observed in material taken from naturally infected cases on the North American continent.

TRYPANOSOMATA.

During the past year it has been found that some of the animals of this country harbour in their blood trypanosomata. These are, so far as we have been able to determine, non-pathogenic, with the exception of the parasite demonstrated to be the cause of the Dourine in horses.

RABBIT TRYPANOSOMATA.

Organisms were first observed in the blood of a wild rabbit ('cotton-tail'), which was about to be used for experimental purposes by Dr. Watson at the Lethbridge quarantine station. Fortunately, however, the blood was examined previous to inoculation with material from a case of Dourine, and was found to contain trypanosomata. Dr. Watson has since found the organisms to be present in a large percentage of the rabbits examined by him. On December 28 last we received two rabbits at this laboratory, one of which was found by Dr. Watson to harbour trypanosomata in its blood; the other, however, did not show any parasites up to the time of leaving Lethbridge, but, on their arrival here the blood of both contained organisms. The rabbit referred to in whose blood trypanosomata were found by Dr. Watson at Lethbridge, came to an untimely end from an accidental cause, but the other has, whenever examined, presented a greater or less number of organisms and is otherwise in perfect health. Inoculations have been made into mice, guinea-pigs and rabbits with blood containing active trypanosomata, but in no instance has a subsequent examination of the blood of the inoculated animal revealed any organisms, and we have, therefore, concluded that the parasite is non-pathogenic and similar to the *Trypanosoma lewisi*, in that it cannot be transferred from its normal host.

Blood from the rabbit which we have at this laboratory, containing active trypanosomata, has been subjected by Dr. Hadwen to freezing in pipettes for eighteen hours (+20° F.) without any apparent harm to the organisms, they being very active when thawed out at the end of this period, but clumping was in progress.

Many fleas from the rabbit in question have been examined in fresh and stained preparations, and trypanosomata have been demonstrated in several instances to be in an evolutionary stage. Fleas removed from the rabbit and kept for twenty-four hours before crushing did not show anything simulating trypanosomata.

From the data which we have, it is evident that infection can take place from rabbit to rabbit through the medium of the flea, and in all probability is the result of direct inoculation.

MOUSE TRYPANOSOMATA.

Trypanosomata have also been found by Dr. Watson in the field mice, which are abundant at the Lethbridge quarantine station. This organism is different in its general and micro-chemical characteristics from the organism found in rabbits. No attempt has been made to transfer this parasite to other species.

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TRYPANOSOMA LEWISI.

These organisms were found by Dr. Hadwen in a rat obtained near this laboratory on January 24, 1907. Since this finding organisms have been demonstrated in the blood from six of the sixteen rats examined. These sixteen rats were obtained from three different localities several miles apart. We have not found any particular locality from which the rats have been obtained to be entirely free from non-infected rodents. Fleas from some of these infected rats have been crushed and trypanosomata have been observed in the debris. This organism has been under cultivation on blood agar.

TRYPANOSOMA GAMBIENSE.

While this organism is not native to Canada we have conducted a large number of experiments with it for the purpose of familiarizing ourselves with a pathogenic trypanosoma.

The organism was received from Dr. Adami, pathologist to McGill University, in August last, and is one of the original strains brought from Africa by Dutton and Todd. All of our work with this organism has been with guinea-pigs and the object has been to learn the characteristics of a pathogenic trypanosoma. During this study we have found certain facts which we have not seen recorded in the literature on this organism.

These trypanosomata have been kept alive for eleven days at room temperature, the blood containing them having been drawn into a pipette and the end left unsealed but the organisms lost their virulence by this exposure. Blood containing these trypanosomata has been subjected to a temperature of $+8^{\circ}\text{F}$ to 0°F for two hours and three quarters, the organism becoming active with the warming of the slide. Material taken from a guinea-pig forty-eight hours after death was infective and at sixty-two hours transitional forms were seen but the parasite was no longer pathogenic for guinea-pigs. These trypanosomata disappear very rapidly after the natural or artificial death of its host provided the body is not opened.

This parasite is a strict xerobe and some experimental work has been undertaken in the use of serum to treat infected, and to immunize susceptible animals. The serum used was obtained from sealed pipettes which contain no organisms a few hours after closing. This study, while very interesting has not progressed sufficiently for us to make any statement in this connection.

RABIES.

Owing to the reported existence of rabies in certain localities it was deemed advisable to issue the following circular on the subject which would enable the receipt at the laboratory of material suitable for the purpose of verifying diagnoses.

RABIES (HYDROPHOBIA).

'An animal suspected of being affected with rabies (hydrophobia), should, if possible, be captured alive, placed in a cage where it can do no harm and watched. If affected with rabies, symptoms will appear within forty-eight hours and death will occur within a few days. No affected animal recovers.

That other causes of death may be excluded, material should be forwarded to the laboratory for a confirmatory diagnosis. If the time necessary for transmission to the laboratory does not exceed twenty-four hours, the head may be severed from the body and forwarded by express packed in ice. In winter, the severed head, if frozen, may be sent any distance provided instructions are given to keep frozen.

Where the distance from the laboratory exceeds twenty-four hours a portion of the nervous system, (brain or spinal cord), the medulla or base of the brain is pre-

ferred, may be placed in pure glycerine and forwarded by mail. There should be an excess of glycerine over the bulk of material forwarded.

Full information concerning history, clinical symptoms, &c., should be given.

Specimens should be addressed,

Biological Laboratory,
Ottawa, Canada.'

POULTRY DISEASES.

The past year has shown that there is still much to be gained from a study of the causes of death among the domestic fowls. From the findings at many autopsies, it is evident that there is an error in the diet of the birds which have come under our notice. My views may possibly appear to be somewhat radical in this connection but they have been informed from the observation of the lesions seen in fowls sent to this laboratory with a request for assistance in the prevention of further losses among the flocks from which they originate. The main lesions consist of an erosion of the mucous membrane of the gizzard, an atrophy of its muscular structure and an accompanying muco-enteritis. In such cases a complete change of diet to the whole grains and the placing of muriatic acid (a teaspoonful to the quart) in the drinking water has, in every instance from which subsequent information has been received, wholly corrected the difficulty, and there have been no further losses in the same flock.

In many instances the birds have been supposed to be suffering from clickeæ cholera, but the autopsy findings have in no instance revealed this condition during the past five years, nor have I any knowledge of an outbreak of this affection in Canada, with the exception of an outbreak studied by me in 1895-6, and therefore it is evident that this serious affection is not as common as usually supposed.

ENTERO-HEPATITIS IN TURKEYS.

Some experimental work was undertaken in this connection during last fall, but the nocturnal disappearance of the experimental birds nullified investigations covering a period of six weeks. From the data obtained, however, it is evident that the infection is transmitted either through the egg or upon its surface, and that the buying of new stock in the egg will not wholly prevent losses from this disastrous disease. Other observers report that the treatment of the eggs with a weak solution of alcohol has, in some instances, prevented the appearance of the affection in the young stock hatched therefrom.

PHOTOGRAPHY.

Photography is an essential feature in conducting the routine and scientific investigations of this laboratory, for, by its application an accurate record may be made of any particular feature which comes under our notice, and such photographs records, apart from their value in the publication of a descriptive article on the work conducted, assist in a positive determination when comparing specimens from different sources. Apart from the above-mentioned assistance, the photographic work of this laboratory during the past few years has included the preparation of the majority of the photographs used as illustrations in the annual reports of this branch. In this connection, it is particularly gratifying to note that some of these photographs have been considered of sufficient scientific value to warrant their reproduction in other publications.

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ADDITIONAL FACILITIES PROVIDED.

Certain additional rooms deemed necessary that the various preparations manufactured at this laboratory may be thoroughly separated from one another are very nearly completed and will greatly facilitate our work. These rooms have been partitioned off in the basement—providing a large incubating chamber of special design, inoculation and preparation rooms for use in connection with the manufacture of mallein and tuberculin and a room for the preparation of virulent black-leg material for use in the manufacture of black-leg vaccine. In the attic, rooms have been provided for the anthrax and black-leg vaccines, thus, all of the products are effectually separated the one from the other and the general routine work of the institution.

ISOLATION STABLE.

The need of an isolation stable is still more urgent than at any previous period in the history of this laboratory. Such a stable would be invaluable in connection with the preparation and testing of the anthrax and black-leg vaccines as well as affording facilities for experimental observation of cases of virulent infectious disease in the larger domestic animals.

In closing this my report I desire to express my appreciation for the assistance and timely advice which you have so freely given.

I have the honour to be, sir,
Your obedient servant,

CHAS. H. HIGGINS, B.S., D.V.S.
Pathologist.

The Veterinary Director General,
Ottawa, Canada.

W. H. PETHICK, D.V.S.

GOVERNMENT EXPERIMENT STATION, ANTIGONISH, N.S.
March 31, 1907.

SIR,—I have the honour to submit a brief report of the experiments conducted at this station, together with other work in which I have been engaged during the year ending March 31, 1907.

Since the publication of your report dealing fully with Pictou Cattle Disease and in which you conclusively show that ragwort is the cause of that malady, we are often asked for advice as to the best means of ridding the farms of this weed, which, as you know, is slowly, but none the less surely, claiming new territory.

It has long been known that sheep are free eaters of weeds and the experiments, which I have the honour of conducting, under your direction, at the present time, are chiefly with a view of learning what dependence can safely be placed in these animals in clearing land of this weed. It was, therefore, necessary to learn the effect of continued ragwort eating upon sheep.

It is generally believed that these animals will tolerate a considerable quantity of the plant without ill effects. Notwithstanding all this, the comparison of our own observations with those of others, help to confirm the suspicion (well known to you) that sheep die annually on certain farms from the effect of ragwort eating. The exact condition of plant or animal which lead to these fatal results has not yet been explained, although many theories have been advanced.

It is thought by some that ragwort is injurious at any season or stage of growth. Others consider it harmless when green, but poisonous when dried. According to the third theory, the seeds of the plant are alone injurious. The weight of evidence is very much in favour of the view that the plant is only poisonous when frozen, or at least, after the hard frosts set in. The opinion is strengthened by the fact that the deaths usually occur late in the fall. This again gives rise to the question: Does freezing cause any chemical change in the juices or texture of the plant to render it hurtful, or is the loss accounted for by the fact that the sheep are compelled, owing to the scarcity of the usual fodder plants, which are wilted by the frost or covered with snow, to exist almost entirely upon the more hardy ragwort?

Some people claim that fat, adult sheep are only susceptible. Others again state that feeding upon the plant rarely produces death, but causes staining of the tissues, making the mutton unmarketable.

I do not think that you would wish me, at this stage of our work, to furnish a report of each experiment. Nearly all are yet in progress, and I know that you (very rightly) consider it unwise to anticipate results. You are thoroughly familiar with every detail. But I would just say, for the information of such as may read this report, that the opinions or theories outlined above are at present being investigated by various experiments, systematically conducted, at this station, under your direction.

The outlook is decidedly hopeful, and I trust that before the new year we may be able to speak with confidence, and from the knowledge gained you may be in a better position to advise effectual means of eradicating the plant, which is the source of so much worry and loss. Already we seem to have fairly well disproved certain theories, which, had they been true, would certainly have hindered the sheep industry within the weed area.

I am glad to be able to inform you that many of our farmers are increasing the number and strength of their flocks by keeping over a good many ewe lambs. I believe that there are, at least, 5 per cent more sheep wintering in this county this year than last.

Farmers are beginning to see that if weeds are to be successfully fought, sheep should be kept. I certainly concur in this opinion, and from the present outlook, might say that the better cultivation of the tillable portion of the farms, the free use of the hoe and scythe in the headlands, fence corners and roadsides assisted by the keeping of plenty sheep on pasture and waste lands are the best means towards stamping out this weed, that we could perhaps suggest at present.

While we are sparing neither time or trouble, both here and at the biological laboratory, in endeavouring to learn the cause for the loss of sheep upon certain farms, presumably due to the eating of ragwort after the plant has been frozen, and until more definite knowledge is obtained, I would suggest that sheep be removed from ragwort land before the fall frosts set in or the snow covers up the usual fodder plants. It certainly can do no good, but only harm, to keep sheep out at pasture as late in the fall as is the custom on many farms. They should at least (after the grass is wilted) be penned at night and fed hay in the morning before being turned free. This may prevent them from eating injurious plants.

Our goats continue in good health, but are not giving a very good account of themselves as ragwort eaters. In this particular, they do not compare with sheep, and, contrary to our expectations, the common variety are more destructive to the plant than are the Angoras, which very much prefer to feed upon browse.

The experiment in which cattle are employed, is still in progress. The three cows which have been fed, during two winters, upon native hay, from which the ragwort was carefully removed, are, apparently, in perfect health, while one of the three cattle fed upon the same kind and quality of hay, but containing ragwort, died of Pictou cattle disease in June last.

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While this experiment has, perhaps, not yet been extended over a sufficient period to justify us in making a public announcement, as to the safety of feeding cattle upon hay, from which the ragwort growing therewith, has been carefully removed by hand, it has certainly, already, clearly shown that neglect or carelessness in removing the plant will be surely followed by fatal results.

The mare, which has been fed for thirteen months on ragwort mixed with hay and chopped fine, is still alive and apparently healthy.

The experiment with guinea pigs has given nothing worthy of notice.

The vote of thanks tendered you by the Board of Trade and by the Municipal Council for the county of Antigonish, together with the many complimentary and encouraging letters from representative people of this county and elsewhere, show, clearly, that your work in eastern Nova Scotia is well understood and highly appreciated.

In addition to the work already mentioned, I have by your instructions, inspected all shipments of live stock from Bayfield and Mulgrave. The report, which I have the honour of sending you monthly, contains all particulars. You will have noticed that one hundred and thirty head of cattle, ten horses and twenty-three sheep were shipped from Bayfield and seven hundred and three head of cattle, ten horses and one hundred sheep from Mulgrave to St. Johns, Newfoundland. I wish to thank Mr. Edgar Whidden, the owner of the vessels engaged in the trade, for giving the best possible facilities for the proper performance of my duty.

I am glad to be able to say that so far as live stock is concerned, this has been one of the healthiest years in the history of this very healthy province. Glanders, rabies, cholera and other contagious diseases have been reported from time to time, but prompt and careful investigation proved the suspicious unfounded and suspected animals to be suffering from diseases of a non-contagious character. And with reference to this branch of the work, I wish to express my appreciation of the valuable services rendered by the biological laboratory under such capable management. It certainly is a great help to your inspectors, particularly in investigating obscure diseases.

I have the honour to be, sir,

Your obedient servant,

W. H. PETHICK,

Inspector.

The Veterinary Director General,
Ottawa.

F. TORRANCE, B.A., D.V.S.,

WINNIPEG, March 31, 1907.

SIR,—I have the honour to submit the following report of the investigation of Swamp Fever in horses during the past year.

Work began in January, when, on your instruction, I visited several farms in the vicinity of Dominion City and made an inquiry as to the prevalence of the disease in that locality, the result of which has already been communicated in my letter of February 3. There were no actual cases of disease discovered at that time, and nothing further was accomplished until June, when Mr. Baskerville wrote stating that the disease had again made its appearance in his own neighbouring farms. With your consent, I again visited the locality, and spent several days investigating the cases of the disease and obtaining specimens for further examination. The facts in connection with this trip to Dominion City have already been conveyed in my letter of June 26.

Through the kindness of Mr. Baskerville and his neighbour, Mr. Bratton, I obtained two mares afflicted with the disease, and shipped them to Winnipeg, where they remained under my constant supervision until they died. The Bratton mare was well advanced in disease, and lived only a few days after her arrival here, but the Baskerville mare survived until November 7. During this period daily observations of pulse and temperature were made, and at short intervals the blood was examined, in fresh and stained specimens under the microscope, and by counting the red and white corpuscles.

No trypanosomes, plasmodia or other organisms could be detected at any time, and cultures made from the living blood invariably remained sterile. A well marked peculiarity in the blood of the Baskerville mare was a greatly increased number of œsinophile cells, constituting the condition known as œsinophilia. This frequently indicates the presence of worms in the intestinal tract, and I consequently treated the mare vigorously with vermifuge remedies, but without causing the expulsion of any worms. At the post mortem, there were no worms discovered in the intestines, and the few specimens in a verminous aneurism of the great mesenteric artery could hardly be sufficient to account for this change in the blood.

Various remedies were tried, and during the first month there was a marked improvement in the mare under a course of arsenic, salol and nux vomica. She increased in weight, and the number of red blood corpuscles went up from 2,240,900 per c.c. to 4,650,000, and she seemed on the road to recovery. The improvement was, however, only transitory, and was followed by a retrograde movement, in which all the gain of the previous month was lost, and an additional amount as well. A progressive anæmia followed, accompanied by a gradual loss of bodily strength, the mare gradually became weaker and weaker until she could no longer rise without assistance, and finally died.

The postmortem in this case showed the following conditions: Body much emaciated, no subcutaneous or intermuscular fat. Pericardial sac contained several ounces of fluid. Interventricular septum of heart had a curious yellowish area an inch in diameter, extending from one ventricle to the other. Microscopic examination of this area showed the muscle fibres disappeared and replaced by cellular infiltration and commencement of fibrosis. This had probably resulted from thrombosis of a branch of one of the coronary arteries. The spleen was enlarged and adherent to the stomach by an inflammatory area enclosing a small abscess, which, was found to contain a pure culture of the colon bacillus. A verminous aneurism of the great mesenteric artery was found, also numerous calcified tumors of small size in the wall of the small intestine, the result of the activity of *strongylus armatus*. No other parasites found.

The postmortem in the Bratton mare revealed the following conditions: Body much emaciated and distended with gas. Yellow gelatinous infiltration beneath skin, along back and other regions. No fat muscles, pale and flabby.

Thorax.—Some effusion in pleural and pericardial sacs. Lungs resilient and mottled, and large vessels filled with clotted blood, clots chiefly yellow. Heart large, flabby, containing yellow (chicken fat) clots in ventricles. Numerous hemorrhagic spots on endocardium and in heart muscle. Area of gelatinous infiltration surrounding coronary artery.

Abdomen.—Stomach small, contains about two gallons feed and one bot. Small intestines pale and nearly empty. Cæcum and colon similar. A few dead strongyles in cæcum. No other parasites. Lymph glands of mesentery enlarged and soft (Hyperplasia). Kidneys-right, pale and flabby, left enlarged and contained pus (pyo-nephritis). Spleen enlarged. Womb and ovaries normal.

Several other postmortems were made, but with a few exceptions, they did not vary from the usual result. In one case there was a marked enlargement of the lymph vessels of the small and large intestine, and some of them were as large as a

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lead pencil, and distended with a clear fluid, cultures of which remained sterile. The lymph glands were much enlarged and flabby, but showed only hyperplasia

Another case that apparently was typical of swamp fever, was found to be badly infested with parasites, the caecum and colon being filled with a squirming mass of tiny worms, the sclerostoma tetracanthum. These worms are known to produce anæmia in horses in other parts of the world where swamp fever is unknown, and probably their presence in this horse led to symptoms mistaken for swamp fever. Mr. Post, who lives on a farm, in the same locality as Mr. Baskerville, tells me he found the same kind of worms in a mare which died with, what was apparently, swamp fever, but he states the worms were found, not only in the bowel, but also in the muscles and beneath the skin. These may have been the agamous form of the strongylus armatus, a worm somewhat similar in appearance to the sclerostoma tetracanthum and well known in its usual habitations, the large intestine and the verminous aneurisms of the mesenteric arteries. They have been found in the muscles and connective tissues by European observers, but I am not aware of any American discoveries of them in this situation. However, the worm is well known, and frequently observed in American horses, and there is no reason to doubt the accuracy of Mr. Post's observations.

It is evident, from these facts, that a disease closely simulating swamp fever in its clinical manifestation, may be accompanied or caused by the presence of large number of worms belonging to two closely allied species, sclerostoma, tetracanthum and strongylus armatus, but as these forms are not present in every case of swamp fever, they cannot be the cause of that disease.

In this connection it may be noted that there is a tendency among farmers and others to name any disease of a lingering or wasting character, 'swamp fever,' and in this way, swamp fever appears to be much more prevalent than it really is. Many of these so-called cases of swamp fever would be found, on closer examination, to be diseases of another kind, such as typhoid influenza, verminous anæmia and ordinary debility. Swamp fever has enough to answer for, without having to take the responsibility of these other diseases, and it is to be regretted that so great confusion exists. It is very easy to distinguish typhoid influenza from swamp fever, by two only of its characteristics, the loss of appetite and the deeper colour of the mucous membranes. Swamp fever shows no loss of appetite, at least until near a fatal termination, and the mucous membranes are paler than usual.

Anæmia from worm invasion is more difficult to differentiate, but as this is a rarer condition, it is not of so great importance. A careful examination of the fæces for worms, or their ova, would decide most cases. Debility results from previous attacks of disease or from lack of proper food and care, and the history of the case should decide to which class it belongs.

In conclusion I wish to express my obligation to Dr. Bell for valuable assistance in making cultures and examining specimens, and to Messrs. Baskerville and Bratton for the gift of cases of swamp fever.

I have the honour to be, sir,

Your obedient servant,

F. TORRANCE, D.V.S.,

Inspector.

The Veterinary Director General,
Ottawa.

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S. H. WARD, V.S.

March 31, 1908.

SIR,—I have the honour to submit herewith my report covering the inspection of meats under the 'Meat and Canned Foods Acts,' from September 3, 1907 to March 31, 1908.

At the time the Act went into force, September 3, 1907, there were twenty-seven establishments designated by Order in Council as coming within the provisions of the Act, each being known by an official number. To enforce and carry out the regulations promulgated for the enforcement of the Act, thirty-nine veterinary inspectors were appointed, each establishment being under the supervision of from one to four inspectors according to its capacity. The veterinary inspectors received a thorough course of training in Chicago in all branches of meat inspection, and, in addition, were required to pass an examination prescribed by Order in Council before being eligible for appointment.

The duties of the inspectors are clearly defined in the regulations appended herewith. In their essence, the regulations are the embodiment of the various inspection laws formulated by countries in which meat inspection is maintained. The organization and practical working out of a competent meat inspection system applicable to the immense interests and peculiar conditions that exist in Canada, involved an amount of work that can scarcely be appreciated except by one who, like yourself, has given a great amount of time and thought to framing regulations consistent with the Act, and which had, of necessity, to cover and protect an industry which is but in its infancy, and which, up to the time at which inspection was enforced, had governed itself. Under the conditions which surrounded the enforcement of the Act on September 3, 1907, the department has cause to congratulate itself on the harmonious development which has attended the work of inspection. This can only be credited to your forethought in training an intelligent body of men who have striven to their duty with tact and credit to themselves and to you as the head of the branch. I am confident that their successful efforts were the result of pride in the knowledge that upon them to a large extent devolved the successful inauguration of a system which is of the utmost importance to the packers, and of still more importance to the country at large.

It is not necessary for me to go into the reasons which prompted the passage of an Act of such vast importance to the agricultural community. It is sufficient to say that, without the government guarantee of meat exports, it was but a question of a short time until foreign competition would quietly and effectually have swallowed up our bacon trade with Great Britain, by reason of the fact that their countries were certifying that all meats exported by them were from inspected animals and were sound and wholesome at the time of shipment. Public sentiment in Great Britain is asserting itself and demanding some guarantee that this meat supply from abroad be free from suspicion.

An investigation of Canadian packing houses, made some time prior to the passage of the Meat and Canned Foods Act, revealed nothing of an alarming nature, yet some conditions were found to exist that were felt might be corrected advantageously to the packer and the consumer. These conditions were remedied as early as possible after the Act went into force and the changes, to one who had visited the establishments prior to the enforcement of the Act, are very perceptible. The sanitary conditions at the establishments are well marked, and still more marked is the method of handling, not only in the process of cure, but in the manufacture of the various meat products. Our inspectors were impressed with the necessity of furthering the sanitary conditions at each establishment, and were instructed to inculcate personal cleanliness into the minds of employees, and it is encouraging to note the good results which have followed.

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Shortly after the inauguration of the inspection it was deemed advisable that a travelling inspector be appointed, and R. Barnes, V.S., inspector in charge of Toronto, was promoted to the position. His duties consist in visiting the various establishments from time to time with a view to establishing uniformity in the general work of inspection, and in investigating and reporting on the various problems which arise at all times and which go hand in hand with the enforcement of compulsory measures. The wisdom of the appointment is apparent in the good work which he has performed.

The question has been raised as to the value of inspection to the packers and to the public in general. The opinion so far among packers is that it is a good thing and was needed as a stimulus to the export trade. There has been, if statements are to be accepted as true, an increased number of animals slaughtered over previous years. During the first month the Act was in force there were very few establishments but were required to work four or five hours almost every night of the week in order to clean up the consignments of live stock. These extra killings ran over the months of September, October and November, and of course necessitated our inspectors remaining on duty sixteen hours a day owing to the fact that there were not sufficient inspectors trained in the work of inspection to relieve them. The department is to be congratulated on the fact that the inspectors faithfully remained on duty whenever the exigencies of the establishment demanded, notwithstanding the wearisome, and by no means pleasant, work of inspection, handicapped as the inspectors were for the first two or three months by cramped and, in many cases, badly ventilated killing floors.

A synopsis of the method of inspection is perhaps necessary that the regulations may be thoroughly understood. Every animal intended for slaughter is examined by a veterinary inspector in the yards or pens of the abattoir before being allowed to enter the killing floor. Any animal found diseased, or suspected of being diseased, is tagged and held back until the end of the day's kill. As animals are killed the inspector makes a thorough examination of the carcass and all viscera. If no evidence of disease is found, the carcass is marked with a stamp or label showing the inspection legend,—The Crown and the words 'Canada Approved' together with the establishment number. Should any carcass be found showing evidence of disease such as to render it unfit for food, it is immediately marked with a 'condemned' tag. A carcass of which a doubt exists as to its condition has placed upon it a 'held' tag, and when the kill is over the inspector makes a further examination and disposes of the carcass according to his judgment. All condemned carcasses are tanked under the supervision of the employees of the department.

The postmortem inspection of swine is a most thorough one, and the inspectors have been impressed with the necessity of a systematic examination of the carcass. As you will perceive from the statistics, tuberculosis is the most common disease, the seat of the lesions in the majority of cases being the glands lying to the outside of the base of the tongue. So constant is the location of the disease in these glands, that it was deemed advisable that they be removed, and cut into by the inspector, as quite often evidence of disease can only be detected by section.

I feel at this time that some mention should be made in regard to the prevalence of tuberculosis in swine. It occurs to me that the virulence of the bacilli is greatly increased after gaining entrance to the organism of these animals. As glanders differs in virulence in the horse and the mule (running a remarkable rapid course in the latter animal), so does tuberculosis differ in virulence in the cow and in the hog. In the one animal it might be called a chronic disease, in the other, acute.

The question will suggest itself as to why this disease should be so prevalent and what means can be adopted to prevent its dissemination. The reports from our inspectors and our own observations tend to show that the creamery-fed hogs are very

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prone to the disease, the infecting medium undoubtedly being the by-products of the creamery and cheese factory. Experiments have shown that skimmed milk contains as a rule, very large quantities of tubercle bacilli, as no means are taken at the creamery or cheese factory to render the milk innocuous. It is readily seen how dangerous the skimmed milk may be as a food, not only for swine but for rearing young calves. The remedy is an easy one and lies with the creamery and cheese factory, as the case may be. The sterilization of the by-products could easily be performed before the skimmed milk is handed back to the patron. It is necessary, however, in order to accomplish this end, that our provinces enact laws making sterilization compulsory, and appointing competent men to see that the same is properly carried out. It is questionable, however, if this will be done, at least in the near future. The prevalence of the disease in hogs has not yet been brought to the attention of legislators, nor have swine breeders realized the extent of the disease, and until this is brought to their notice, it is not expected that any active steps will be inaugurated looking to the control of the disease through the milk.

Your attention is directed to the large number of condemnations under the head of immaturity. The trade in calves usually opens up in March, it being the custom of farmers to sell their calves immediately they are born, shippers buying them from fifty cents to a dollar a head. They are loaded in double-decked cars and consigned to the large cities where they formerly entered into consumption for human food.

The fact that the carcasses of calves, anywhere from one to ten days old, were allowed to be placed upon the market for sale in our large centres, and designated as veal, was a disgrace to all connected with such traffic. Public health and sentiment were completely lost sight of by dealers in the profits which accrued from buying a 'food' (?) at one cent a pound and retailing to the housewife at fourteen cents. The custom of selling calves prevails in the dairy districts and is probably the result of the lack of forethought on the part of the farmer.

It would seem that two subjects, viz: The raising of calves and the thorough sterilization of all creamery skimmed milk, could with profit be brought to the attention of the farming community through the farmers institutes.

Section 19 of the regulations prohibits the entry into establishments of any carcasses or portion thereof, unless the same are marked or certified to as having passed inspection. Exception is made, however, in the case of dressed carcasses when the head, heart, lungs and liver are held by their natural attachments. This provision had in view the large trade carried on in dressed carcasses in certain sections of the Dominion. This trade is a relic of the times which prevailed two decades ago when farmers found a readier market for dressed carcasses than prevails at the present time. During the development of the country the demand for domestic cured meats was very large giving way, however, to the products of the various abattoirs which sprang into existence with the advent of transportation facilities. Some opposition was experienced against this section, confined however, to the Counties of Essex and Kent, many breeders in these counties believing that all carcasses slaughtered by them upon their own premises, would come within the provisions of this section and that it would be necessary that the head, heart, lungs and liver be left attached, no matter to whom the carcass was sold. Representations were made that the dressed hog trade from this district would be killed were the department to enforce the regulation. In order to overcome the difficulty, it was suggested to the minister that local veterinarians be appointed and certain railway points designated at which shipments of carcasses could be inspected. Acting under instructions from the minister, an examination was held in Chatham on November 30, 1907, in order that veterinarians might be qualified as inspectors *pro tem*. The candidates presenting themselves for examination were informed in the presence of C. H. Higgins, D.V.S., pathologist, and A. G. Hopkins, M.D.V., who, with myself, conducted the examina-

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tion, that appointments as inspectors would not make them eligible for permanent appointments. Notices were sent to various points in the counties of the proposed action by the department, and shippers were instructed to notify M. B. Perdue, V.S., of Chatham, of intended shipments. This inspection went into force on November 27, 1907, and from that time until this date only ten carloads, or a total of one thousand, eight hundred and thirty-seven carcasses, were shipped to four establishments at which inspection is maintained. It is somewhat strange that farmers persist in dressing their hogs, selling them at seven and a half cents a pound, when live hogs are worth from five to five and a half cents. As a rule a hog weighing two hundred pounds, live weight, will dress one hundred and forty pounds, or seventy per cent of the live weight. There can therefore be no advantage in slaughtering swine upon the farm.

A small trade in dressed carcasses of sheep is carried on in the Maritime provinces, the principal shipments being from Charlottetown, P.E.I. The trade usually opens in the late fall months, and shipments are made to centres in the Dominion as far west as Winnipeg.

Since the inauguration of the Meat and Canned Foods Act, considerable agitation has arisen in various cities favourable to the establishment of public abattoirs under direct municipal supervision. This agitation indicates that the inspection of foods is becoming popular, and will develop and become more necessary with time.

I have the honour to be, sir,
Your obedient servant,

S. H. WARD,
Chief Meat Inspector.

The Veterinary Director General,
Ottawa.

C. H. HIGGINS, B. Sc., D.V.S.

BIOLOGICAL LABORATORY,
OTTAWA, Canada, March 31, 1908.

SIR,—I have the honour to transmit this my report as Pathologist for the year ending March 31, 1908.

A great increase in my work and in the work of the Biological Laboratory, over that of any previous year has been witnessed. Not only has the routine connected with the examination of material forwarded for diagnosis, exceeded that of other years, but there has also been an increased amount of work in connection with the manufacture of biological products. Our disbursements in this direction are partially indicated from the fact that 879 registered packages have been forwarded from the laboratory containing anthrax and black-leg vaccines, mallein and tuberculin.

The pursuit of special research work has been impossible during the year, save in connection with some minor investigations where only a limited number of examinations were necessary, as we have been overwhelmed with the duties connected with the work above outlined.

We have, in addition to preparing all the mallein used by the department, prepared anthrax and black-leg vaccines and it is gratifying to note that these two pro-

ducts have given almost universal satisfaction wherever used. This year, through a slight change in the package and the designing of a new means of administration, the application of either vaccine is so simplified that less trouble is to be anticipated in disbursing than has hitherto been the case.

The alterations in the building which was completed early in the year have greatly simplified our work and the several preparations which we manufacture have been effectively separated, the one from the other, thus, the liability of any of our products to contamination from another or from the infectious work of the laboratory is reduced to a minimum. Each branch of the work is confined to a limited space, a feature which is absolutely essential where material of such widespread importance to the live stock interests of the country is prepared.

The inception of the meat inspection service under the Meat and Canned Foods Act, has caused an increase in our work through the necessity for diagnosis of conditions commonly seen in slaughter houses but which have hitherto received no attention nor have they been accurately diagnosed. Aside from the assistance which we have been able to render in this direction, we have obtained through this service many rare and valuable specimens which have been added to the museum of the laboratory.

Aside from the work of the laboratory and from my duties as Pathologist, I proceeded to Regina in June last, at at your request, placing myself at the disposal of the Commissioner of the Royal North West Mounted Police as a special agent of the Branch to exercise a general supervision over the enforcement of the compulsory mange dipping order. To this end, at the direction of the Commissioner and accompanied by Inspector Burnett, I visited Calgary, Macleod, Lethbridge, Medicine Hat and Maple Creek for the purpose of meeting and instructing the various inspectors who were to organize and supervise the work in their respective districts.

The transfer of the executive administration of the Health of Animals Branch in Saskatchewan and Alberta to an officer of your Branch having been decided upon, I later proceeded to Regina, remaining there to assist at its consummation by arranging for such details as were possible prior to the arrival of Dr. Hilton, the officer commissioned to effect the change. After this transfer and assisting in a few minor inspections for which no officer was available, I completed the inspection of the Boundary Stations in these two Provinces which was started previous to the change of administration, and also witnessed the operations of the Seabury Spraying Machine.

BOUNDARY STATIONS.

The Boundary Stations at North Portal, Wood Mountain, Willow Creek, Pendant d'Oreille, Coutts and Twin Lakes were visited by me for the purpose of ascertaining what changes were required to place the dipping plants at these points in first class order. The conditions found at these points as well as my detailed recommendations in connection with each were forwarded to your office immediately following the inspection and, therefore, need no further consideration at this time.

SEABURY SPRAYING MACHINE.

I was present at a point on the Little Bow river, about forty miles north of Lethbridge, during the setting of the Seabury Spraying machine in connection with a series of corrals and a chute erected for this purpose. Some difficulty had already been experienced by the men in charge of this apparatus prior to their arrival at this point in obtaining a proper emulsification of the oil and they found a similar difficulty with water taken from the Little Bow river.*

*A sample of the water from the Little Bow river taken at this time, (July 21st, 1907), was on my return to Ottawa, analyzed by Prof. Shutt of the Experimental Farm, who found that the total hardness was 11.5°. Basing an estimation on this degree of hardness it would take seventeen pounds of quick lime to soften one thousand gallons of this water.

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In order to overcome the trouble and to determine the manner in which we could improve the emulsion, I conducted a series of experiments with this end in view. After the preparation of many trial emulsions it was found that an excellent emulsion resulted when twice the amount of hard soap recommended by the compulsory order for use with boiling soft water was used with the oil on hand (Beaumont) and the water taken direct from the river without treatment. Having thus arrived at the cause of the difficulty in the preparation of the emulsion a sufficient amount was prepared to operate the machine. After the thorough mixing of the emulsion by forcing it through the machine a number of times a sample was taken and this sample shows but a slight separation of the oil even at this writing (over nine months).

This machine, while thoroughly applying the emulsion to the cattle passing through it, so frightens the animals that considerable persuasion is at times required to induce an obstinate steer to enter the sprayer. To me it appeared much slower than a dipping vat and the only advantages which I could see that it possessed over such an arrangement, were, the small amount of material required to treat the cattle and the portability of the apparatus. These advantages, however, are of doubtful value when considered with the disadvantages. The general idea of the machine is good but it seemed to me that a machine into which the animals could be driven without such excessive prodding would possess many advantages over the apparatus that I saw.

Another difficulty in the application of oil emulsions with this machine seems later, to have been experienced through the alkali taken into it by the feet and on the hair and hides of the cattle to be sprayed. From some of the results it is apparent that the emulsion was improperly prepared or that there was sufficient of this alkali to alter the emulsification of the oil. Such a contingency was not considered when I witnessed the operation of the machine, therefore, no steps were then taken to provide for such errors.

Oil emulsions are such delicate mixtures that it will be necessary, if they are to be used in the future, to have their use more thoroughly supervised by men better trained in their preparation than was possible during last summer.

* * * * *

Without further preliminary remarks I will proceed to enumerate a few of the special features connected with the work of the laboratory which will indicate the wide range in the scope of our work and some of the special means by which we have been able to assist in the general efficiency of the branch.

EXAMINATION OF SPECIMENS.

During the past year 339 series of specimens have been received from various sources throughout the country representing an increase of 166 series more than were received during the year immediately preceding.

The specimens which have been received during the year represent a far greater variety of conditions than has been the case during the whole period that the laboratory has been in operation. Many are valuable representatives of their respective classes and an examination of our records indicates that the senders in many instances are not individuals from whom we have received material previously.

From the laboratory standpoint, it is desirable that more care should be exercised in the preparation of specimens that they may reach us in better condition for diagnostic purposes. As a rule Inspectors who have had particular training in this respect or who are careful to follow the simple instructions which have been issued from time to time, supply specimens which are in excellent condition when we receive them. There are, however, many specimens with which we could have done

more to assist interested individuals had more care been exercised in preparation prior to their shipment.

We are in a position to render great assistance to the practitioner of veterinary medicine, a fact which has already been exemplified in numerous instances and such practitioners should be more eager to avail themselves of the opportunity offered by the facilities of this institution which are at their command.

In order that the greatest possible assistance may be available I will outline some of the main principles which should be observed in taking and preparing material for laboratory diagnosis.

The possibility of an accurate diagnosis is often nullified by the apparent carelessness in the manner of preparing the specimen transmitted to the laboratory and foreign micro-organisms have become so abundant that the lesions are obscured or the causative factor destroyed by the changes which have taken place during transit.

It must be borne in mind, however, that any solution which will preserve the tissue cells intact, or hold the form of an organ is necessarily antiseptic and will prevent the recovery of the organism in pure culture. Thus, where cultures are desired the greatest care must be exercised in the preparation of material and freezing is usually the most convenient solution of such a difficulty. As this procedure is out of the question during a greater portion of the year we have indicated on a special circular, which is reprinted herewith, instances in which bacteriological diagnoses may be made from easily prepared material. Further, it is almost impossible to issue any general guides which will assist in preparing material so that we may make some use of it from a bacteriological standpoint.

To retain the peculiar selective staining characteristics of individual cells it is necessary to use such preservative solutions as have proven to be most suitable for the purpose, and the individual forwarding the material should consider the general rules prepared for his guidance in the various circulars which have been issued from time to time for this purpose.

The special general circular is reproduced herewith and the details to be observed in connection with the forwarding of material from suspected cases of anthrax, black-leg and rabies were outlined in my report of last year which is printed as a portion of the report of the Veterinary Director General, therefore, they require no further consideration at this time.

*Dominion of Canada—Department of Agriculture.
Health of Animals Branch.*

Instructions for sending Specimens for Microscopic Examination

In forwarding specimens of diseased tissues or organs for diagnostic purposes the following suggestions should be noted and carefully carried out in order to ensure their arrival at the laboratory in good condition.

Specimens for Pathological Examination.

Unless a specimen is so remarkable and characteristic that it should be preserved as an exhibition or museum specimen, it is unnecessary to send large portions. Small portions about an inch cube well selected from different regions are sufficient. They should be taken in such a manner as to exhibit the normal tissue passing into the diseased tissue. Together with the material which shows actual lesions, portions of an inch cube should be taken from the lung, heart, spleen and kidney. In many instances the microscopical lesions in apparently healthy organs give the clue to the affection from which the animal suffered. These small portions should be placed in a wide mouthed bottle or jar, with at least five times their volume of alcohol, or better still 4 per cent solution of formaldehyde.

Specimens from different animals should be placed in separate containers.

Large specimens may be packed in ice or frozen.

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Hog Cholera.

Where this disease is suspected, in addition to the material above designated, a portion of the intestine is necessary, consisting of the last portion of the small intestine and the first portion of the large intestine, including the ileo-cæcal valve.

Specimens for Bacteriological Examination.

Bacteriological specimens are easily contaminated by the many putrefactive organisms which exist in the air and soil and, with few exceptions, must be taken by some one thoroughly trained in bacteriological methods.

Anthrax.—A few drops of blood from an animal suspected of having died of this disease, placed on a clean piece of note paper, allowed to dry in the air, folded, placed in an envelope and forwarded to the laboratory provides sufficient material for diagnostic purposes.

Specimens for examination should be accompanied by a letter giving complete information concerning the case in question, with its history, clinical symptoms, &c.

Specimens must be labelled in order that they may be identified. The name and address of the owner of the animal and the name and address of the sender of the material are necessary in order that records may be kept and reports promptly forwarded to the proper parties.

Specimens not exceeding five pounds in weight after being securely packed, to prevent breakage of the containers or leakage (see Sec. 106 and Sec. 107, page XX, Canada Postal Guide), should be sent by mail.

Specimens exceeding five pounds in weight should be sent by express.

J. G. RUTHERFORD,
Veterinary Director General.

Specimens should be addressed,
Biological Laboratory, Ottawa, Canada."

When material is forwarded by mail the Post Office regulations must be complied with, otherwise the authorities may confiscate and destroy the material at the first office, in which case we never receive the material nor is there a record of its disposition. When sent by express equal care should be observed in ascertaining the regulations of the Express company thus avoiding the delays through the omission of some slight detail. Special precautions must be taken when the specimen forwarded is presumably of an infectious nature.

The details of labeling the material forwarded and of accompanying information therewith should be faithfully observed that delays may be avoided in examinations and that a report may be promptly issued to the proper party.

PRESERVATION OF SPECIMENS.

There may be and doubtless are many veterinary surgeons and others reading this report who may desire to preserve some curious or rare specimen prior to transmittal or for purposes of their own. To secure the desired preservation there are many methods which may be followed and therefore, I will detail those which have been found of greatest assistance.

Alcohol.—Until recently alcohol was the only preservative generally used for this purpose which did not destroy the structure of the tissue or the staining qualities of the cells. It is largely used at the present time for special purposes but for general use has the disadvantage of being expensive and causing a loss of the natural colour, bleaching the entire tissue to an almost pure white. It is however of value where formaldehyde, cannot be obtained and should never be used in less than an eighty per cent solution.

Formaldehyde.—The introduction of formaldehyde has overcome many of the obstacles formerly encountered in the preservation of specimens for museum and other purposes. In watery solution it has taken first rank over any other method of procedure during the past few years. Its use is attended with many modifications each of which possesses some particular advantage for special purposes. Ordinarily it is used in a four per cent solution, which is prepared by adding one part of the commercial formaldehyde (40 per cent watery solution) to nine parts of water. Such a solution not only preserves the specimen but hardens it, rendering quite soft tissues very firm. The only objection to the solution for the general preservation of specimens for museum purposes is, that the tissues will show considerable bleaching, but, for material which is to be subsequently used for microscopic purposes it is very serviceable. Special modifications in the dilution with water and the addition of other chemical agents are used for special purposes.

Kaiserling's Method of Preserving Museum Specimens.—By following the procedure recommended by Kaiserling specimens are obtained which preserve their natural colours almost indefinitely provided they are not exposed where the light is too strong. The method of procedure is somewhat tedious, and requires the use of a number of solutions which are as follows:—

No. 1.—Potassium nitrate, 15 grammes; potassium acetate, 30 grammes; formaldehyde (40 per cent.), 200 cubic centimetres; water, 1,000 cubic centimetres.

Medium sized specimens are usually left in this solution for five days after which they are removed to the solution No. 2, which is an 80 per cent solution of alcohol, in which they remain for one to six hours. They are removed to 95 per cent alcohol for one to two hours to restore the colour which is somewhat affected in the fixing solution.

The final preservation is in solution No. 3 which is as follows:—

No. 3.—Acetate of potassium, 200 grammes; glycerine, 400 cubic centimetres; water, 2,000 cubic centimetres.

Unless the water available for the last solution is very clear it is better to use distilled water. This last solution is liable to contamination when no preservative is added, but the specimens as a rule contain sufficient formaldehyde or alcohol to prevent the growth of moulds or fungi. By this method the original colours are preserved in almost their original shades on placing the specimen in its final preservative fluid.

When the surface of the specimen has lost some of its natural colouring, due to prolonged exposure to light, the colours can be restored by placing in 95 per cent alcohol for variable length of time till the colour returns, or a thin slice may be cut from its surface exposing the unbleached tissue.

Heidenreich's method of Preserving Museum Specimens.—While it is necessary to use a very expensive solution in the preservation of museum specimens by Heidenreich's method, it is ultimately less expensive than the foregoing in that the technique is much simpler and the results are fully as effective. We are at present using this method in preference to any of the many methods for holding the colours on valuable museum material. The details are as follows: A stock solution, Holzlin, consisting of three parts of 40 per cent. formaldehyde and two parts of methyl alcohol is prepared. The solution is made by adding this holzlin to the following mixture:—

Holzlin, 70 cubic centimetres; glycerine, 700 cubic centimetres; water, 300 cubic centimetres; chloral hydrate, 150 to 200 grammes.

This is the only solution required and the specimens are placed directly in this fluid in which they will harden. There is no handling of specimens impregnated with chemicals which are dangerous to handle with the unprotected hands and much less time is required in the preparation of the material.

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In the placing of specimens in this or any other preservative great care should be exercised to prevent pressure on any part through the use of too small a container or by the weight of the specimen being so great as to flatten it on the bottom of the container, otherwise valuable material will be so distorted in shape and general appearance as to render it almost valueless for exhibition purposes.

A few specimens prepared according to Heidenreich's method have been exposed to bright daylight in the laboratory for varying periods up to three months without any apparent alteration in the colours. While this has been the case it is far safer to keep specimens either in subdued light or complete darkness. This method has an advantage over that of Kaiserling in that specimens preserved by it may subsequently be used for microscopic purposes, there being no marked alteration of the staining qualities. Unless we find some defect in this method not apparent at the present time we will continue its exclusive use for museum material.

As in the past we shall be very glad to receive material which is of value for museum purposes and due acknowledgement will be given to the individual forwarding the same in the labeling of specimens on the shelves of our museum. It will be a pleasure for us to show interested parties our museum which contains specimens illustrative of many of the features connected with the general work of the branch.

In a report on the work of the laboratory for the year just ended it is not our purpose to describe each individual specimen with which we have dealt, some, however, have been of more than passing interest, not only to laboratory workers but to the various inspectors attached to the Health of Animals Branch and to the individuals whose interests have been involved in the diagnoses rendered by us. It is, therefore, my intention to briefly describe such material and in some instances to reproduce photographs or drawings. These data are classified alphabetically as it has seemed the most appropriate for the purpose.

ABNORMALITIES.

A very interesting specimen of a bifurcation of the small intestine and its subsequent anastomosis was forwarded to the laboratory by Inspector T. M. Pine.

ACTINOMYCOSIS.

Three cases of this affection have come to our notice during the year. In two instances the differential diagnosis was established from *Actinobacillosis* by animal inoculation. In the other instance a positive identification from *Actinobacillosis* was impossible owing to the condition of the material on its receipt at the laboratory.

ANTHRAX.

Material has been examined from twenty-two suspected outbreaks, although we were able to positively identify the diseases in one instance only. The identified outbreak occurred at Collingwood, Ont., and there is a history of this disease having been manifest on this same farm two years previously. Another outbreak was investigated by Dr. Hadwen in the vicinity of St. Hyacinthe, Que.

Some difficulty is still experienced in the examination of material from suspected cases of this disease owing to the lack of care in taking material for microscopic examination. The instructions given in the circular should be followed very carefully if it is desired that we render the greatest possible assistance in diagnosing this affection.

BLACK-LEG.

Material from six suspected cases of Black-Leg has been dealt with, one with a positive finding, two were negative and three were doubtful. The general idea seems

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to prevail that infection in Black-Leg is similar to that of anthrax and that the blood is equally serviceable for diagnostic purposes in either case. This idea is correct to a certain degree, but the blood should be diluted with an equal amount of pure glycerine and forwarded in a small vial which must be properly sealed. The glycerine destroys the saprophytic non-spore bearing bacteria, but does not kill the spores of either Black-Leg or Anthrax. We, therefore, are able, when material is furnished as directed, to positively identify and differentiate between the two diseases by animal inoculation.

As a rule, the presence of gas beneath the skin covering the affected muscles together with the discoloured appearance of the muscles themselves and the fact that the blood clots after death are sufficient for a diagnosis in the field. When a confirmation of a clinical or post mortem diagnosis is desired, a few drops of the bloody serum from the affected muscles placed on a clean piece of note paper and allowed to dry in the air, furnishes sufficient material for examination.

CALCULI.

Two excellent specimens of biliary calculi have been received and are valuable additions to our museum. One is about an inch in diameter and was forwarded by Inspector H. E. Marshall from Hamilton, Ont., while the other is about two by three inches and was forwarded to us by Inspector Ransom of Peterboro, Ont.

CYSTICERCUS BOVIS.

An excellent specimen of this condition was forwarded by Inspector Fisher while he was stationed in Winnipeg, Man. Portions of the masseter muscles, pillars of the diaphragm, lymphatic glands, and the heart presented numbers of these encysted parasites. This is the only specimen of beef measles which has come to our notice during the existence of the laboratory.

CYSTICERCUS CELLULOSAE.

Three specimens of this condition have reached us, two from Toronto and one from Calgary. We have from this material been able to obtain a sufficient number of cysts for purposes of demonstration to interested parties when visiting the laboratory and also have a number of specimens for the shelves of our museum.

CYSTICERCUS TENUICOLLIS.

Three specimens of this condition have been received, the first having been forwarded by Inspector Fisher of Winnipeg and was taken from a sheep. The second was forwarded by Geo. W. Collison, M.D., Brinston Corners, Ont., and was also removed from a sheep. The third was forwarded by Inspector J. H. George who removed them from a hog and we were able to demonstrate a pyelo-nephritis involving the kidney as well as the cystic form of the parasite under consideration.

ECHINOCOCCI.

The first specimen of echinococci was forwarded to the laboratory by Inspector Marshall from Stratford, Ont., who reported that there were eighteen cysts in the liver. This specimen proved to be of the multilocular variety. The other specimen was furnished by Inspector Thompson of Collingwood and was of the polymorphous variety.

FATTY DEGENERATION.

Inspector Kellam of Montreal forwarded a portion of a carcass to the laboratory for us to determine the cause of a peculiar colouration of the muscle and strong odour which was present. Microscopically we found this tissue to be greatly de-

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generated and infiltrated with fat, in all probability a result of the food which the animal received for some time prior to its slaughter.

FLOATING KIDNEY.

A live sheep was brought to the laboratory in May for us to determine the trouble from which it was suffering, it having been decided that the animal was of no further value. There was a history of its having been handled the day previous for the purpose of shearing, after which it was noticed to be very unsteady on its legs. The sheep was destroyed and we found that both kidneys were floating in the abdominal cavity. There was considerable fluid contained in the abdomen and this was found to have been due to hemorrhage through the capsule of the kidneys. The hemorrhage was considered to have been the result of the twisting of the kidney upon itself occluding the renal vein and thereby increasing the blood pressure within the organ, a result of the handling during shearing.

GLANDERS.

A number of examinations of material from suspected cases of glanders have been made during the year, some of which were undertaken with a view of recovering the causative organisms for use in the manufacture of mallein. As our remarks upon mallein are more fully considered elsewhere in this report I will not consider the details in this connection at this point.

HOG CHOLERA.

There has been a marked decrease in the number of instances in which we have been called upon to determine the presence of the lesions of this disease in material forwarded for examination. We have received specimens from seven outbreaks only, two of which were positively identified as hog cholera.

LEUKAEMIA.

One suspected case of this disease in a hog was dealt with during the year. We were, however, unable to assist in its positive identification owing to the fact that some delay was experienced during the transit of this material from the packing house to the laboratory. An allied condition in the human being has been the subject of much study from laboratory workers and it would be interesting for us to avail ourselves of all material which may be obtained from similar cases in the lower animals. Apart from the examination of the spleen, the lymphatic system, and the medullary substance of bone, the kidneys and liver should be supplied for examination as they are at times involved. Perhaps the most important detail in a study of such cases is a careful examination of the blood, and to this end blood smears should be furnished in addition to the organs above mentioned.

NECROSIS.

Three forms of necrosis have been observed in material received,—cold necrosis in the hog, fat necrosis in an ox and osseous in material taken from a hog. In no case have we encountered a necrotic condition which could be ascribed to the bacillus necrophorus.

NEPHRITIS.

An opportunity has been afforded us to study a chronic interstitial nephritis in a hog where both kidneys were involved. The kidneys in question were supplied by Inspector Pine of London, Ont., and were taken from a hog presenting no other lesions as observed at post mortem inspection. There was no suspicion of such a change

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prior to the slaughter of this animal. This is the first time that such a condition has come under our observation although it has been quite frequently observed in material of human origin. The study of such a condition is interesting, not only from the bearing which it may have on the traffic in the lower animals which are utilized for food purposes, but also in the relationship which conditions in the lower animals bear to those of the human family.

OESOPHAGOSTOMA COLUMBIANUM.

We have received two good specimens of this affection during the year and these are now preserved and placed in our museum. One was taken from a sheep while the other was found in an ox. The principal economic importance of this nematode infestation is that the presence of the nodules induced by this parasite destroys the intestines for sausage casing purposes. Where the lesions are extensive there may be a marked anæmic condition observed in the host animal.

OILS.

During the early part of the year some experimental work was undertaken with various oils to determine the best method to combine them in an oil emulsion, and the effects which they produced when applied in varying strengths on cattle. That more satisfactory conclusions might be arrived at individuals of the experimental tubercular herd were sprayed with emulsions of various formulæ and with proprietary dips. We were able to gain much valuable information through these experiments and this information assisted greatly in advising the Inspectors directly concerned with the enforcement of the compulsory mange-dipping order. It may be well to point out in this connection that we do not observe similar results from such emulsions applied under the conditions existing in Eastern Canada as are observed when they are applied to cattle on the range where the conditions are so vastly different. A harmless preparation to eastern cattle might be followed with quite serious consequences when applied to cattle on the range.

PICTOU CATTLE DISEASE.

Our studies on this disease were confined almost exclusively to an examination of the tissues forwarded by Inspector Pethick, obtained from the various experimental animals under observation in the investigation of this disease. Material from one hundred and fourteen cases was examined and in the material from two of these cases we were able to detect positive evidence of the affection under consideration. No experiments have been conducted at the laboratory during the year with this disease.

PNEUMONIA.

Four cases in which the condition proved to be a pneumonia have been dealt with. One is of particular interest coming as it did from a horse which had been improperly drenched and was of mechanical origin.

PYAEMIA.

Material from a single case of this affection in a hog was forwarded to us in which the infectious agent, streptococcus pyogenes was isolated in pure culture.

RABIES.

We have been called upon to diagnose nine suspected cases of this disease during the year and four of these suspected cases have given positive evidence of its existence in the animal from which the material was obtained. Of our positive findings, one was received from Niagara Falls, Ont., one from Bridgeburg, Ont., one from Shoal

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Lake, Manitoba, and the other from Moosomin, Sask. In diagnosing this affection at this laboratory we have used the older method of animal inoculation exclusively for the confirmatory evidence, although we have also searched for the bodies of Negri. While the presence of the Negri bodies is considered an almost certain means of diagnosing this affection, we have preferred the older method as we have to deal with such a limited amount of material that it is necessary to be absolutely certain of our diagnosis in every instance. Then too, the examinations for the Negri bodies require considerable skill and constant practice on the part of the examiner. This constant practice is denied us from the fact, that we are called upon to diagnose but a very small number of cases each year.

We would particularly direct the attention to the method of taking, and forwarding material from suspected cases of this disease which appears in another portion of your report.

STRONGYLIDAE.

That these parasites are still causing considerable loss particularly to the hog industry, is indicated by the large number of lesions observed by some of the Inspectors stationed at slaughter houses. We have been called upon to diagnose the affection in but two instances in each of which the strongylidae were found. In one case the strongylus paradoxus was found in the lungs of a hog sent in from one of the packing houses for identification of the lesion which was reported as a very frequent one. In this instance the hogs originated from southwestern Ontario where we observed some years ago enormous numbers of these parasites in the lungs of hogs which had been slaughtered on account of having been affected with Hog Cholera. The other instance of finding strongylidæ was in the lungs of a sheep which were forwarded from Nova Scotia, where the owner had lost a number which he reported were similarly affected. In this instance we were able to identify the strongylus rufescens.

TRICHINOSIS.

This affection appears to exist to a very limited degree only, among Canadian hogs. We have observed its presence twice in material from three suspected cases. It is of very little economic importance when it is considered that thorough curing or cooking will destroy the life of the parasite. The detection of its presence is somewhat difficult and we have examined fully one fourth of a cubic inch of muscle taken from the pillars of the diaphragm without finding evidence of its presence and after this have been able to find an occasional parasite.

TUMORS.

Probably the most interesting feature of our work during the year has been the examination of various tumors which have been sent to the laboratory with a view to their accurate classification. We have received nine from the lower animals and a number from human beings. The tumors originating in the lower animals only, will receive our consideration at this time, as the material from the human subject has been largely received from local medical practitioners and hospitals, to confirm clinical diagnoses and to determine the advisability of operations, or the liability of certain new growths to reoccur after their removal.

Tumors from the lower animals have received very little attention and we shall be glad to receive available material that we may continue our studies, not only with a view of determining their relative frequency of occurrence, but also the frequency of certain forms in particular species and the bearing which this may have on tumor formation in the human subject.

CARCINOMA.

A tumor removed from the rumen of a bovine was forwarded to the laboratory by Inspector Ross of Winnipeg. This tumor which weighed 1800 grammes consisted of many lobules containing a jelly like substance. Microscopically the tumor was found to be a gelatinous carcinoma.

DERMOIDS.

A specimen received in February, consisting of small nodules in the parietal and visceral peritoneum, was detected by Inspector Evely and forwarded from Winnipeg. These nodules were found to contain hair, rudiments of teeth, skin and other structures which originate from the epiblast. The condition is a rare one and results from the embryonic inclusion of cells properly belonging to other portions of the system.

ENCHONDROMA.

A single specimen of this form of tumor, which is not uncommon in cattle was received from Chas. Haley, V.S., of Iroquois, Ont., and exhibited the usual structures. It was located on the sternum of a cow ten years of age.

ENDOTHELIOMA.

In one instance only have we observed this form of tumor, the material having been forwarded by Inspector Kellam of Montreal. The history of this case and the description of the lesions found at autopsy are described by him as follows:—

'The specimens sent are typical in appearance, but not in size and were taken from the peritoneum in the region of the upper flank, rumen, omentum and diaphragm. The animal was an aged cow, in fair condition, pregnant about the sixth month, and the abdomen was pendulous.

Post Mortem.—All organs in a healthy condition except the liver, spleen and peritoneum. The parietal portion of the peritoneum was literally covered with growths varying in size from a pea to that of a half bushel basket. Two of the growths were considerably larger than a half bushel basket. The smaller lesions were sessile, of a uniform white colour and firm in consistency. Those from the size of a pigeon's egg and larger, were cystic, pedunculated, having a strong fibrous capsule within which was a gelatinous substance, white or pale yellow, and in the centre there was a quantity of pale yellow fluid. The peritoneum covering the uterus, spleen, liver and intestines was also involved. The growths were not found on any membrane except the peritoneum, and there were sufficient of these growths to nearly fill a two bushel basket.'

This form of neoplasm is rare in bovines and we were very glad of the opportunity afforded for its minute examination.

SARCOMA.

Opportunity has been afforded to study sarcomatous lesions in the fish, ox and hog.

The fish sarcoma was observed in two pike forwarded to the laboratory by Inspector Fisher. Both fish had several large, irregular, rough looking white growths on their bodies and were in poor condition. They were caught in Mississippi lake near Carleton Place. Microscopically the growths exhibit the characteristics of a round celled sarcoma. They were evidently of rapid growth and as instanced by the large number of mitotic figures were decidedly malignant. Dr. Fisher reports that numbers of fish are caught each year exhibiting similar growths. These tumors are interesting, mainly from the fact that it establishes that this class of tumors can and do occur in cold blooded animals.

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The sarcoma of the ox which we studied occurred in the region of the hock, extending up the quarter to within a foot of the tail. The enlargements were subcutaneous, irregular in size and the portion examined was one centimetre thick ten centimetres long and five centimetres wide, of a yellowish colour and quite soft in consistency. On section, portions were found to be semi-gelatinous. Microscopically, numerous mitotic figures were to be observed and there were also degenerated areas containing a homogenous mass. A slight amount of fibrous tissue was present and many atypical cells were noted. The specimen was forwarded by Inspector Pine.

The hog sarcoma which we examined was forwarded by Inspector Walsh and was attached to the kidney. It weighed two hundred grammes, was of a pinkish colour, fairly firm and attached by a band to the base of the kidney. Microscopically it proved to be an adeno-sarcoma.

TUBERCULOSIS.

We have, as formerly, dealt with a large number of suspected cases of tuberculosis, and of those received during the year we have made nineteen positive identifications and in seventeen suspected cases have failed to find evidence of the characteristic lesions. The details connected with the examination of the above mentioned material is of general interest. In addition to the routine work with this disease we have isolated the causative organism from a number of cases retaining the cultures thus obtained for future study as time and opportunity permit.

WATER EXAMINATIONS.

We are occasionally called upon to examine water for an opinion as to its potability. Four such samples have been received, three of which were found on examination to be unfit for human drinking purposes. The remaining sample was sent in a container that had previously held medicinal agents and it was, therefore, impossible to arrive at a definite conclusion as to its potability.

WHITE DIARRHOEA OF YOUNG CHICKENS.

The subject of 'white diarrhœa' has received a great deal of attention from poultry raisers and scientific investigators in Canada and the United States within the past few years. It has cost each country an immense amount of money through the loss of chicks, and this at times when they were most needed by interested individuals to keep up certain strains, or to replenish the stock used for food or egg purposes. Unfortunately the term is a decidedly bad one, for, under this name it is quite evident that various observers are describing affections widely different from one another.

My first interest in this disease was a visit from Prof. Graham of Guelph, Mr. L. H. Baldwin of Deer Park, and Mr. Elford, Chief of the Poultry Division of this Department, during their investigations as members of a special commission appointed by the Ontario Agricultural College. During their visit to the laboratory we discussed the various phases of the subject and arrangements were made by which I was to examine material which they should send for investigation purposes from a poultry ranch within a short distance of Ottawa. As the manifestations of this affection at the ranch in question had ceased prior to their visit, chicks were not received, but, having become interested in the subject I at once took the necessary steps to secure the material required for purposes of investigation.

Very recently articles on the subject have been issued by Morse,* and by Rettger and Harvey.†

*Circular No. 128 Bureau of Animal Industry, Washington, D.C., 'White Diarrhœa of Chicks With Notes on Coccidiosis in Birds,' by Geo. Byron Morse, M.D., D.V.S.

†Journal of Medical Research. Vol. XVII No. 2, 1908. 'A Fatal Septicæmia in Young Chickens, or White Diarrhœa,' Rettger and Harvey

The conditions which these authors have studied seem to be quite different from each other and from the observations which I have made, and while the white diarrhoea is a manifestation in each instance, I have been unable to find the lesions or etiological agents which they record. Further, I have been unable to reproduce the condition by co-habitation, either with affected chicks or in an infected brooder. I have not seen the chronic lesions reported by Morse, nor have I observed the condition in older chicks as instanced by Morse or by Rettger and Harvey.

In all of the instances where I have observed the affection the manifestations appeared within the first week after hatching.

I make the above statements that there may be no mistaking the condition to which my remarks refer, as it is very evident that this common term has been used to designate a number of affections widely separated from an etiological standpoint. These variations in etiological factors are undoubtedly the source of much of the present chaotic state in which we find ourselves on the subject of white diarrhoea. It seems that investigators and poultrymen consider that the form of this manifestation with which they are familiar is the only one which occurs, and hence, any remedy which is efficacious in one instance will prove a panacea in all instances where this condition in any of its varied forms is dealt with.

That poultrymen should make this mistake is not to be wondered at, but, it is scarcely excusable for scientific workers to consider that the existence of white diarrhoea is due to but one etiological factor and we should at once endeavor, when advising poultrymen on the subject of this disease, to properly analyse their statements that we may acquaint them with the best means of preventing that form of disease accompanied by this manifestation, with which they are familiar.

In the study of this affection material has been used from three outbreaks and certain opinions have been formulated as to its cause in these particular instances. We have not developed the theory that it is due to an infectious agent for we have had conclusive evidence, in at least one instance, that it was not communicated to chickens which were purposely placed in a brooder containing a large number of chicks affected with the disease. No effort was made to disinfect, nor were any precautions taken which would tend to eliminate the disease from the brooder in question, had the affection been due to a specific infectious agent. The details of the theory which was formulated from these observations, has, I believe, been made public through the poultry press of Canada, but is deserving of a little fuller explanation at this time.

The experiment conducted at my suggestion, and the various steps taken, were closely observed from day to day. Strict care was exercised in the identification of the chickens by markings placed in the webs of their feet and every precaution was taken to prevent the possibility of an error occurring through a lack of system in our observations. The conclusion reached, is, that the 'white diarrhoea,' with which we are familiar, is due, not to an infective agent, but to a defective anatomical development prior to the emerging of the chick from the shell. I am, however, unable to offer an opinion as to the exact cause of this defective anatomical development but, it is a fact that the chicks which I have examined, dead of the so-called 'white diarrhoea,' have only a partial absorption of the yolk sac. Normally this yolk sac is wholly absorbed at the completion of the period of incubation, or within the first few days after the chicks emerge from the shell. Where this sac is not absorbed, 'white diarrhoea' is extremely liable to make its appearance soon after the chick commences to eat and the food fills the proventriculus, the gizzard and intestine. By the distention of the above named organs with food the yolk sac is mechanically pressed against the cloaca or posterior portion of the bowel, rendering the passage of feces to the vent impossible, and no relief being afforded the chick dies of stoppage. The 'white diarrhoea' is merely a coincidence occasioned by the fact that the ureters enter the cloaca from above and posterior to the point at which closure is caused by the pressure of the yolk sac, and there being no obstruction they are easily voided. The urates are white, and of semi-

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solid consistence, hence the name 'white diarrhœa.' That the condition referred to may not result from defective incubation or an inherent weakness in the parent stock is beyond our present knowledge.

I consider that it is non-infectious from the fact that during the experiment above referred to the affection was not communicated to newly hatched chicks placed with chicks which were dying as a result of this condition, and the circumstances were those which would assist in the propagation of a disease of an infectious nature. Chicks subsequently placed in this brooder were not troubled with the affection. Concerning the details of the affected chickens in this instance, they were hatched in an incubator, but nothing is known of their parent stock, &c., as they were shipped from a distance of 800 miles, arriving the third day after hatching.

From chicks dead of the so-called 'white diarrhœa,' I have obtained a variable bacterial flora, but it was impossible to associate any single organism with a series of cases.

If individuals observing this affection will make careful autopsies, they will undoubtedly be able to observe the conditions found at this laboratory in all cases examined to date.

The treatment of affected chicks offers little encouragement, as we are unable to reconstruct the defective anatomy of individual chicks. Pressure on the yolk sac, and by this pressure the removal of a certain amount of its fluid material may relieve the trouble, or even pressure, with a view of emptying the posterior portion of the bowel, is attended with variable results. These methods must be practiced with great care, otherwise the chick will be killed by manipulation.

In chicks which are found to have the yolk sac only partially absorbed when emerging from the shell, the retention of all food for at least four days may be a precautionary measure of some value.

BIOLOGICAL PRODUCTS.

Our routine work during the past year has been largely taken up in the preparation of biological products. Those with which we have been particularly concerned are anthrax vaccines, black-leg vaccine and tuberculin. The anthrax and black-leg vaccines were manufactured by us for the first time during the early part of the year, and we have obtained experience in this connection that cannot fail to be of immense service to the live stock interests of the country in the future.

Aside from the ability to prepare these products, there is the commercial gain to the live stock interests of the country which must be considered. A careful estimate of the cost of labour, supplies, &c., used in their manufacture, compared with the amount which would have to be paid to commercial houses for these products, indicates that there is a saving sufficient to very nearly compensate for the cost of conducting the whole work of the laboratory. The commercial feature, in this instance, however, should not alone be considered, for the direct control of the Health of Animals Branch over the preparation of a product where such interests are at stake as is the case in the testing of horses with mallein, should alone be a sufficient guarantee for a liberality far greater than has been necessary in the conduct of this institution.

MALLEIN.

We have disbursed 20,946 doses of mallein during the year on instructions received from your office. This is about one-third more than was disbursed during the same period of the previous year. With our new facilities, and the new methods which we have adopted in its preparation, there will be little difficulty in maintaining the supply required by the branch.

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A statement of the amounts disbursed each month is as follows:—

	1906-7.	1907-8.
April.	1,370	1,750
May.	702	1,600
June.	1,400	1,308
July.	1,645	2,205
August.	1,730	1,675
September.	1,786	1,150
October.	1,245	1,835
November.	598	1,895
December.	225	553
January.	712	2,090
February.	830	1,320
March.	2,060	3,565
Total.	14,303	20,946

It has been our experience that mallein is the most difficult of all the products which we have been called upon to prepare either experimentally or for general distribution. The care required in its preparation is great and the impossibility of following any hard and fast rule in its standardization increases the personal element in maintaining its potency. The experience which we are in possession of enables us to prepare a very uniform product, judged by the satisfactory results obtained by the various inspectors entrusted with its use.

TUBERCULIN.

There have been shipped from the laboratory, on instruction from your office, 5,934 doses. The product which we have disbursed has been of German origin. We have now a large amount of this material of our own manufacture at the laboratory, and can easily furnish the requisite amount required to meet the needs of the branch.

I append hereto a statement of the amounts as they have been disbursed monthly by month.

	1906-7.	1907-8.
April.	267	509
May.	349	848
June.	160	206
July.	184	257
August.	161	336
September.	254	583
October.	118	276
November.	423	565
December.	336	735
January.	589	562
February.	437	575
March.	152	482
Total.	3,430	5,934

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BLACK-LEG VACCINE.

We have forwarded from the laboratory, as directed by your office, 7,031 doses of black-leg vaccine and 115 outfits for its administration, during the year just ended. A detailed statement of the monthly disbursements is as follows:—

	1907-8.	
	Black-leg Vaccine.	Instruments for Application.
April.	250	4
May.	392	9
June.	554	3
July.	392	29
August.	254	9
September.	586	11
October.	998	11
November.	785	9
December.	1,560	12
January. . . . .	....	..
February.	270	5
March.	990	13
Total.	7,031	115

While it is but natural that we should encounter difficulties in the preparation of this product, we have learned much during the past year concerning the details of its preparation and have been able to design special appliances which have greatly reduced the labour connected with its manufacture. The circular which accompanies our disbursements of this vaccine is as follows:—

“Dominion of Canada—Department of Agriculture—Health of Animals Branch—Biological Laboratory.

Black-leg Vaccine.

Black-leg vaccine, properly used, affords protection or immunity to a subsequent artificial or natural infection. The vaccine for protecting cattle against black-leg prepared at this laboratory is dried on braided silk threads, and these braided silk threads are held by a special spring clip to the stopper of their sterile container. Black-leg vaccine is an attenuated or weakened virus prepared from virulent black-leg material. The process of attenuating or reducing the strength of this virus is confined to the laboratory, and cannot with safety be conducted elsewhere.

To protect or immunize an animal against black-leg we prepare a single vaccine, and protection or immunity is the result of the animal passing through a mild, properly graded attack of the disease, which, as a rule, causes no inconvenience to the patient, save a slight elevation in the temperature. During this mild attack of the disease it is advisable to take particular care of the animals, protecting them from inclement weather, extremes of heat or cold, &c. Protection or immunity is established in from twelve to twenty days after the administration of the vaccine. During this interval from the administration of the vaccine until immunity is established, vaccinated animals should be kept from grazing on infected pastures, and no hay from infected lands should be used for feeding.

Vaccine used on an animal already affected with black-leg will not protect such an animal, nor will it prevent its death. The use of black-leg vaccine during or immediately after the occurrence of an outbreak of black-leg may be followed by death, in some instances due to the stimulation of the black-leg germs already in the system

of the animal, and such accidents cannot be prevented. In the use of black-leg vaccine it is well to take the temperature immediately before inoculating and in the event of the temperature being elevated, vaccination should be deferred until the temperature of the animal is again normal.

EACH CONSTITUTES A SINGLE DOSE AND IS READY FOR USE AS SUPPLIED.

The threads should be handled with the needle only.

Method of application.—By using the vaccine prepared at the Biological Laboratory, together with the vaccinating outfit supplied by the department, the method of introducing the vaccine beneath the skin of the animal is very simple. (See special instructions for the use of the outfit.) The site of inoculation should be prepared by clipping away the hair and washing with alcohol or boiled water.

With the needle properly placed in the needle holder and the braided silk thread of impregnated vaccine on the needle, a fold of skin is grasped with the left hand, while the right forces the needle, carrying the braided silk through the skin until the silk is lost from sight, when the needle is immediately withdrawn and the impregnated silk is left behind.

The most convenient point for inoculating is behind the shoulder; however, any point where the thread may be introduced beneath the skin into the cellular tissue of the animal to be vaccinated is suitable.

Cattle over four years of age are not, as a rule, susceptible to the disease. Calves under six months are not fully immunized by vaccination, and if vaccinated prior to this age should be revaccinated in three months. It is preferable to use the vaccine in the spring before the animals are allowed access to infected areas, for at this time of the year they are usually less resistant to a natural infection than at other periods, and, unless vaccinated, they are more liable to a fatal infection.

In the manufacture of black-leg vaccine at the Biological Laboratory every possible precaution during its preparation and subsequent testing is taken, but the department can assume no responsibility for untoward effects following its use.

The price of black-leg vaccine is 5 cents per dose, a dose consisting of a single thread of vaccine.

The price of the vaccinating outfit is 50 cents.

Black-leg vaccine and vaccinating outfits may be procured by applying to the Veterinary Director General, Ottawa, Canada."

A NEW VACCINE PACKAGE.

After having successfully manufactured black-leg vaccine I was confronted with the problem of devising a suitable package for its disbursement. The older method of having it in powder form and the user preparing a solution of this powder in the field, was at once discarded as being too complicated, entailing too much detail work under very unfavourable conditions. After carefully examining the various existing devices used by commercial houses, each was discarded on account of defects which were very apparent. Consequently, I devised an entirely new scheme, briefly detailed in my report of last year on which some improvements have been made, and we now have a package to which scarcely an objection can be offered. The impregnated threads are attached by a spring clip to the cork of their sterile container and these threads are held with sufficient firmness to prevent their dropping out, yet, they can easily be removed with the special needle which I have designed for the administration of the vaccine prepared at this laboratory or in fact with any vaccine which is dried on a braided filament. The package is perfectly aseptic and is sealed at the laboratory when the vaccine is placed in it. In vaccinating the use of the special needle obviates the necessity of touching the impregnated threads with the fingers,

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or in fact, with anything but the needle, thus reducing to the minimum, the liability to contamination with foreign bacteria, dirt, &c., features which are not possessed by any other method in the administration of similar vaccine.

To protect this package and the needle for the administration of the vaccine, the necessary steps have been taken to have it patented in Canada, and it is my intention to assign the same to the Crown that the device may be preserved for the benefit of the live stock interests of the country.

The circular which accompanies the vaccinating outfit, which outfit can be used for either the anthrax or black-leg vaccines, is as follows:—

“DOMINION OF CANADA.

Department of Agriculture—Health of Animals Branch.

BIOLOGICAL LABORATORY.

Vaccinating Outfit for the Administration of Anthrax and Black-Leg Vaccines.

The Anthrax and Black-Leg Vaccines prepared at the Biological Laboratory are dried on Braided Silk Threads and require a special instrument for their administration.

The outfit consists of a handle and two inoculating needles. The handle of wood is hollow and the needles are placed in this recess for protection during shipment, and when they are not in actual use. The needle is of special construction with a bayonet point and a small hook about one half inch from the sharp end.

Method of Vaccination.

The Needle may be dipped in Alcohol before Vaccination and allowed to thoroughly dry before engaging a Thread of Vaccine. If disinfectants such as Carbolic Acid or Creolin are used on the needle, the Virus on the thread will be destroyed, in consequence of which the vaccination will be of no protective value to the animal.

The needle is placed in the holder, the ferule is screwed down tight to securely hold the needle and the outfit is ready for use. The stopper of the vaccine container—to which the vaccine is attached by means of a spring clip—is removed from the vial and reversed. The fine hook of the needle is passed through the braiding of the silk and by a slight pressure away from the spring clip, the thread of vaccine is removed from the clip and remains on the hook of the needle. With the thread of vaccine on the hook of the needle, the site of inoculation on the animal having been properly prepared, the skin is grasped with the free hand and the needle carrying the thread is forced under the skin parallel to the body of the patient. When the thread is lost from sight the needle is removed, leaving the vaccine beneath the skin and the process of vaccination is complete.

The price of the Vaccinating Outfit is fifty cents.

The price of Vaccinating Needles separate from the handle, is twenty-five cents for two.

The price of Anthrax Vaccine is five cents per dose.

The price of Black-Leg Vaccine is five cents per dose.

Vaccinating outfits and vaccines may be obtained by applying to the Veterinary Director General, Ottawa, Canada.”

ANTHRAX VACCINES.

There have been disbursed from the laboratory during the year just ended, as directed by your office, 483 doses of each of the first and second vaccines. A detailed monthly statement is as follows:—

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	1907-8.
April.	239
May.	17
June.
July.	98
August.	77
September.	5
October.	15
November.
December.	32
January. . . . .	..
February. . . . .	..
March. . . . .	..
Total.	483

In all instances these vaccines have been supplied in hermetically sealed tubes, the vaccine being a liquid culture of properly attenuated anthrax germs. Owing to the excessive amount of labour required in the preparation of the vaccine and the danger of improper handling by individuals using it, I conducted a series of experiments to determine the feasibility of drying this vaccine on specially prepared braided silk filaments. The experiments were satisfactory, and we were able to immunize sheep and calves against virulent anthrax, which killed control sheep in 52 hours. As there is less danger connected with the preparation, disbursing, shipping and use of dried vaccine, than is the case with the liquid vaccine, I have, with your approval, prepared sufficient vaccine for the demands of the year. The package used is similar to that in which we place our black-leg vaccine, with the difference that an amber vial is used as a container and the first vaccine bears a yellow label and seal, while the second vaccine has a green label and seal.

I believe that this preparation of dried anthrax vaccine is the first instance in which it has been prepared in this manner, and it is very gratifying to note that at least one commercial house is at present investigating and seriously considering the advisability of preparing their output in a similar manner.

The instrument for the administration of this vaccine is the same as for the administration of black-leg vaccine.

The following is a reprint of the circular which accompanies all disbursements of anthrax vaccine:—

*“Dominion of Canada—Department of Agriculture—Health of Animals Branch—
Biological Laboratory.*

Anthrax Vaccine.

Anthrax vaccines properly used, afford protection or immunity to a subsequent artificial or natural anthrax infection. The vaccines for protecting against anthrax prepared at this laboratory are dried on braided silk threads and these braided silk threads are held by a special spring clip to the stopper of their sterile container. Anthrax vaccines are attenuated or weakened cultures of the germ causing anthrax (*Bacillus anthracis*). The process of attenuating or reducing the strength of the germ is confined to the laboratory and cannot with safety be conducted elsewhere.

To protect or immunize an animal against anthrax, two vaccines are required and protection or immunity is the result of the animal passing through two mild, properly graded attacks of the disease, which, as a rule, cause no inconvenience to the patient save a slight elevation in temperature. During these two mild attacks of the disease it is advisable to take particular care of the animals, protecting them from inclement weather, extremes of heat or cold, &c.

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The first anthrax vaccine (yellow label), is a very weak virus and is only intended to protect against a subsequent administration, after the proper interval, (twelve days), of the second anthrax vaccine, (green label), which is a very much stronger virus and this in turn protects against virulent anthrax. Protection or immunity against anthrax is established in from twelve to twenty days after the administration of the second vaccine. During this interval, from the administration of the first vaccine until immunity is established in the vaccinated animals, they should be kept from grazing on infected pastures and no hay from infected lands should be used for feeding.

Vaccine used on an animal already affected with anthrax will not protect such an animal, nor will it prevent its death. The use of anthrax vaccine, during or immediately after the occurrence of an outbreak of anthrax, may be followed by death, in some instances due to the stimulation of the anthrax germ already in the system of the animal and such accidents cannot be prevented. In the use of anthrax vaccine it is well to take the temperature of the animal to be vaccinated immediately before inoculating and in the event of the temperature being elevated, vaccination should be deferred until the temperature of the animal is again normal.

Method of Vaccination.

By using the vaccine prepared at the Biological laboratory, together with the vaccinating outfit supplied by the department, the method of introducing the vaccine beneath the skin of the animal is very simple. (See circular with vaccinating outfit). The site of inoculation should be prepared by clipping away the hair and washing with alcohol or boiled water.

With the needle properly placed in the needle holder and the braided silk thread of impregnated vaccine on the needle, a fold of skin is grasped with the left hand while the right forces the needle carrying the braided silk through the skin until the silk is lost to sight when the needle is immediately withdrawn and the impregnated silk is left behind.

The most convenient points for inoculating are, the side of the neck in horses, behind the shoulder in cattle and behind the shoulder or the inside of the thigh in sheep. Any point where the thread can be introduced beneath the skin into the cellular tissue of the animal to be vaccinated is suitable.

Each thread of vaccine constitutes a single dose for the horse, cow, sheep and hog.

In the manufacture of anthrax vaccines at the Biological Laboratory, every possible precaution in their preparation and subsequent testing is taken, but the department can assume no responsibility for untoward effects following their use.

The price of anthrax vaccine is 5 cents per dose, a dose consisting of a thread each, of the first and second vaccines.

The price of the vaccinating outfit is 50 cents.

Anthrax vaccines and vaccinating outfits may be procured by applying to the Veterinary Director General, Ottawa, Canada."

While I have endeavoured to outline the various phases of our work and to describe certain special features which are of more than passing interest, there are many details connected with all of the work of the laboratory, which, if mentioned, would be uninteresting and add little of general value to my remarks on the various subjects which have been treated.

The greatest need of the laboratory at the present time is additional assistance which will afford a relief from the routine, thus enabling the devotion of a portion of the time to original research that we may more intelligently understand some of the peculiar phases manifested by some of the contagious diseases of animals.

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Without further remarks, I desire to acknowledge the great appreciation which you have manifested in the work of the laboratory, and also the interest taken from time to time in the development of its varied features.

I have the honour to be, sir,
Your obedient servant,

CHAS. H. HIGGINS,
Pathologist.

The Veterinary Director General,
Ottawa.

W. H. PETHICK, V.S.

GOVERNMENT EXPERIMENT STATION.

ANTIGONISH, N.S., March 31, 1908.

SIR,—I have the honour to submit a report of experiments conducted under your direction at this station particularly, of such as were completed recently. As this report may possibly be read by others, I beg liberty to make a few general remarks, which otherwise would be unnecessary.

Since the distribution of your special report, in which it is clearly shown that ragwort is the cause of Pictou cattle disease, renewed interest is taken in the matter, and farmers and others now realize that if cattle-raising is to be conducted with safety and profit, that ragwort must be exterminated. This may be accomplished without great difficulty on tillable land by a short rotation of crops and the usual weed-destroying implements. But the firm foothold the plant has obtained on the hill-sides, rocky pastures, among stumps and on waste land, where it is practically impossible to use hoe, plough or scythe, and from whence the seed is carried by the wind and distributed freely, renders the task anything but an easy one.

The hope that sheep might prove of valuable assistance in the work, and no doubt the commendable desire to gain information of interest from a scientific standpoint, led you to conduct a series of experiments, which form the subject of this report.

It is true that these animals have long been known as free eaters of ragwort and a great help in keeping it in check. But it was just as generally believed that the weed was injurious to sheep. By some it was thought to cause sickness and death as in cattle. By others it was believed to produce staining of the tissues, making the mutton unmarketable, and as we recall the loss and discouragements which attended the raising of cattle on ragwort-infested farms, we are not surprised that unless these and other questions were satisfactorily settled, that the farmers within the weed area would hesitate to stock up with sheep and await with interest the result of our work here.

It will be noticed that these experiments were conducted not only with a view of settling the two important questions referred to, but also to test several popular theories regarding the season and stage of growth of the plant when the harm is supposed to be done.

The many callers at the station agree that the farm upon which these experiments were conducted was very suitable. On it thirty-six head of cattle had died of Pictou Cattle Disease. It is traversed from end to end by a stream of pure water. The north portion of about fifty acres, was practically weed free. The centre of the farm was under hay and contained considerable ragwort in places, while the field towards the south was literally covered with the plant. It will thus be readily seen that by a suit-

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able arrangement of fences, we were able to confine sheep on weedy or weed free pasture as desired.

The experimental pens for winter feeding consisted of framed buildings well lighted and ventilated and divided into separate apartments, a door in each leading to separate paddocks enclosed by a suitable fence. Fresh running water was always within reach.

The sheep employed were the crosses usually met with in eastern Nova Scotia, long and short woolled breeds being about equally represented. All were marked 'E.R.' on the side and a plain figure gave the subdivision and pen to which the animals belonged, while other marks enabled us to decide as to the individual and rendered a mistaken identity impossible.

In order to avoid repetition when dealing with each experiment separately, I would state here that all our sheep suffered during December, 1905 and January, 1906, with contagious ophthalmia, and while nearly all made a rapid and complete recovery, a few aged ewes became much emaciated and died. Post mortem examinations showed that ragwort was in no way accountable. The places thus made vacant were filled by young sheep born on the premises.

We were most fortunate in meeting with very small loss by accident or ordinary causes.

Careful post mortem examinations were held on all animals dying from any cause and specimens forwarded to the biological laboratory for microscopic examination, thus removing any doubt that might exist, as to the cause of death.

EXPERIMENT NO. 1.

To ascertain the effect, if any, upon sheep of ragwort feeding during winter only (with dried plants), on December 1, 1905, ten healthy sheep were placed in a suitable pen at the new stable and fed three times daily upon ragwort hay such as is found upon cattle disease farms. Great care was taken to secure only such hay as contained an abundance of ragwort, and which, consequently, would be fatal to cattle, if fed thereon. All had good appetites and were particularly fond of ragwort. In fact they would pick it from among the common fodder plants, strip off the leaves and flowers refusing only the coarse stalks. Their health continued good. We thought, however, that the wool had lost some of its lustre. (It now seems that this condition was over-rated).

On May 24, 1906, these sheep with their lambs were turned upon fifty acres of weed free pasture. The continued bright and healthy during summer and on December 1 were again placed on the winter ration previously described. Nothing unusual was noticed in their behaviour. Their appetite for ragwort continued good and when turned out on May 21, 1907, to their weed free pasture, had, if anything, a better appearance than during the preceding fall. They did as well during the summer as could be expected. (The season was unfavourable). All were slaughtered under my inspection between November 1 and December 3, 1907.

Ante-mortem examination.—All had the appearance of health. Numbers one and six, being old, were thin, the others were in good marketable condition.

Post-mortem examination.—The organs were normal in every case. Flesh of good colour and firm. The pathologist reports that he examined the specimens forwarded, and that all were normal.

EXPERIMENT NO. 2.

To ascertain the effect, if any, upon sheep of ragwort feeding in summer only (while the plant was green), ten healthy sheep were kept from December 1, 1905, to May 24, 1906, in a suitable pen situate at a considerable distance from such as were

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occupied by sheep receiving ragwort. The hay fed three times daily to this lot, was similar in kind and quality to that fed in the preceding experiment, except that in this instance all ragwort plants had been carefully removed. As might be expected, all wintered well, and on May 24, they were turned into a field containing thirty-five acres where ragwort was growing abundantly. They were noticed to eat freely of the plant and were particularly fond of the young succulent leaves. By fall, they had somewhat improved in condition. On December 21, they were again stabled and fed as formerly on weed free hay, and while not gaining much in flesh, remained quite thrifty. They were returned to their weedy pasture on May 16. As they had so reduced the ragwort another weedy field of sixteen acres was taken in. Here, they remained, apparently in perfect health until slaughtered between November 15 and December 30, 1907.

Ante-mortem examination.—All bright and healthy. Three old sheep rather thin; remainder in good condition.

Post-mortem examination.—No evidence of disease. The pathologist reports all organs normal.

EXPERIMENT No. 3.

To ascertain the effect, if any, upon the health of sheep of ragwort feeding during the entire year, this lot of ten sheep were fed from December 1, 1905 to May 24, 1906 on ragwort hay, this being similar in every respect to that fed to pen No. 1. They were also kept with this lot (pen No. 1) at the new stable. These animals were also fond of the weed, eating it freely and thriving upon it. On May 24, they were turned to pasture on the weed infested land with pen No. 2. They gained somewhat in flesh during the summer and were penned again on December 1 and fed upon ragwort hay. Their health and appetite continued good. Their fondness for dry ragwort was very noticeable. On May 24, they were again turned to pasture on ragwort land, where they remained until slaughtered between November 15 and December 30, 1907.

Ante-mortem examination.—All apparently healthy. Two old ewes and one wether thin. The remainder in good flesh.

Post-mortem examination.—All organs healthy. Flesh normal in colour and firm. Pathologist reports no evidence of disease in specimens forwarded.

EXPERIMENT No. 4.

The opinion prevailed in certain sections that fat adult sheep only are susceptible to the injurious properties of ragwort. The following experiment, will, therefore, be interesting.

Four healthy well fed wethers reached the station on February 3, 1905, and were at once placed in a suitable pen not previously occupied. They were fed three times daily upon native hay, which contained a liberal admixture of ragwort. During the winter these animals were observed to eat freely of ragwort—in fact, seemed to prefer it to the ordinary hay. They continued in good health and condition. On May 24 they were sheared and turned into a four-acre field where ragwort was growing abundantly. By fall they had almost exterminated the plant. On December 1 they were returned to the pen and fed on very weedy hay until May 24, when they were again turned upon weed-infested land. Here they remained all summer, eating the ragwort with relish and without injury to themselves. On December 2 they were penned and fed as during the two preceding winters. We observed in January that the two older animals were losing flesh, and, although showing unmistakable evidence of old age, were bright and healthy. On May 26 they were again turned into weedy pasture, where they remained until slaughtered between November 24 and December 30, 1907.

Ante-mortem examination.—All bright and apparently healthy. Nos. 1 and 3 rather thin; 2 and 4 fat.

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Post-mortem examination.—All organs appeared normal. Flesh good colour and firm. Specimens of liver, spleen, kidney and lymph glands were examined by the pathologist, who reports that he finds no evidence of disease.

EXPERIMENT No. 5.

In order to control the preceding experiments, ten healthy sheep were fed during the winters of 1905-6, 1906-7, with pen No. 2 receiving the same kind and quality of hay, which, as it will be remembered, was absolutely free from ragwort. During the summers of 1906 and 1907, they were pastured with pen No. 1 on weed free land. Care was taken that these animals should not eat ragwort in any form. As might be expected, all remained healthy. They were slaughtered between November 16 and December 30, 1907.

Ante-mortem examination.—Three aged ewes rather thin. Remainder in good marketable condition.

Post-mortem examination revealed no evidence of disease. This was confirmed by the pathologist's report.

It is both interesting and significant that careful ante-mortem and post-mortem examinations failed to show any material difference between this lot and such as had lived more or less constantly upon ragwort. As this is a most important point, and in order that we might have the opinion of an expert and recognized authority, I requested Mr. A. G. Bailey, sheep buyer for the Maxwell Meat Company, a branch of Swift & Company, of Chicago, to compare the different subdivisions of pens, judging them from the standpoint of health and condition. The following is a copy of his letter:—

ANTIGONISH, N.S., Nov. 4, 1907.

'I have to-day visited the government experiment station at Cloverdale, and have looked over the sheep employed in the various experiments held there, with the view of ascertaining whether or not the continued feeding on ragwort, would produce sickness or death in these animals or in any way effect their value for market.

'Taking the flock as a whole, I would say that while a few sheep show unmistakable evidence of being old, all are strong and thrifty and none have the appearance of being sick.

'After judging the five experimental subdivisions and comparing each of these with a pen of ten sheep which have been kept altogether upon a weed-free ration, I cannot see that the ragwort has had any injurious effect upon their health, appearance or condition.

'(Sgd.) E. G. BAILEY,
'Swift Company, Chicago.'

EXPERIMENT No. 6.

The supposition that the ragwort seeds might be more potent than the leaves and flowering tops, led to the following test.

A quantity of ragwort cut while the plant was bearing ripe seed was mixed with an equal quantity of fine native hay which in addition to affording nourishment would hold such seeds as might shake out from the heads while feeding. Three healthy sheep, which had eaten ragwort during summer, three healthy sheep which had never eaten ragwort and three lambs from weed free pasture, were fed for forty-one days (December 1, 1906, to January 10, 1907) on the mixture mentioned above. They were observed to eat the seed heads and leaves of the ragwort with as much relish as they did the true grasses. No ill effects were observed, except a gradual loss of flesh, a condition which was fully expected in consequence of the bleached and innutritious ration. On January 10 our supply of seed heads was exhausted and the

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animals were then fed on ordinary ragwort hay. They were slaughtered between November 20 and December 30, 1907.

Ante-mortem examination.—All bright and healthy. The shearlings were in good condition; four aged sheep very thin. Two sheep in good condition.

Post-mortem examination.—All organs appeared healthy. Flesh of normal colour. Pathologist reports no evidence of disease.

EXPERIMENT No. 7.

To ascertain whether or not feeding upon ragwort causes staining of the flesh, and if so, at what stage does the discolouration begin. On June 17, 1905, five ewes with their lambs procured from outside the weed area were put in very weedy pasture. On August 1, lamb No. 1, was killed. Flesh normal. On September 1, lamb No. 2 was killed. Flesh normal. On November 1, lamb No. 3 was killed. Flesh normal. On December 1 the survivors were stabled and fed upon hay, which contained a large proportion of ragwort. On December 6, ewe No. 1, died (from accident). Flesh normal. On January 1, 1906, ewe No. 2 was killed. Flesh normal. March 19, ewe No. 3 was killed. Flesh normal. On April 20, ewe No. 4 was killed. Flesh normal. On July 14, ewe No. 5 was killed. Flesh normal.

It seems in place to state here that eleven lambs born in the early spring of 1906 were pastured on ragwort infested land, and when slaughtered for market during September were found to be in good condition and the flesh of normal colour. Regarding this phase of the subject, I would also say that Mr. E. G. Bailey, who has this summer purchased over three thousand lambs in Antigonish and Pictou counties, informs me that he has not heard a word of complaint from his butchers regarding the colour of the flesh, and when we realize that at least fifteen hundred of these lambs had pastured on ragwort infested land, it is at least significant, and confirms our opinion that lambs may be pastured on ragwort without depreciating their value for market.

There are unfortunately certain places throughout the weed area where conditions are particularly favourable to the vigorous growth of ragwort, such as amongst stumps in burnt land. In such places the hoe and scythe cannot be used to advantage. Pulling the weed up by hand seems an endless task, and one not readily undertaken by our farmers. Consequently, the weed grows in such places undisturbed, and year after year the seed is distributed by the wind over the surrounding fields. Therefore, the following experiment, conducted with a view of learning what dependence could be placed in sheep, under such conditions, is of much practical importance.

On May 25, 1907, I leased by your direction 110 acres of weed-infested land of the character above indicated. Sixty sheep were turned in as early as possible, but as there was some unavoidable delay in securing suitable animals, the ragwort plants had gained quite a start, and for a time we were very doubtful as to the outcome. By July 10 we were satisfied that the sheep had the mastery. In August, only a close observer would notice any ragwort. At no time did the sheep allow a plant within their reach to bloom. A few plants growing out of brush piles, and which the animals could not reach, were pulled by hand. Otherwise, the sheep cleared off this land unaided.

It is true that many plants will come again, both from root and from seed that may blow during winter. But the fact that sheep will reclaim the most weedy land has been clearly demonstrated, and to the satisfaction of many visitors who agree that this is a most valuable object lesson, settling as it does a point upon which there was much doubt.

As to the health of the animals engaged in this experiment, none had the appearance at any time of being sick. An aged ewe died on June 21 from accident; otherwise we had no loss. All the sheep have now been slaughtered under my inspection.

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The flesh was of good colour (no yellow carcasses). All organs were healthy to the naked eye. The pathologist reports that he found no evidence of ragwort disease in the specimens, which I forwarded to him from each animal.

The result of our experiments prove clearly that sheep may be employed without risk in the extermination of this plant. We would not, however, be warranted in assuming that these animals are absolutely immune to the effect of ragwort under all conditions, for we occasionally have reports of a few sheep dying upon certain farms, presumably from ragwort poisoning. Several theories are advanced as accounting for these deaths, which I may say occur during fall and early winter. First, that the frost causes some chemical change in the juices of the plant. Second, that the snow covers up the low-growing fodder plants and the sheep are compelled to subsist entirely upon the more hardy ragwort. Third, that the ragwort is not in any way accountable.

In the absence of experimental proof, I am inclined to favour the second theory as most reasonable, and as the preventive measures which will naturally present themselves will apply alike to all, I would advise that sheep be removed from ragwort-infested lands before the hard frosts set in or the snow covers up the true grasses. It certainly can do no good, but only harm to keep sheep out at pasture as late in the fall as is the practice on certain farms.

Our experiments with sheep as ragwort destroyers is certainly most encouraging. In this particular, they have exceeded our expectations. Our farm, once so weedy, and which for many years bore the undesirable distinction of 'a cattle disease farm,' is now weed free, and one upon which cattle-raising may be engaged in with safety and profit. And while this favourable change was brought about through the agency of sheep (and what they have done for us they will do for others); it must, however, be remembered that the experimental flock, which allowed one sheep for about two acres, was much larger than is usually pastured on the same acreage throughout the weed area. And while we admit that the influence of a few sheep will be noticed over a considerable tract of land, yet too much must not be expected from a small flock over a large territory.

The area of Antigonish county is 355,850 acres, while the number of sheep thereon is estimated at 24,886 (only one sheep to fourteen acres). It is scarcely necessary to say that the number is far too small to cope successfully with ragwort, particularly where it has a strong foothold.

It is generally admitted that the extermination of ragwort will increase the value of farms so reclaimed from twenty-five to seventy-five per cent, and, the fact that sheep will do the work effectively, should in itself be sufficient inducement to stock the land much more heavily with these animals. But, apart from the ragwort question, I cannot see why the flocks in eastern Nova Scotia, should not be greatly increased with profit, for it is difficult to imagine a country possessing more natural advantages for successful sheep raising.

EXPERIMENTS WITH GOATS.

(Extending over a period of two years).

Numbers one and two were fed during winter upon weed free hay and pastured on ragwort infested land.

Numbers three and four were fed upon ragwort hay and pastured on weed free land.

Numbers five and six were fed upon ragwort hay and pastured on ragwort infested land.

Numbers seven and eight were kept upon a weed free diet and controlled the experiment.

Towards the close of this experiment, numbers one and two were killed by accident. The others were slaughtered, under my inspection, on January 28, 1908. Post mortem examination gave no evidence of disease in any of the eight. The pathologist has found all organs healthy.

The results of our observations will not warrant us in recommending these animals as ragwort destroyers. In this particular they do not compare at all favourably with sheep. It is true that they seem able to eat the plant with impunity and remain perfectly healthy throughout the entire test. But they are small eaters of ragwort and very much prefer to feed upon browse. Strange to say, those of the common variety are more destructive to this weed, than are the Angoras.

You will be pleased to learn that the suggestions we have been able to offer from time to time as a result of our experimental work have been well received and acted upon with the result that cases of Pictou cattle disease are now few, as compared with former years. The majority of our farmers are, I believe, making an honest effort to exterminate the plant, and now, with the aid of sheep, they should certainly succeed. But this cannot be accomplished at once, so while the good work is going on it is important to know whether or not native hay, from which the ragwort plants have been removed as thoroughly as possible, may be fed with safety to cattle. The following experiment answers the question affirmatively.

Three healthy young cattle were fed twice daily from November 1, 1905 to May 30, 1906, on native hay, from which the ragwort had been removed as thoroughly as possible after the mowing machine. On May 30, they were turned to pasture till October 30, when they were stabled and fed as during the preceding winter. On June 1, 1907, they were again at pasture, where they remained all summer. These animals continued in perfect health during the entire test and when slaughtered in the fall, were in excellent condition. All organs were normal to the naked eye. The pathologist found no lesions of Pictou cattle disease in the specimens forwarded from each animal.

An experiment covering the same period in which three healthy young cattle were fed upon hay of the same kind, in fact part of the same field. But in this case, no attention was paid to the ragwort, which was permitted to go into the mow with the hay. These animals were also at pasture during the summer season. On July 16, 1906, animal number one died of Pictou Cattle Disease. On February 8, 1908, numbers two and three were slaughtered. These animals were rather thin. Microscopic examinations of the liver revealed characteristic lesions of Pictou Cattle Disease.

The foregoing experiments show clearly, that if ordinary care is exercised in removing the ragwort plants, then native hay may be fed to cattle without risk, while neglect or carelessness in picking the weed, will be surely followed by fatal results.

EXPERIMENTS WITH HORSES.

For many years, a peculiar and fatal disease affecting horses has been reported from the ragwort area, both in Nova Scotia and Prince Edward Island. Public opinion and circumstantial evidence pointed strongly to ragwort as the cause.

On January 1, 1906, I purchased, with your authority, a mare eight years old, which though disabled and of little value, was in good health. She was at once placed in a comfortable box stall and bedded with sawdust. Her constant ration consisted of dried ragwort chopped fine and mixed with a small quantity of native hay. Her appetite was good and during the first six weeks, she improved a little in condition. On June 1, 1906, she was turned to pasture, where she remained until October 5, when she was again stabled and fed as before stated. No change was noticed in her condition or behaviour until June 1, when she became uneasy. Her temperature, hitherto about one hundred and one, reached one hundred and three, with little change for

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some days. She now began to fail and look unthrifty. On June 23 her temperature fell suddenly to one hundred. Her appetite remained good until July 1, when it became variable and somewhat depraved. She was now losing flesh rapidly. At times she was dull then excitable. Pulse fast and hard; temperature and respiration about normal; bowels constipated.

As the symptoms became more violent she was, on July 6, turned into a small field, where she wandered aimlessly about, exhibiting certain symptoms, which I considered to be characteristic of the disease. The visible mucous membranes were pale, slightly yellow. The muscles, particularly of the face and neck seem rather rigid. Slight dropsical swelling in legs and belly. Occasionally seems in slight pain. Urine scanty and voided often. Walks with unsteady gait and if interrupted or turned sharply around would stagger and even fall. When standing quietly, the ears are kept alternately in motion, and a peculiar stamping with one hind foot (usually the left) is very characteristic. The foot is drawn up close to the body and returned to the ground with considerable violence. This action is usually repeated every three or four minutes. Temperature remained fairly normal, but respiration is laboured. Pulse quick and intermittent. All the symptoms became daily more aggravated. The dropsical swelling increased, appetite entirely gone. There was grinding of the teeth and an escape of sticky saliva from the mouth. After July 18 she was entirely indifferent to her surroundings; paid no attention to flies, but would stand for hours with her head pressed against a fence or other firm object. She died on July 22, being eighteen months and twenty-two days from beginning of experiment and fifty-two days from first symptom of sickness.

An autopsy was held immediately after death. Lungs and pleura normal. Pericardium contains about three ounces fluid. The abdominal cavity contains about three quarts dropsical effusion. The fat wherever situated, was soft and yellow. The mesenteric lymph glands are enlarged. The stomach and intestines show no change of importance. Kidneys are dark. Spleen slightly enlarged and soft. Liver normal in size and hard and showed morbid changes to the naked eye. Other organs and glands appear fairly normal.

Specimens from the liver, spleen, kidney and lymph glands together with pipettes and smearings from each were forwarded to the laboratory.

As you have the pathologist's report on the subject, further comment by me is uncalled for, except to admit the uncertainty regarding the true nature of the disease, which Dr. Higgins finds is not hepatic cirrhosis and is, consequently, a different disease to that produced in cattle by ragwort feeding.

While I do not wish to attach too much importance to the result of a single experiment, yet, when confirmed by careful observation of outside cases, I submit that the result is, at least, definite enough to carry conviction and to throw the strongest suspicion upon ragwort as being at the bottom of the trouble.

During the past season, I have inspected all shipments of live stock at the ports of Bayfield and Mulgrave. You will have noticed by my monthly reports that eight hundred and eighty-seven (887) cattle, thirty-two (32) horses, two hundred and eighty-four (284) sheep and one pig were shipped from Mulgrave, and one hundred and forty eight (148) cattle, seventeen (17) horses and thirty seven (37) sheep from Bayfield to St. Johns, Newfoundland.

In accordance with your instructions, I have from time to time visited different points in this Province, as well as in New Brunswick and Prince Edward Island, and am glad to state that the health of farm animals, during the past year, has been excellent. No contagious disease was discovered, although about the usual number of suspected cases, were reported and promptly investigated, of which I have given full particulars in my special reports, which were duly forwarded to you.

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In addition to my regular work, I have attended and taken part at a number of Farmers Meetings, as well as at the Short Course at the Agricultural College, Truro, N.S. and at the Dairy School at Sussex, N.B.

I have the honour to be, sir,
Your obedient servant.

W. H. PETHICK,
Inspector.

The Veterinary Director General,
Ottawa.

DEPARTMENT OF AGRICULTURE, ANIMALS QUARANTINE STATION.

BOX 477, LETHBRIDGE, ALBERTA, March 31, 1908.

SIR,—I have the honour to submit herewith the Annual Report of the Quarantine Station, Lethbridge, Alberta, for the year ending March 31, 1908.

The main work of the station has been an investigation into the disease of horses known as Dourine or *Maladie du Coit*. A fully detailed report under date of November 15, 1907, has recently been submitted to you, and I will therefore only briefly mention the results of the investigation, and the aim of the experimental work now in progress.

In the first place the identity of the disease has been fully established by the frequent finding of the infective agent, namely, the *trypanosoma equiperdum*, in affected mares, and, subsequently, by producing the disease in healthy equines by inoculation of this parasite, and by again isolating the trypanosomes from typical lesions of dourine in these experimentally infected animals.

For the purpose of gaining information as to the duration under favourable circumstances, and the mortality or percentages of recovery from the disease, a number of infected animals are being held under close observation. Evidence is accumulating in support of the belief that the disease is an extremely chronic and insidious one. The fatality is higher in stallions than in mares, every infected stallion that has been admitted to the quarantine station having succumbed to the disease, whereas a number of mares have returned to a condition of apparently perfect health. However, in some cases, and after lengthy periods, there have occurred relapses, recoveries must therefore be considered with great suspicion. Under such conditions diagnosis is often an extremely difficult task. A careful study of certain cases that have been under almost daily observation for a period of twelve months, convinces me that there are times when it is quite impossible to diagnose the malady on clinical grounds, and yet, even at such times, the infective trypanosomata have been demonstrated, and the animal is capable of propagating the disease. Efforts are being made to prepare a serum for test purposes, to assist in diagnosing these 'latent' conditions. Lastly, the medicinal treatment of dourine-affected animals is being attempted, experiments which are only commencing, and in which very little can be said at present. One of the remedies being tried in the administration of Atozyl, a drug from which very encouraging results are being obtained in the treatment of trypanosomiasis or sleeping sickness in man, a disease which in many respects bears a striking resemblance to dourine in equines. Very interesting in this connection is the fact, recently brought forward by Prof. Koch, that human trypanosomiasis may be transmitted by coitus. Koch, who has treated some 2,000 cases says, 'We have in Atoyl the specific drug for trypanosomiasis, as we have in quinine that for malaria,' and that sleeping sickness may be cured by Atozyl by a six months treatment. Sir Patrick Manson, however, points out that the limit of the duration of the infection in man is not yet

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known, and that it certainly may run a course of three or four years. We have similar evidence as to the duration of dourine, so that even if Atoxyl is proved to be a valuable remedy, it could scarcely ever be economically applied in the latter disease, the prolonged and expensive course of treatment under quarantine conditions, that would be necessary, prohibiting its use save, possibly, in the case of an exceptionally valuable animal. But should Atoxyl prove to possess a preventive action, then it might be extensively employed for the protection of breeding studs in dourine-infected districts.

LOCO-DISEASE.

On October 27, 1907, a carload of thirteen animals, six bovines and seven equines, all suspected of loco-poisoning, and showing distinct evidence of a chronic disease, were shipped to this station for investigation. These animals had been collected in the Tennessee Coulee and Livingstone ranges, Western Alberta. The removal of these animals to a district where Loco-disease is unknown, and where they could be hand fed and well cared for, would, it was thought, result in recovery for at least some of them. Up to the present time seven of the thirteen have succumbed, three of the remainder have made a markedly downward progress and are apparently in the final stages, and the other three, all bovines, are in about the same condition as on arrival, and may ultimately recover. In the study of these cases an interesting fact has been brought to light, namely, the extensive infection in all cases examined with the parasite *Sarcocystis*, a sporozoan parasite invading the musculature in a manner somewhat resembling that of the more familiar spiral nematode *Trichina*. As pointed out in a detailed study in sarcosporidiae separately submitted to you, this infection occurs probably as a sequel, in these cases, to loco-weed poisoning, the latter condition is being further investigated and will be reported upon at a later date. It is a pleasure to acknowledge my indebtedness to Dr. M. V. Gallivan, who has, whenever time permitted rendered much assistance at autopsies, in field-work, etc.

I have the honour to be, sir,
Your obedient servant,

A. WATSON,

To the Veterinary Director General, Ottawa, Ont.

SPECIAL REPORT ON LOCO POISONING.

REGINA, Sask., October 5th, 1907.

SIR.—I have the honour herewith to submit my report in connection with my recent visit to the Porcupine Hills, Alberta, whither I proceeded in accordance with your instructions, to inquire into the reported serious losses among stock ranging in the Tennessee Coulee, Jack O'Neil Coulee, Beaver Creek, Meadow Creek, Willow Creek, and Livingstone districts, and also to select a number of suitable cases showing characteristic symptoms of the disease under consideration, for removal to the Quarantine Station, at Lethbridge, in order that the disease might be closely studied under favourable conditions. I was fortunately able to arrange for Dr. Warnock to accompany me, and found that his knowledge of the various districts, and long experience with the prevailing conditions on the range, and also his close observance during the past few years, of the disease under investigation in its varied stages, was of the greatest possible assistance to me.

We proceeded first to the Tennessee Coulee district, where the losses in horses and cattle during recent years had evidently been the greatest, although the present season's mortality had not attained the high percentage of former ones.

The topographical lay of this district is one strongly conducive to healthy conditions, it is rolling in character, interspersed with numerous fast running streams, containing an abundance of clear water. The soil is of a light gravelly nature, and there are no depressions containing stagnant water, the natural fall of the country being well defined and continuous, making the sanitary aspect all that could be desired.

The vegetation, however, was not as prolific as in other districts visited, although the Loco Plant was very much in evidence everywhere and had been liberally eaten off wherever stock had access.

In the vicinity of Summerview we found on one premises four horses and five young cattle affected. The owner had only resided in the district three years, having come direct from Manitoba, bringing his stock with him. The year following his arrival some of his animals commenced exhibiting nervous symptoms, which gradually increased. His work horses, previously fearless, began to fight the halter and finally refused to have their heads handled, followed by apparent defective vision. Their gait attracted attention, upon coming to a small object in their path they would step unusually high, or endeavour to jump over it. The appearance of their eyes became unnatural, assuming a wild distant glare. One mare tied in her stall was found dead in the morning, after having battered the wall in front of her up to the ceiling with her front feet in an endeavour to climb up, and falling over the partition, which gave way, injured herself fatally.

At the time of our visit one two year old and one three year old colt were in an unthrifty condition, a portion of their winter coats were still visible, they were dull, sleepy, presenting a condition of malaise when undisturbed. Upon being approached they would trot away a short distance, with heads carried semi-erect, exhibiting a stilty, jerky, and uncertain gait. A lachrymal discharge was noticeable in both animals, which appeared to be simply an increased flow of that fluid. These colts were showing the same symptoms last summer, they were kept in during the winter and well fed, resulting in a marked improvement. Upon being turned out, however, the symptoms reappeared with increased severity in the course of five or six weeks.

Two mares, one seventeen, the other fourteen years, brought from Manitoba, after being in the district one year commenced to act strangely, exhibiting nervous movements, were unable to back, or did so with great difficulty. The symptoms disappeared to a certain extent during the winter months but returned during July and August, after the mares had been on pasture for a short time. At the date of our visit they were in very fair condition, lachrymation marked in both animals, salivation apparent, but not profuse, they moved in a slow careless manner and presented a similar appearance of the eyes as the colts above-mentioned. These mares were being worked with caution, the owner keeping them off the pasture as much as possible. Their condition, however, would suggest that if the exciting cause could be eliminated a complete recovery would be probable.

Four two year old heifers, one three year old, were also affected. Three of these appeared dull, while the other two were excitable, erratic, and nervous. They were all very much stunted, and in an unthrifty condition, showing decided lachrymation and salivation, prehension appeared difficult, grazing being accomplished in a slow grubbing manner, accompanied by marked rigors of the muscles of the head, neck and forequarters. Upon being approached suddenly they would trot away for a short distance, all exhibiting the same typical outline, the head carried semi-erect, arched spine, very similar to opisthotonos, while their gait was of a jerky, stumbling and uncertain nature. One of these animals presented a marked swelling in the submaxillary space, accompanied by a thickening of the inferior maxilla.

A stallion, kept for breeding purposes, does not show any symptoms of this disease, although he is continually coming in contact with affected animals, being also stabled with them. He has not, however, at any time been out on pasture.

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We found the loco plant growing plentifully on all sides and elicited the information that the owner had never seen a disease similar to the one affecting his stock before coming to this district. In his experience the stabling of affected animals resulted in the majority of cases in a decided abatement of the symptoms.

Proceeding along this coulee the loco-weed could be easily detected on all sides, noticing a live animal in the distance we drove up to it and found a two year old colt in an unthrifty condition, and of a dejected appearance. He gazed at us in a semi-crazed manner for a few moments, then suddenly trotted away exhibiting a similar gait to the other colts we had seen.

In conversation with an old resident we learned that he had been compelled to reduce his breeding stud, owing to the mortality he had experienced in his young stock, ranging from one to two years. He had resided in the district for twenty-five years but had not noticed this disease until six years ago, since when he had lost a very large percentage of his young stock, evidently from the same cause, as the symptoms and progress of the disease appeared in all of his cases to be similar. During the last winter this gentleman had stabled a number of his affected colts, with a resulting improvement in their condition when turned out in the spring. After a few months on the range, however, they rapidly fell back to their former condition. One ten year old mare with colt at foot died a few weeks ago, with identical symptoms of the disease affecting his younger animals. The colt which was being specially cared for by his neighbour, was presenting a very unthrifty appearance, he was sleepy, dull and erratic, and moved along in a slow careless and unsteady manner. Lachrymation was well marked, while a slight flow of saliva was dribbling from his mouth.

A stray mare showing characteristic symptoms, although not far advanced, was noticed among this man's horses. He has now only 80 head, and has lost during the past season 27 colts, aged from one to three years. The location of his premises are excellent, the water supply abundant, obtained from rapid running streams, while the drainage and sanitary outlook appear perfect. The soil is of a light gravelly nature, and the loco plant well distributed over the range.

Upon visiting another premises we found the owner had recently lost one mare, which had exhibited symptoms similar to those already described. He had also at the time of our visit one colt and one six-year old cow affected with this disease. We had not, however, the opportunity of seeing these animals, as they were out on the range, and approaching darkness preventing the possibility of finding them in sufficient time for examination purposes. The owner had not lost many animals during the last two seasons, but had been a heavy loser four of five years ago. He had found that affected stock improved in condition and that the symptoms abated when housed and fed, but that they returned again some weeks after the animals were let out on the range. In his experience young stock were most susceptible and cattle were affected almost as readily as horses, the symptoms appearing most pronounced during the months of July and August.

We proceeded to the premises of another resident in this vicinity and were informed by the owner that they had lost seven horses during the last few years, which they attributed to the disease prevalent on the range. They have never engaged in stock raising extensively, having given their attention to farming. One of their work mares was still showing some of the peculiar symptoms, although she had been stabled for some time and given careful attention. This animal at the time of purchase by her present owners had been working in a neighbouring town, and was gentle and fearless. After being out on the range, however, for a short time she developed pronounced nervous symptoms, and when first taken in could only be handled with considerable difficulty. She was at the time of our visit in good condition and appeared to be in perfect health while standing undisturbed. Upon being turned loose in the corral with the halter rope hanging, she immediately began to tremble, fixed her eyes upon it and became quite excited, and while endeavouring to

get away from it exhibited the same gait previously observed in other affected animals, but not to such a marked degree. We found no cattle on these premises but the owner stated that a neighbour had lost about forty head a few years ago, and that owing to continued losses was obliged to dispose of his remaining stock.

Upon arriving at the last premises visited along this coulee we found that the owner had lost fifty horses, and a number of cattle during the last few years, all of which exhibited similar symptoms before death. These animals had been grazing on a portion of the range where the soil was of a light nature. He removed his remaining animals, having detected that they were developing symptoms of a similar nature, to another portion of the range, where the soil was heavier and the loco plant not so abundant, with the result that the mortality among them was reduced considerably and the survivors have improved. His experience with this disease was that affected animals did not develop naturally, appeared to lose their senses, saw imperfectly, ran into fences constantly, remained in an unthrifty condition, and when nearing death would wander about in a circle, finally fall and die after a few convulsive kicks. A stallion owned by this gentleman, and kept constantly stabled on his premises, is quite healthy, and has not shown any symptoms at any time similar to those noticed in his other animals on the range. A number of his affected stock have been stabled each winter, and have shown marked improvement in the spring, upon being turned out, but a few weeks on the range have been sufficient to produce a return of the symptoms, which appear to become more pronounced during the midsummer months. One young mare showing decided symptoms last fall has been kept off the range, stabled and fed constantly since, which has resulted in a marked abatement of the symptoms. At the time of our visit it was with difficulty that anything abnormal could be detected. This animal had been visibly affected for two years.

Proceeding to Jack O'Neil Coulee we found on one premises two colts badly affected, the symptoms having developed a year ago. They were fed during the last winter on sheaf oats, and improved considerably, only, however, to return to their previous condition after a month on the range.

While in this vicinity we obtained the information that a resident a few years ago owned 400 head of cattle. After losing 150 of them, all of which developed similar symptoms, he disposed of the remaining apparently healthy animals and removed 80 affected one to the vicinity of Pincher Creek. These animals gradually improved and fattened, and were all finally sold for beef, not one of them dying after removal. They remained, however, small, undersized and stunted, no growth or development taking place.

A noticeable feature in this connection is the fact that no other animals became affected in the vicinity where these diseased animals were removed, although no precautions were taken, and they were allowed the freedom of the range. Dr. Warnock in his report on loco poisoning, two years ago, dealt fully with this outbreak, having had the opportunity of examining the animals and holding a few post-mortems.

A badly affected horse was shipped to Cranbrook, B.C., where he remained useless for two years, but gradually recovered and is working daily attached to a dray in that town.

Returning to the Tennessee Coulee in consultation with another resident we found that he had lost five horses during the last few years, after exhibiting similar symptoms to those described. They were brought in from Eastern Canada, two of them became visibly affected six weeks after arrival, dying a few weeks later, while the remaining three continued in an unthrifty and nervous state with erratic tendencies for eighteen months before succumbing. At the time of our visit a two year old was still showing some of the abnormal symptoms. This animal had been kept off the range for some time, and according to the owner's statement, with marked

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beneficial results. This gentleman informed us that the eastern horses had always been perfectly gentle, until a short time after being turned out, when they became dull, moved sluggishly, attempted to jump, or step unusually high over the smallest objects, and finally refused to be haltered, or have their heads handled. If this was persisted in they would strike, or rear, and fall backwards. These animals rapidly became reduced and remained so, and it was found impossible to handle the three, which lived for eighteen months, at any time during their illness without considerable danger.

We next visited the Livingstone range district where we found conditions very similar to those already described. The soil, however, varies; along the hill slopes it is of a clay consistency, while it appears to change to a lighter nature in the bottoms of the flats. The loco weed, although quite noticeable on some portions of the pastures, does not appear to be as general, or as widely distributed, as on other parts visited. The same excellent sanitary conditions, however, prevail.

An old resident informed us that he first noticed the disease among his stock one year ago, and has since lost six yearling colts, the character of their illness being strongly suggestive of the same exciting cause. He had at the time of our visit two two-year old colts evidently affected with the disease under consideration. They commenced to develop symptoms as yearlings, and upon the advice of Dr. Warnock, he put them into a pasture, which included 25 acres of oat stubble and 25 acres of green fall wheat. The change appeared to benefit them, although they still maintained the peculiar gait, and did not regain their usual vigour.

The colts which succumbed to this disease had been running in the same pasture as those of his neighbour, none of whose stock, however, have so far become affected, neither have any symptoms been detected in 150 cattle grazing under the same conditions.

The only difference between the pasturing of this gentleman's colts and those of his neighbour was that the former's were turned out earlier in the spring.

Proceeding a few miles to another premises the owner informed us that this disease had never affected any of his animals. Another neighbour, however, lost three young cattle, three colts, and one mature horse, all of them exhibiting similar symptoms during their illness, which coincided with those of other animals already described.

On arriving at another premises we found that the owner had no animals affected although he had lost last winter four two-year old cattle and two two-year old colts, evidently from the same cause. This was his first experience with this disease, the animals developing symptoms during the summer of 1906, all of them dying upon the advent of cold weather. The soil in this vicinity is noticeably of a heavier nature than in the Tennessee coulee, and the loco plant, while in evidence, is not by any means abundant.

Upon proceeding farther up the Livingstone range we elicited the information from two stock owners, who were in partnership, that nine of their yearling colts began to act strangely a year ago, followed by unthriftiness. They became sluggish in their actions, erratic, and nervous, and finally developed a jerky stumbling gait. Five of them died this spring, while the remaining four were disposed of. They have not detected any cases among their cattle, although they have 300 head grazing on the range. The loco plant was in evidence, but to a very limited extent.

Proceeding to a large range in this vicinity we interviewed the owner, who stated that they had lost a number of valuable colts this spring, some of them succumbing to attacks of Cerebro Spinal Meningitis, while others were the victims of Verminous Aneurisms. Two yearling colts, in which Aneurisms were suspected, were receiving special care and attention in the hospital corrals, their diet consisting of green feed and oats, while medicinally vermifuges were being administered daily. They were in a very fair condition, appeared dull, exhibited nervous symptoms on being approached, while their gait denoted inco-ordination to a certain extent.

The symptoms presented, although similar, were not as typical as the majority of cases witnessed in the other districts. These colts, however, were under far more favourable conditions, which would naturally have a mitigating effect upon the symptoms in a disease of a sub-acute nature.

After a drive of eight miles up the range we came to a special enclosed portion known as the calf pasture. The grass was very luxuriant, and the local sanitary conditions excellent, the latter features being all that could be desired on any part of the ranch visited by us. One three-year old colt and one two-year old were kept in this pasture, in addition to a number of other animals. They were suspected of being affected with Chronic Cerebro Spinal Meningitis. Their illness was ushered in with an attack of irregular strangles, but upon recovery from this malady nervous symptoms developed, accompanied by unthriftiness, great excitability upon being handled, finally becoming unmanageable. When trotting their gait was of a stilty, jerky character, one of them showing a stringhalt tendency. Lachrymation and salivation were not visible in these animals, although the other symptoms had many aspects similar to those noticed in affected stock in other districts. The owner stated that he had not experienced any unusual disease among his cattle, and that they had no cases of the diseases prevalent on the range in his herd. On returning along the range, however, we noticed a three year-old black steer, within the limits of the ranch, showing the characteristic symptoms observed in the affected cattle on the Tennessee Coulee. This animal was in a very unthrifty condition, arched back, exhibiting nervous symptoms when approached, careless, stumbling and erratic gait, wild glaring appearance of the eyes, lachrymation and salivation marked. It is therefore evident that the main disease does occur among the cattle on this ranch, although possibly not to a serious extent, otherwise the owner's attention would have been directed to it. In conversation with him regarding the strong suggestive features pointing to the loco plant, as the exciting cause of the mortality among stock in the districts visited, he was strongly inclined to believe that the plant in question was not of a poisonous nature, and that the conditions existing outside of this ranch were probably of a different nature to those found thereon.

Specimens obtained from two yearlings were shown us, consisting of Aneurisms of the Posterior Aorta, Anterior Mesenteric and Renal arteries, as also a section of a kidney containing sclerostomes. These were well marked cases, the thrombi formed, owing to the irritation of those parasites, almost occluding the arteries.

I am quite satisfied, however, from symptoms observed in the affected animals in the other districts visited, that the exciting cause is not a parasitic infection. Conditions resulting from the causative agent would naturally lower the resistance of the individual, and explain the seriousness of such parasitic infestations.

On the next premises visited we examined a three year old filly, which had been running on the range in the Tennessee Coulee district from a yearling, and developed abnormal symptoms during last winter. In the month of July the owner brought her to Macleod and has since given her the very best care and attention. At the time of our visit she was in very fair condition, a portion of her winter coat was still in evidence, there was a slight edematous swelling on the inferior portion of the abdomen, lachrymation and salivation quite visible, the glaring appearance of the eyes noticeable, while her gait was uncertain and erratic. Her demeanour was of a nervous excitable nature, and although her appetite was good she exhibited difficulty in prehension. A marked improvement had taken place since she was removed from the range, Dr. Warnock especially noticing the improvement since his last visit. The mother of the colt in question had also pastured in the same district but had not developed similar symptoms, neither have any of this gentleman's horses at Macleod, which have been in contact with this colt but have not been on the range, developed any symptoms of an abnormal nature.

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Leaving this district we proceeded to Meadow Creek and on the first premises visited we found three yearlings and two two year old colts showing symptoms of the same disease, and learned that the owner had lost one three year old affected in the same manner. These colts, after having been wintered, were let out on to the range, the abnormal symptoms being first detected during the month of July last. At the time of our visit the two year olds were being kept in close proximity to the stables and were receiving special attention. They were in fair condition, showing signs of unthriftiness, slight lachrymation, and presented to a less marked degree the staring glare noticed in the eyes of other affected animals. They were dull and sleepy, changing to excitement upon being approached. Previously gentle, they were now difficult to handle, and moved in a careless stumbling manner. Although this gentleman has 100 head of cattle, he has not so far detected any abnormal symptoms among them.

We found the sanitary conditions excellent, the soil not as light in nature as in other districts coming under our observation, and the loco plant growing on the hillsides to a limited extent, appearing, however, to be smaller and of younger growth.

Calling upon another resident of this district we found that he had one two-year old and one yearling calf affected; they had presented peculiar symptoms shortly after weaning. While grazing, prehension appeared difficult, the animals nipping off the grass in a slow grubbing manner, this act being accompanied by rigors of the muscles of the head, neck, and forequarters. They were undersized, one in very fair condition, the other very unthrifty, the nervous condition apparent in other animals was almost lacking, while the gait was not at all characteristic. The owner informed us that he had lost eight two year-old cattle last fall, and that at the commencement of their illness the symptoms were similar to those exhibited by the animals at present affected. As the disease advanced they became very dull and sleepy, changing rapidly into an excitable state upon being approached. In some of them he noticed a swollen condition of the head, especially of the lower jaw. They developed a peculiar gait, which he could not describe, and fell frequently.

The loco plant is found growing in this district and is well distributed especially along the hillsides.

The last premises visited are divided by Willow Creek, a rapid flowing stream containing an abundance of clear water; the range running west terminates along the Poreupine Hills, while easterly it changes into a farming country. The loco weed grows profusely along the Poreupines, but has not yet been detected east of the creek. The owner informed us that he had lost sixty head of horses, as well as a number of cattle, during the last two seasons. He had not noticed this disease until they commenced to pasture their stock west of the creek. He has at the present time a number of colts and cattle affected, all exhibiting the following symptoms, varying in intensity, defective vision, unthriftiness, peculiar slow gait, lachrymation, salivation, and a wild glaring appearance of the eyes. The mortality among his stock has been largely due to the affected animals walking over the cliffs and falling into the creek below, thereby fatally injuring themselves.

One six year old cow was at the time of our visit, commencing to develop symptoms similar to those of his other affected stock, the wild glaring appearance of the eye was quite noticeable, her condition was not one denoting vigour, and her movements were sluggish, unless disturbed, when they changed to those of a quick, unsteady, jerky nature. The owner appeared very familiar with this disease and stated that in his experience all affected animals had ranged on the west side of the creek, and that he had never heard of stock developing similar symptoms that had not at some time grazed on the Poreupine slopes. He has also observed that animals turned out in the spring rarely developed abnormal conditions before the months of July and August, while those turned out during the month of July rapidly became visibly affected, frequently exhibiting symptoms of a more pronounced character than many of those grazing on the same pasture from early spring. He is endeavouring to keep

his animals on the eastern side, and is of the opinion that if he is successful his losses will be partially, or completely reduced. There is no doubt that the disease under consideration has caused considerable losses in the districts visited, and, as is generally the case, where a distinct malady predominates, has also been unjustly blamed for many fatalities resulting from ordinary ailments to which stock are heir. It would appear, however, from information gathered that there is a decided decrease in the number of affected animals during the present year. This can possibly be accounted for by the past unusually severe winter claiming as its victims a large percentage of affected animals, in preference to those whose constitutions had not been undermined.

The disease under consideration, however, from the constant similarity and uniformity of the symptoms observed by us, must necessarily under ordinary conditions be classed as a distinctive one, attributable to a definite exciting cause. The fact, however, that animals of all ages, including horses and cattle of varied constitutions, continually in contact with affected ones, kept under certain limitations, do not contract this disease under any circumstances, together with the endemic tendency of these outbreaks, constricted as they are to definite areas, makes the possibility of a contagium as the exciting cause most remote, and can therefore, I think, be safely eliminated from further serious attention.

Ever since this disease has been recognized, it has been a common practice for individuals living in districts where the malady was unknown, to purchase at nominal figures affected animals, removing them to such districts where they either recovered, or died, without in any instance establishing this disease, and extending the limits of the already defined area. There is no doubt that parasitic infestations do occur, a fact which has long been recognized, in prairie fed and range animals. Stock reared under such conditions are seldom found free from some of their species. It is difficult to conceive, however, how such disastrous results could be produced by them in a country where the existing conditions are totally at variance to their vitality, if such causes were deserving of serious consideration. Neither was the uniform chain of symptoms witnessed by us, in all affected animals, suggestive of abnormalities resulting from the invasion of such parasites. It would also be impossible to satisfactorily explain the phenomena persistently apparent when badly affected animals of both species are removed from certain limited districts and allowed their freedom on other portions of the range, or housed, and fed on ordinary fodders without any medicinal treatment.

A very striking feature noticed was the fact that the Loco weed was in evidence everywhere where affected animals had grazed, and that its growth was most profuse in districts where the greatest mortalities had occurred. The disease appeared to exist in proportion to the growth of this plant. In vicinities where the Loco weed was apparently of young growth and sparsely scattered the young colts appeared to be the only animals visibly affected, while in districts where this weed flourished abundantly mature animals of the equine and bovine species were exhibiting characteristic symptoms, with a serious percentage of mortalities. Unfortunately the grazing of sheep is prohibited on the range in the districts visited, and we were therefore unable to obtain any data regarding them. There is no doubt, however, that some animals, whether or not due to abnormal desires, do pick out and eat this plant, as was evidenced in several instances in pastures where the vegetation was of luxurious growth, and the weed very limited, the latter having been eaten off so systematically that it was with difficulty an undisturbed plant was found.

Hay cut in July or August on the range, containing the Loco weed in abundance and fed to stock in the winter months, has resulted in a number of the animals developing the same symptoms as those detected in stock grazing on the range, while those fed on cultivated fodders, or upon hay obtained where this weed has not been detected, do not become affected.

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After carefully considering the evidence, the indications point most strongly to the cause of this malady being one of a dietetic origin. The symptoms produced in affected animals, accompanied by their tendency to fluctuate according to the choice of pastures, and fodders, denote the ingestion of a toxic principle contained therein, which apparently exerts its influence directly upon the nervous system, in ratio to the amount consumed and the regularity with which it is taken. The persistent presence of the loco plant, where the disease exist, and its total absence where this malady is unknown, together with its unfavourable history, point most strongly to this plant as being the exciting cause of the disease witnessed by us in the Tennessee Coulee, Jack O'Neil Coulee, Beaver Creek, Meadow Creek, Willow Creek and Livingstone districts, and which had been diagnosed by Dr. Warnock some years ago, along the Porcupine slopes, as loco poisoning, and reported upon by him.

The remedial treatment from present appearances resolves itself into one of removal, either of the plant, an apparently impossible task, or of the animals from the districts in which it flourishes. A number of affected animals were selected in accordance with your instructions for experimental purposes, and arrangements made for their collection and shipment to the Lethbridge Quarantine Station. A great deal of difficulty will, I am satisfied be experienced, however, in their removal. It is almost impossible to handle or drive them, due to their excitable tendencies and erratic nature. We fortunately secured the services of a man who had lost a large number of animals with this disease, and therefore one quite familiar with the peculiarities, to take charge of their collection and removal to Pincher Creek for shipment.

A list and description of each animal will be forwarded immediately they are shipped, as it is most probable a number of those selected will become unmanageable and their removal abandoned.

I have the honour to be, sir,
Your obedient servant,

GEORGE HILTON,
Inspector.

The Veterinary Director General,
Health of Animals Branch,
Ottawa, Ont.

T. BOWHILL, F.R.C.V.S.

VANCOUVER, March 31, 1908.

RED WATER INVESTIGATIONS IN BRITISH COLUMBIA.

SIR,—In my preliminary report forwarded December 9th, 1907, I drew your attention to the occurrence of a species of *Piroplasma* infection of the erythrocytes of the blood of animals suffering from the so-called Red Water disease, prevalent in certain portions of this Province. I also informed you of the discovery of some ticks belonging to the Genus *Rhipicephalus* some of the female ticks, obtained on that occasion are still alive and commenced ovipositing on the 18th of February, 1908.

I visited Chilliwack and Mount Lehman. At the former place, I saw several well marked chronic cases of Red-Water; blood smears were obtained and examined on my return to Vancouver, only a few parasites were present. It was only after a prolonged examination, that I was able to demonstrate the presence of a few piroplasmata, a twin parasite was rarely observed and this fact also applies to the examinations previously conducted. In many instances, the number of parasites observed averaged

6-8 per smear and many of them were extra-corpuseular, others were dimorphic, while some were disintegrated and exhibited no distinct karyosome staining. Both of the cases examined at one farm, 7 miles from Chilliwack, were of long standing, one of the cows had been infected at intervals during the past three years, no history of ticks ever having been found on these cattle could be elicited but ticks were stated to have been observed on the rabbits. At Mount Lehman, I visited another farm, and with the kindly assistance of the Local Farmer's Institute, one of the owner's cows was purchased and slaughtered. I was extremely anxious to obtain a post-mortem examination, consequently, the offer of the above cow, a chronic case was taken advantage of, in order to determine if possible the nature of the lesions peculiar to this disease and at the same time note the comparative differences if any, to allied diseases in other countries.

The subject was 8 years old and had had 3 attacks of Red-Water extending over a period of three years, the animal being attacked in the Fall and Winter and was apparently healthy during the Summer months. On examination, previous to slaughter the following clinical symptoms were noted—marked hæmaturia, general marasmus, severe muscular tremors, especially in the posterior region and flanks, visible mucosæ and hairless spots exhibited a distinct hæmaphæic icterus, a small swelling was also present in the parotidæan region close to the angle of the mandible. The cow was shot and on removal of the skin the carcass was observed to be very emaciated, the subcutaneous fat and tissues icteric, the blood was very red and watery, coagulated quickly and the serum was distinctly hæmoglobinæmic. The swelling in the parotidæan region also involved the periosteum of the mandible and was caused by Actinomycoitic infection. The lungs were practically normal, only a few pigmentary spots being observed and a small lesion of hæmostatic pneumonia. The walls of the heart were very thin and a few petechiæ were present on the ventricular endocardium. The liver was slightly enlarged, fatty and engorgement of the gall capillaries was well marked in the portions of the organ contiguous to the gall bladder, the latter contained a quantity of dark green coloured bile, thicker than normal but not inspissated. The stomach did not show any marked lesion but the mucosa of the Abomasum was slightly hyperæmic, no ulcerations were present. The mucosa of the entire intestinal tract was markedly anæmic, the Duodenum, in the region of the Ductus Choledochus was slightly bile stained. Spleen slightly enlarged and indurated, the capsule being thickened, blood vessels swollen, cut surface dark purplish-colour, trabeculæ also thickened. The Suprarenal capsules were slightly enlarged. The kidneys were slightly enlarged, firmer to the touch than normal, capsule slightly adherent, a number of cysts were present on the margin of the cortex, about the size of a small pea, they contained a yellowish-brown viscid fluid, there was no trace of hydatids on section, the cut surface presented a reddish brick colour, no pus was present in the pelvis and no blood clot, although the lining membranes of the pelvis were swollen and studded with hæmorrhagic centres. The bladder was full of claret wine coloured urine, mucosa swollen, congested, in rugæ and studded with numerous ecchymotic hæmorrhages. Studded here and there, but most pronounced at the openings of the ureters were several fibropapillomatous growths. A few of the Mesenteric lymph-glands were enlarged, the parenchyma, being of a brownish-red colour (but not juicy.) The above are the principal lesions observed, the other parts of the carcass were anæmic.

BLOOD EXAMINATION.

Smears were prepared from the blood, kidneys, liver, heart and spleen, fixed and stained on my return to Vancouver. On examining one of the smears prepared from the peripheral circulation, I was astonished to find a large flagellate body belonging to the Trypanosomidæ. I am uncertain to which genus it belongs as in this research, I was not looking for Trypanosomidæ, consequently, the technique usually adopted in such research was not observed. I believe this is the first instance in North America,

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where this type of parasite has been found in cattle. This flagellate may be the cause of considerable loss and presuming, that it has been recently introduced, or even that it is indigenous to the Fraser River Valley, I would draw your attention to the danger of neglecting the determination of what species of blood sucking Diptera or Anophelinae may be responsible for the spread of this parasite. In dealing with double flagellated trypanoplasma, Prowazek, considered that in the course of phylogenesis sometimes one pole or the other has been suppressed. Schaudinn, expressed the opinion that the flagellate *Herpetomonas muscæ domesticæ* could be traced to a doubly flagellated trypanoplasma. These observations and results of other investigators point to the importance of tracing, if possible, the origin of the flagellate body I discovered in the blood of Mr. Turner's cow at Mount Lehman.

In the blood smears, also the smears prepared from the heart, kidneys and the spleen, a few piroplasmata were observed, the most were present in the kidney smears—the piroplasmata were mostly amœboid forms, a few dividing forms and flagellated parasites were also observed. The erythrocytes exhibited a distinct poikilocytosis and in the smears prepared from the peripheral circulation, polychromatophilia of the erythrocytes was well marked—

PATHOLOGICAL ANATOMY.

The following is the result of the microscopical examination of the principal lesions observed in the cow slaughtered at Mount Lehman. Pieces of the organs and the tissue were hardened and sections cut and stained—*Spleen*—the spaces contained less cells than normal and many of the leucocytes and endothelial cells contained a red pigment—some of the malpighian bodies exhibited more or less fibrillated tissue and the trabeculæ were hypertrophied,

Kidneys.—The changes were those of a well marked chronic parenchymatous nephritis; pigmentary deposits were present in the stroma and the cysts on the surface of the cortex were probably due to the obstruction of the tubules, caused either by the inflammatory changes in the parenchyma or pigmentary deposits—the walls of the cavity of the cysts were lined with flattened epithelial cells—considerable interstitial infiltration was also present.

Bladder.—Sections of the wall of this organ showed the presence of well marked subepithelial hæmorrhages, while the growths on the mucosa, especially those at the entrance of the ureters were found to resemble vascular papillomatous fibromata, an extravasation of blood was present in the center of the growths and associated with this were marked pigmentary deposits, probably due to hæmosiderosis. A bacterial invasion was also observed, associated with the subepithelial hæmorrhages, the cocci being arranged in zooglea—these organisms are probably associated with a terminal infection or a contamination from without—the recurrence of the disease and altered condition of the urine injuring the mucosa of the bladder and thus forming a suitable nidus for a bacterial growth, as well as favouring the extension of infection by way of the uro-genital tract, owing to the albuminous condition of the urine causing a contamination of the vagina and external labia. The valves at the oblique entrance of the ureters at the postero-superior portion of the bladder were thickened and continuous with the largest of the above described vascular papillomatous fibromata.

Lymph-Glands.—Sections were examined from one of the enlarged mesenteric glands—the endothelial lining of the lymph spaces, as well as the follicular cords were disintegrated—there was a well marked extravasation of blood cells in and around the blood vessels contiguous to the interfollicular cords. The connective tissue of the trabeculæ was slightly hypertrophied and fibrillated tissue containing pigment occurred in portions of the stroma. This concludes the pathological changes I have observed in the principal lesions present in the cow slaughtered at Mount Lehman. The animal was a marked instance of a mixed infection viz.—Actinomycotic, Trypanosomidæ and Piroplasmata infection, associated with a bacterial inva-

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sion of the submucosa of the bladder. It is self evident that this subject although afflicted with typical chronic Red Water as it occurs in this province, was far from being a satisfactory case to determine the typical lesions peculiar to this type of Red Water. It is very insidious and where hæmaturia is absent, can be overlooked and owing to climatic conditions serious epidemics do not occur—on the other hand, the cold prevalent in British Columbia within a radius of about 100 miles from the coast does not appear to be severe enough to kill off the infection. It must also be borne in mind that a region not previously infected can ultimately become a zone of permanent infection. In 1887, I had occasion to investigate a severe outbreak in California and at present the mortality is nothing like as severe, although the area of permanent infection is much more extensive. Many farmers have informed me that the ravages of this disease practically kills off the increase. Medicinal treatment is practically useless and at the best, can only alleviate individual cases temporarily, consequently preventive measures must be introduced. It is a peculiar chronic type of piroplasmata infection and bears a closer resemblance clinically to human malaria than any other form of piroplasmoses I have met with.

The above concludes the result of my observations to date regarding the Red Water disease in this province. The role of the tick or other intermediary host remains to be determined. The further consideration of the Trypanosomidæ infection is less important and on receipt of authority, same will be dealt with.

Tuberculosis.—This is the only other important disease that has come under my observation since I commenced original research in your department. I can only refer to the disease in swine and I have no doubt that you have read the observations I made in my special report dealing with the outbreak of swine plague, &c., at South Vancouver. At that time I was astonished to note the enormous number of swine that were infected with tubercular lesions, both generalized and localised in the mesenteric glands. It is well known that tuberculosis becomes generalised very quickly in swine, consequently, the consumption of the flesh of such animals is a source of great danger to mankind, especially where no trained veterinary inspection is carried out.

Respectfully submitted,

THOS. BOWHILL, F.R.C.V.S., F.R.P.S.,

Inspector.

The Veterinary Director General,
Ottawa.

REPORT ON A SO-CALLED CASE OF LOCKJAW SEEN AT LETHBRIDGE DOURINE EXPERIMENT STATION.

SIR,—On June the 15th, at 9.30 in the evening a number of horses were driven into the corrals, all were in apparent good health at the time, they had come some ten or fifteen miles, but had not been over driven.

No food or water was given to those horses until noon next day. At 11 a.m. I noticed that a mare branded X A was ailing, she had a very distressed look; her hips and nostrils appeared to be distorted.

The horses were taken out to graze at noon, and I did not see this mare again till 3 p.m., at this time a cowboy came to me and asked if I could do anything for her, as she was in a very bad way.

The symptoms then noticeable were as follows:

Gait, abduction of hind limbs, and extreme flexion (spasmodic), I observed her strike her belly several times.

Facial muscles twitching, the superficial shoulder muscles also twitching, otherwise the muscles did not seem harder than usual, except the facial; along the back they felt quite normal.

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Lips and nostrils distorted and very hard.

The jaws were set tightly, a few blades of grass were held between the lips, and had been there for at least two hours.

Membrana nictitans not more in evidence than usual. The eyes were somewhat sunken. The ears were laid back close together. The parotid gland stood out very plainly and was hard to the touch. Spasms of the pharyngeal muscles were not very marked; the animal sucked up a little water when it was offered. The heart beats were tumultuous, the temperature 101½. The animal was cast, and struck the ground very hard, the jaws relaxed for a minute, but set tight again. Chloroform was administered and the animal kept under its influence for half an hour. The twitchings gradually ceased, the nostrils regained their normal position and the mare was easier, she was allowed to lie for some time, then a little cold water was thrown on her head, and she got up. She was then driven down to the river, there was marked improvement in her gait at this time. On reaching the water she walked in belly deep, and remained there voluntarily for over an hour, dipping her head in and out of the water. Her condition improved gradually from that on, and when I saw her later in the evening she could trot. The nervous symptoms did not return though at this time the muscles of the jaws still looked somewhat tense. Complete recovery had taken place next morning, the mare had a full belly and looked as well as ever. Later in the day she was driven several miles, the symptoms did not return, and she has remained well ever since.

The local superstition about this disease is that if horses are run hard several miles, then put into a corral, without feed and water they will develop lock jaw within a variable time, but generally in from 12 to 24 hours.

I had frequently heard cowboys speaking about horses getting the lockjaw if kept in a corral without feed and water, but had always thought it was true tetanus and that the infective agent gained entrance by wounds; hungry horses will often gnaw a fence and doubtless get many dusty splinters into their gums.

Dr. Gallivan and I saw another case at Stirling where some horses had been rounded up for inspection similar in all outward appearances to the one just quoted. In this instance the horses had been driven a long way and had been put into a corral, also without feed and water.

The period of incubation in this case was about 18 hours.

The cowboys have a number of quack methods for unlocking the jaws, but I have not met any one who knew of a sure cure. Some horses seem to recover, others die.

The affection seems to be fairly common, but is rarely seen by practitioners as it generally occurs out on the range.

Dr. Higgins when in the West last summer with Dr. Hargrave diagnosed a case at McHugh Bros., Gleichen, through having read my report, and corroborates my statements with regard to the symptoms.

Dr. Warnock tells me he has seen a number of fatal cases.

Dr. Hargrave treated a case successfully near Medicine Hat, and I heard of another case where recovery had taken place in Lethbridge.

Dr. Fritz, Assistant Dourine Inspector for the Bureau of Animal Industry, informs me that the affection is common in the western States.

This case appears to me to have many points which are out of the common, the rapid onset of the disease, the short incubative period, the favourable termination, and above all the similarity which exists between it and true tetanus.

I have the honour to be, sir,

Your obedient servant,

SEYMOUR HADWEN,

Assistant Pathologist.

The Veterinary Director General,
Ottawa.

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SPECIAL REPORT ON GLANDERS.

BY J. G. RUTHERFORD, VETERINARY DIRECTOR-GENERAL AND LIVE STOCK COMMISSIONER.

OTTAWA, September 1st, 1906.

SIR,—I have the honour to present a special report upon the work performed during the last four years by this Branch of your Department in dealing with glanders.

This disease has long been rightly looked upon as one of the most serious and dangerous of animal plagues, and even were there no recent striking developments, or rather circumstances, demanding special attention, a report of this kind would not be out of place.

As matters stand now, however, there are grave reasons for the careful summing up of the whole situation, and in my opinion for the serious reconsideration of the views held regarding the disease by a majority of the veterinary practitioners of this continent, and for a radical change in the attitude generally assumed by governmental bodies in dealing with it.

It is quite unnecessary to occupy your time by any dissertation on the general history and pathology of glanders, or on the serious consequences not only to horses, but to human beings, which its continued existence in any community is liable to entail. It is equally needless to descant upon its prevalence on this continent and the importance of the adoption of an intelligent and comprehensive policy, having in view its immediate control and ultimate eradication.

As statistical and other details have been furnished in my various annual reports, I propose to confine myself to a brief history of our recent work in connection with the disease, followed by a short summary of the conclusions reached, on several points regarding which opinions, even to-day, differ somewhat widely.

It is almost exactly four years since the discovery of a serious outbreak of glanders in the City of Ottawa rendered necessary a prompt decision as to whether the control of this disease was to be assumed by the Federal authorities, or left, as it had up till then been, except in the North-West Territories, and in the case of one or two isolated outbreaks elsewhere, in the hands of the Provinces.

After carefully considering my representations, you decided that it would be in the best interests of all concerned to bring the disease under the direct control of the Health of Animals' Branch of your Department. This was accordingly done, except in Manitoba, where, owing to the fact that the legislation had long been such as to enable the Provincial authorities to deal with it, if they chose to do so, in a most thorough manner, the work was not taken over by the Federal government until 1905.

From August, 1902, until the present we have maintained a continuous effort to eradicate glanders in the Dominion, a work, I may say, of no small difficulty, when the size of the country, its climate and the conditions under which horses are kept in many districts are taken into full consideration.

The discovery of mallein in 1890 revolutionized entirely the views of veterinarians regarding glanders. Older veterinarians will remember the formidable chain of symptoms which, in their student days, were considered essential to a diagnosis of glanders, as also the various ironclad rules to be followed in differentiating between it and that now somewhat dubious disease 'nasal gleet.'

It is now recognized that horses may be, and only too frequently are, seriously affected with glanders while presenting, so far as outward and visible symptoms are concerned, an appearance of perfect health. The knowledge of this fact has, of course, necessitated a complete change in the methods of dealing with outbreaks of the disease. Whereas it was in former years, and in some countries is, even to-day, considered sufficient to slaughter animals showing clinical symptoms, while ignoring entirely those which may have been in contact, the conscientious modern veterinarian

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insists on the latter being submitted to the mallein test, and if found to react, either slaughtered or segregated for observation and further tests.

In studs where clinical cases have occurred there is a strong likelihood that some of the contact horses will be found to be affected, although for a time at least they may present no external symptoms.

Any system, therefore, which ignores this frequent condition is faulty and likely to cause a dissemination of the infection, particularly when, as is often done, studs in which glanders has been found to exist, are dispersed among innocent purchasers.

Under ordinary circumstances, especially when no provision for reasonable compensation exists, the problem presented by the condition outlined above is exceedingly difficult of solution. While horse owners, unless very poor, very ignorant or very unprincipled, are generally willing to have clinical cases destroyed, they quite naturally object to the slaughter of animals which may have reacted to mallein, but show no evidence of disease and remain in good working order.

In some countries the authorities overcome the difficulty after a fashion by leaving the contact horses severely alone, thus avoiding the responsibility which would have to be assumed if the animals, on being tested, were found to react. Untested, they are presumably healthy and are left free from restrictions.

As an illustration of the results of pursuing a policy of this kind, the following figures from the returns of the Board of Agriculture for Great Britain are very interesting:—

	Horses destroyed.
1898.	1,385
1899.	1,472
1900.	1,858
1901.	2,370
1902.	2,073
1903.	2,499
1904.	2,628

It is not, however, necessary to go to Great Britain for proof of the folly of ignoring the contact horse. Similar object lessons are furnished by the conditions prevailing in more than one district in Canada, and while, of course, I cannot presume to speak authoritatively on these matters, I feel confident that in some of the United States of America glanders is rapidly increasing owing to this cause.

The evil is greatly intensified by the fact that, where the proper authorities are inert, private testing of infected studs is continually going on, the reactors being subsequently sold as expeditiously as possible. Prominent veterinarians in Great Britain credit these private mallein tests, conducted by unscrupulous owners through equally unscrupulous practitioners, with the notoriously rapid spread of the disease in that country during recent years.

The same thing is undoubtedly true in America, and here let me point out another condition which, taken in conjunction with the private test, constitutes an additional and very important factor in the spread of glanders.

I refer to the great facility with which, in these modern days of cheap steam transportation, horses may be moved in large numbers from place to place.

While, especially in communities where mixed husbandry prevails, glanders may never obtain a foothold, because in these districts horses from a distance are, with perhaps the exception of valuable and generally healthy breeding stock, but seldom introduced, I would remind you that the great fluctuations in the value of horse flesh during the decade just passed have brought about the movements of large numbers of these animals from one district to another, and that glanders has, beyond doubt, been extensively spread by this means.

Perhaps the most dangerous agents in thus disseminating glanders are the western range horses, which, during the last ten years, have been distributed in large numbers through the country. Glanders on the range exists to a considerable extent in a latent and often very mild form, but it rapidly develops when the animals are broken, stabled and put to work. Many of the most widespread and most serious outbreaks with which we in Canada have had to deal are directly traceable to importations of range horses. Mallein is, of course, seldom used on the range but it is a common thing for owners to shoot down any clinical cases they may notice, the others, showing no symptoms, being sold as healthy, with the result above-mentioned.

Having made this digression in order to clear the way for what follows, I will, with your permission, revert to the time when, in 1902, I was called upon to formulate a definite policy for the control of glanders in the Dominion. At that time there existed no provision whatever for the payment of compensation, and this, of course, rendered quite impossible the slaughter of non-clinical reactors, even if I had then been anxious to adopt this radical policy.

As a matter of fact, however, I was, like many other veterinarians, under the impression obtained from a number of reliable professional sources, that it was quite unnecessary to kill horses of this class, and that satisfactory results would follow the adoption of a policy of testing all contacts with mallein, and retesting from time to time such as reacted until they either ceased to react, or through repeated reactions, furnished conclusive evidence that they were curable. For a period of slightly over two years this plan was carefully and conscientiously followed, but as time progressed it became evident that the results obtained were altogether disproportionate to the risk and labour involved. Not only did the number of horses on our hands keep constantly increasing, but in many cases individual reactors held among others for future tests developed clinical symptoms, and thus established fresh centres of infection. Such horses not only endangered the other reactors with which they were being kept, and some of which might have a possible chance of recovery, but indirectly threatened, through the various every-day channels which horsemen well understand, the health of other animals not actually housed with them.

As our opportunities for observation increased and further experience was obtained, serious doubts as to the conclusions previously reached by eminent veterinarians, both in Europe and America, as to the impossibility of glanders being transmitted by reactors not showing clinical symptoms, or by ceased reactors began to assert themselves. As the work went on evidence gradually accumulated that many of the so-called ceased reactors were not only not permanently cured, but were properly to be looked on with grave suspicion as being likely to introduce glanders among healthy horses with which they might be brought in contact. Several outbreaks of more or less severity and extent can be traced directly to these ceased reactors, and before I conclude, I shall endeavour to demonstrate the advisability of dealing with animals of this class as possible future centres of infection. As the owners of ceased reactors are generally more than willing to dispose of them as soon as possible after their release from official control, the risk of bringing infection to the stables of their unsuspecting purchasers constitutes an added danger which cannot reasonably be ignored.

The conclusion that neither non-clinical reactors nor ceased reactors could, with safety, be considered non-infective, having been thus forced upon me, there remained only two alternatives, either to follow the futile and already discredited policy of killing clinical cases and ignoring contact animals, or to face the situation and adopt the only intelligent course, the destruction of all horses showing the typical reaction to mallein whether presenting any external manifestations of glanders or not.

I need scarcely say that this would have been absolutely impracticable without provision for the payment of liberal compensation. The question of compensation

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for the slaughter of diseased animals has always, and in all countries, been one of great difficulty, and the disinclination of those in authority to assume the financial outlay involved, has been one of the chief obstacles encountered by veterinary sanitarians engaged in dealing with animal plagues.

When, however, the situation was clearly laid before you, you did not hesitate to ask parliament for the needed authority, and the no less necessary funds, with the result that in September, 1904, we were enabled to begin the slaughter of reactors and to pay for them at a reasonable, and when their intrinsic value is considered, a most liberal rate.

From September, 1904, to March, 1905, compensation was paid for non-clinical cases only, but it was soon seen that in order to avoid friction, as well as to secure prompt notification of outbreaks, it would be necessary to pay for all animals slaughtered, whether visibly affected or not. On March 25, 1905, therefore, the following regulations came into effect:—

Dominion of Canada.—Regulations Relating to Glanders.—By Order in Council dated March 25, 1905, in virtue of 'The Animal Contagious Diseases Act, 1903.'

1. No animal which is affected with or has been exposed to glanders shall be permitted to run at large or to come in contact with any animal which is not so affected.

2. Any veterinary inspector may declare to be an infected place within the meaning of the 'Animal Contagious Diseases Act, 1903,' any steamship, or steam or other vessel, or any place or premises where the contagion of glanders is known or suspected to exist.

3. No horse, mule or ass shall be removed out of an infected place without a license signed by an inspector.

4. Veterinary inspectors are hereby authorized to inspect and to subject to the mallein test any horses, mules or asses affected with glanders or suspected of being so affected, or which have been in contact with animals so affected, or suspected of being so affected, or which have been in any way whatsoever exposed to the contagion or infection of the disease of glanders, and for the purpose of making such inspection or test to order any such animals to be collected, detained or isolated.

5. Horses, mules or asses affected with glanders, whether such animals show clinical symptoms of the disease, or react to the mallein test without showing such symptoms, shall on an order signed by a duly appointed inspector of the Department of Agriculture, be forthwith slaughtered and the carcasses disposed of as in such order prescribed, compensation to be paid to the owners of such animals if and when the Act so provides.

6. In the event of the owner objecting to the slaughter of animals which react to mallein, but show no clinical symptoms of glanders, the inspector may order such animals to be kept in close quarantine and retested, such retests, however, in no case to exceed two in number and to be completed within four months of the first test, provided, however, that owners deciding to have their animals quarantined rather than slaughtered shall forfeit all right to compensation.

7. Horses, mules or asses reacting to the third test with mallein shall be forthwith slaughtered on an order signed by an inspector, and the carcasses disposed of as ordered.

8. Inspectors are hereby authorized to permit owners of horses, mules or asses which give no reaction to the third test with mallein and which have at no time shown any clinical symptoms of glanders, to retain and use such animals, subject to the conditions contained in the license signed by the inspector.

9. Before an order is made for the payment of compensation in any of the cases aforesaid, there must be produced to the Minister of Agriculture a satisfactory report,

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order for slaughter, certificate of valuation and slaughter, and certificate of cleansing and disinfection, all signed by an inspector.

10. The certificate of an inspector to the effect that an animal has reacted to the mallein test or has shown clinical symptoms of glanders, shall, for the purpose of the said Act and of this order be *prima facie* evidence in all courts of justice and elsewhere of the matter certified.

11. Every yard, stable, outhouse or other place or premises, and every wagon, cart, carriage, car or other vehicle, and every utensil or other thing infected with glanders shall be thoroughly cleansed and disinfected by and at the expense of the owner or occupier, in a manner satisfactory to a veterinary inspector.

J. G. RUTHERFORD,
Veterinary Director General.

Department of Agriculture,
Ottawa.

Although the time which has elapsed since the inauguration of the policy of compensation and slaughter is altogether too short to enable us to form a definite and decided opinion as to its wisdom and probable effectiveness in securing the eradication of glanders, the following figures furnish convincing proof that it has a strong tendency to remove the disinclination generally evinced by owners to report outbreaks of the disease and to permit the slaughter of their horses:—

	Tested.	Reacted.	Killed.	Clinical.
1902-3.	1,062	466	219	219
1903-4.	1,387	420	499	499
Inclusive of Manitoba—				
1904-5.	4,899	1,854	2,113	932
1905-6 (to March 31).	3,957	1,285	1,387	561
1906-7 (to Aug. 31).	4,200	850	946	502
Total.	15,505	4,875	5,164	2,713

In considering these figures I desire particularly to draw your attention to the large increase, not only in the numbers of those tested and killed as reactors, but of those showing clinical symptoms. These figures furnish incontestable evidence that the present system brings to light a very large number of cases of glanders, which, without provision for payment of compensation, would never have been reported.

Under the conditions formerly existing, there was a tendency on the part of owners, and doubtless of some veterinarians, to avoid trouble and loss by concealing the existence of glanders. Where no compensation is paid many owners, otherwise quite respectable, are undoubtedly in the habit of allowing clinically affected cases to run their course, working them as long as possible, and finally either permitting them to die or having them quietly destroyed; while those less honest or more unprincipled have no hesitation in subjecting them to palliative treatment, with a view to removing or concealing suspicious symptoms, and subsequently disposing of them to the best advantage.

I am satisfied that the system now followed in Canada will, by removing temptation, prove effective in overcoming, at least to a very great extent, these tendencies shown by depraved human nature under less favourable circumstances.

It is interesting to note the manner in which the new regulations are received in different parts of the Dominion. In districts where the disease has prevailed to any considerable extent, and where horse owners realize its serious nature and the importance of stamping it out, the new order of things is heartily welcomed. On the other hand, in places where the people are comparatively unfamiliar with glanders, the new regulations are looked upon as unnecessarily severe, and people complain bitterly that their horses are being slaughtered without good and sufficient reason. The claim is

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made that our inspectors destroy more horses than the disease itself would ever be likely to kill, the argument being advanced that only a very limited number of horses die from glanders under ordinary conditions, and that the disease seldom or never becomes epizootic.

Facts, however, are entirely against this contention. The figures already quoted from the returns of the Board of Agriculture of Great Britain indicate that, under modern conditions, the disease, unless properly controlled, is certain to spread rapidly and to cause a constantly increasing loss in horseflesh.

As an illustration of this, I would quote from our own experience the case of one Canadian lumber company in a remote part of the country, which reported last year for the first time the existence of glanders among its horses. Inquiry elicited the fact that in less than four years upwards of fifty head of valuable horses, owned by this company, had died of glanders. Of thirty-six survivors, thirty-four reacted to mallein, and were destroyed. Of the two remaining, neither had been in contact with the diseased horses.

We have a number of similar cases on record, but it would scarcely be possible to furnish a better illustration of the evil results certain to follow carelessness or neglect in dealing with glanders.

In this connection I cannot refrain from quoting an extract from the *London Lancet* of July 5, 1905, which, in a review of the report of the Board of Agriculture, speaks as follows:—

'Glanders is admittedly on the increase, and it is time that some radical measures were taken to control the disease. In 1894 there were only 502 outbreaks reported, but in 1904 these had increased to 1,539, and 2,658 horses were killed as glandered. More power ought certainly to be given to the veterinary inspectors to test the in-contact horses with mallein, as by this agent an almost infallible diagnosis can be made within 24, or at most, 48 hours. The expense, although great the first year, would not be excessive if allowed to spread over a period of years; and where a preventable disease, which also causes the deaths of numbers of human beings each year, is concerned, the cost ought certainly not to be considered too seriously as the reason why it should not be taken thoroughly in hand.'

It is gratifying to note that the British authorities are being urged to introduce the identical policy which we have already adopted in Canada.

While dealing with this phase of the subject, I would point out that if the adoption of our system is deemed necessary in a small country like Great Britain, where police and inspection work has been reduced to a science, there can be no doubt of the wisdom of its adoption in the Dominion of Canada, where the distances are magnified and the population, especially in some districts, sparse to a degree, although I am glad to say that the last named condition is being rapidly altered by the constant influx of desirable settlers who are coming from all parts of the world, but perhaps in greatest number from the western United States.

In this connection, I would say that while we do not think it necessary to test the human immigrants from that country, I think it altogether likely that we will be compelled, in the near future, to impose this precautionary restriction upon those of the equine species, as the records in our possession indicate that a considerable number of the outbreaks of glanders in western Canada are due to imported American horses, of which we have for a number of years back been absorbing from 25,000 to 30,000 per annum.

Having now indicated, perhaps at too great length, our present attitude in relation to glanders, I would like to lay before you, as briefly as possible, some of the facts brought to light in the course of our work, which have convinced us that in the war against glanders no quarter should be given to the typical reactor, whether he shows clinical symptoms or not.

I have already given you some figures as to the number of horses with which we have dealt during the last four years. In connection with what I am about to say, however, I would call your attention to the fact that up till August 31, 1906, we have tested 15,505 horses, and have actually made 18,177 mallein tests.

The marked disproportion between the number of horses tested and the number of tests made is attributable to the fact that from 1902 to 1904 we, as already stated, followed a retesting policy. It will, I think, be conceded that the number of tests made, each of which was carefully reported, is sufficient to furnish a reasonable basis for definite and intelligent opinions on the various points relative to mallein, its uses, effects and the conclusions which may reasonably be drawn therefrom.

While perhaps to some extent reversing the natural sequence of events, I propose to refer first to the danger inseparable from the keeping alive of ordinary non-clinical reactors. With regard to this point, I am not in a position to furnish any great amount of statistical information for the reason that from the very beginning of our present operations animals of this class falling into our hands have been, except in the case of a few which early became ceased retractors, so dealt with as to prevent the possibility of their coming into contact, direct or indirect, with healthy horses.

When engaged in private practice, however, I had an opportunity of forming an opinion on the subject, for although, after the use of mallein was adopted, which, with me, was in the year 1893, I invariably advised my clients to destroy all typical reactors, the law did not make their slaughter compulsory, and many were permitted to live. Not a few subsequent outbreaks of which I was cognizant were undoubtedly due to the retention and distribution of infection by these apparently healthy animals.

As a matter of fact, there has never been, at least among intelligent and single minded veterinarians, any great tendency to belief in the harmlessness of horses which continue to give typical reactions to mallein, even when they present no visible symptoms of glanders. The departmental committee appointed in 1901 by the Board of Agriculture of Great Britain for the purpose of conducting experimental investigations with regard to this and kindred subjects, reached the conclusion that these apparently healthy reactors are capable of transmitting glanders. The committee in question comprised the late Mr. A. C. Cope, Mr. Wm. Hunting, Sir John McFadyean and Dr. James McI. McCall, all men of high professional attainments and great experience in dealing with glanders. One of the points dwelt upon by them, viz., the suddenness with which a reactor may become clinically glandered, is worthy of special note. Our experience in Canada has demonstrated beyond question the danger arising from this liability of reactors to suddenly develop acute symptoms, and has shown further that a considerable proportion of these superficially healthy animals are in reality clinical cases.

As under our present regulations such horses are slaughtered, opportunities for post-mortem examinations have not been wanting, and in many cases showing absolutely no external symptoms, extensive ulcerations have been found high up in the nasal passages, while the presence in this situation of minute nodular lesions, undoubtedly specific, has been strikingly frequent. These discoveries bear out the opinion which I have long held and frequently expressed regarding the importance, from an infective point of view, of enlarged submaxillary glands in reacting animals. There is never smoke without fire, and these glands are not likely to show tumefaction without a definite pathological reason.

Leaving nasal lesions aside, it is well known that in typical reactors glanders nodules are invariably found in the lungs, and not unfrequently in other organs, although the tendency to localization in the lymph nodes, so common in bovine tuberculosis, is much less frequently noted in glanders.

Again, I would remind you of the days before mallein was heard of, when, in spite of all our efforts and precautions, case after case, and outbreak after outbreak, of glanders would occur in the same stable. After each fresh outbreak the most

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thorough disinfection was practised, and all the surviving horses subjected to careful scrutiny and continued close observation. Six months, or perhaps a year, would elapse and then another case or series of cases would occur. We blamed the stables, we thought the contagion, or, as we then called it, the virus, was immortal and indestructible. Now we know that, outside of the animal body, the life of the bacillus mallei is, under the most favourable conditions, limited to three or four months. In the animal body it is a different matter, and the cause of the mysterious recurrent outbreaks was the chronic latent case of glanders, then unrecognized, but now, through the agency of mallein, marked down and known as a reactor.

In tracing the origin of primary outbreaks in hitherto uninfected localities, we almost invariably find that the disease has been introduced not by a well marked case of glanders, but by a non-clinical contact horse, often a reactor, generally purchased by an unsuspecting farmer, ignorant of the fact that his new bargain has recently come from an infected district, and possibly from a badly infected stud.

Further evidence against the reactor will be incidentally adduced in the notes which I am about to lay before you regarding his close connection, the so-called ceased reactor.

Ceased reactors, so-called, should, in the light of our experience, be divided into three distinct classes:—

- 1 Those which, while not properly reacting to mallein, are, owing to a slight thermal rise or a septic infection, more or less serious at the point of injection, erroneously classed as reactors by the veterinarian making the test.

2. Actual ceased reactors, comparatively few in number, and almost invariably, in our experience, consisting of horses tested when in the incipient stages of glanders, or at any rate when but slightly affected, as evidenced by the fact that their original reactions, though typical, are not as well marked either thermally or locally, as those given by clinical cases or by these animals which, while perhaps not showing external symptoms, are suffering from the disease in an advanced form.

3. Those which having on one or more occasions definitely reacted, develop an acquired tolerance to the test, the latter being, however, of a temporary character, so that after the lapse of a varying period, generally from six to twelve months, a typical reaction again follows the injection of mallein.

The first-mentioned class are of but little importance, and demand no attention at our hands beyond a due consideration of the part they have already played, and doubtless will for some time continue to play, in prompting bootless discussion, and thus, to some extent, retarding the general adoption of mallein as an authoritative diagnostic agent.

The various causes which contribute to their being wrongly classified as reactors will, however, be shortly dealt with when we take up the question of reactions, typical and atypical.

The second class is naturally much more interesting, consisting as it does of horses which actually overcome the infection of glanders either through the action of mallein or by the efforts of nature unaided, or at least aided only by favourable physical conditions.

We have in Canada under supervision at present a considerable number of horses which have at one time or another, during the past four years, given a typical reaction to mallein, but which are now, so far as we can ascertain by periodical inspection and repeated testing, absolutely free from glanders. These animals, however, constitute a lamentably small proportion of the total number which reacted without showing clinical symptoms in the two years during which we followed the retesting system. Two years ago I stated that about 25 per cent of our non-clinical reactors had ceased to react, and were apparently free from glanders. At that time I expressed my great disappointment with the small return which this percentage gave for the risk and labour involved in carrying on the retests, and announced that

it was our intention to discontinue that method of dealing with glanders and adopt the plan which we are now following.

I am sorry to have to tell you that in classing all these horses as safely ceased reactors we were seriously in error. During the intervening period a considerable number of them have rejoined the reacting ranks, and have been condemned as diseased. There are still, however, a number which have continued to stand not only the mallein test, but the test of time. These give absolutely no indication of being other than healthy horses, and thus, so far as can be seen at present, there is no reason to doubt that, in a proportion of comparatively mild cases of glanders recovery may and does take place.

We have found, moreover, that while it is not by any means possible to tell at the first, or even the second, test which of the affected horses will eventually become permanent ceased reactors, we can at one or other of these stages make reasonably certain of those which will not do so.

Animals which, on being first tested, show a thermal rise exceeding 104° Fahrenheit, accompanied by a characteristic reaction, those which give a more pronounced reaction to a second or subsequent test than they do to the first, and those which suddenly cease to react without showing a gradual lowering of the temperature and a corresponding abatement of the local reaction are not likely to become permanent ceased reactors.

Sound pathological reasons can, I think, be advanced for the lack of improvement shown by the first and second classes, but I must confess that I have no mental theory to fit the case of those last mentioned.

Having now dealt with the supposititious ceased reactors and with those which appear to make an actual and permanent recovery, it becomes our duty to discuss those animals, and they are, in our experience, by far the most frequently encountered and, needless to say, the most dangerous, which acquire a temporary tolerance to mallein, but which again give a definite reaction when tested, after sufficient time has elapsed to nullify the effects of previous injections. In the report of the special committee appointed by the British Board of Agriculture, to which I have already referred, the records given indicate that all the ceased reactors dealt with in the experiments showed an abnormally high temperature when tested with mallein some time after they had apparently ceased to react. I considered this a very suspicious circumstance, and one which furnished food for serious thought. In order to discover, if possible, the reason for this peculiar phenomenon, I determined to again submit to the mallein test a number of horses which had been kept for varying periods under supervision as ceased reactors. The results are very interesting, as may be gathered from the following examples from the report of Dr. A. E. Moore, one of our most careful and capable officers, who was entrusted with the task of conducting the investigations. The pathological work was, of course, done by Dr. Higgins.

Results of post-mortem examinations conducted on ceased reactors which again reacted on being tested, after a period of not less than six months:

Paddy, Grey Gelding, 16 years, No. 304.

	Max. temp. before inject.	Max. temp. after inject.	Max. size swelling.
1st test, May 22, 1903.	100%	105	6x6
2nd test, June 7, 1903.	100%	105%	4x5
3rd test, Sept. 7, 1903	100%	101%	2x3 ceased
4th test, Oct. 25, 1903.	101	101	3x4
Retest after 1 year and 2 months, Dec., 1904.	101%	104	3x6

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Result of post-mortem of No. 304:—

Very few nodules scattered in the lungs, around some of these nodules a small quantity of lymph-like substance was seen, others encysted.

Jerry, Grey Gelding, aged, No. 307.

	Max. temp. before inject.	Max. temp. after inject.	Max. size swelling.
1st test, June 6, 1903.	100%	105%	3x4
2nd test, Aug. 20, 1903.	101	104	2x2
3rd test, Nov. 19, 1903.	100%	104	3x3
4th test, Feb. 26, 1904.	101%	101%	2x2 ceased
Retest, after 9 months, Nov. 15, '04	100%	104%	3x4

From 20 to 30 small nodules seen in the lungs from the size of a pea to small bean, several places in right lung showing cicatricial tissue, all the nodules were deep seated, mostly encysted, and followed the large bronchial tubes. Three guinea pigs inoculated and from one bacillus mallei was isolated in pure culture.

Nance, Grey Mare, 8 Years, No. 308.

	Max. temp. before inject.	Max. temp. after inject.	Max. size swelling.
1st test, Mar. 10, 1903.	101%	104%	4x4
2nd test, June 6, 1903.	101	105	6x8
3rd test, Aug. 20, 1903.	99%	104%	6x6
4th test, Nov. 19, 1903.	100%	102%	5x6
5th test, Feb. 2, 1904.	100%	101%	3x3 ceased
Retest, after 9 months, Nov. 15, '04	100%	104%	4x4

About ten very small nodules encysted, all deep seated in the lungs and near the bronchial tubes.

Two guinea pigs were inoculated 7-12-'04. They were still thrifty 8-6-'05, and had gained considerably in weight. They were chloroformed, no lesions found and cultures remained sterile.

Doll, Bay, White Face, 9 Years, No. 309.

	Max. temp. before inject.	Max. temp. after inject.	Max. size swelling.
1st test, Mar. 23, 1903.	99%	104%	2x2
2nd test, June 6, 1903.	100%	105%	4x8
3rd test, Aug. 8, 1903.	100%	104%	4x5
4th test, Nov. 19, 1903.	100%	102%	4x5
5th test, Feb. 26, 1904.	101	101	2x2 ceased
Retest, after 9 months, Nov. 15, '04	100%	104%	3x6

Bronchial and mediastinal glands slightly enlarged. About twenty small nodules (pea) were found in the lungs, sixteen in the right lung and four in the left. Mostly encysted. Three guinea pigs were inoculated, and from one bacillus mallei was isolated in pure culture.

Mag, Black Mare, 10 years, No. 310.

	Max. temp. before inject.	Max. temp. after inject.	Max. size swelling.
1st test, May 5, 1903.	102	104%	2x6
2nd test, Aug. 6, 1903.	100%	104	3x3
3rd test, Nov. 19, 1903.	100%	104%	3x3
4th test, Feb. 20, 1904.	100%	100%	2x3 ceased
Retest, after 9 months, Nov. 15, '04	101	103%	3x3

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About 15 very small nodules found in lungs, all deep seated, and following the main bronchial tubes, mostly encysted.

Three guinea pigs inoculated 7-12-'04. From one pure culture of bacillus mallei were obtained.

In all these autopsies there was noted the peculiar injected appearance of the lungs which is seen when a reacting animal is destroyed immediately after testing. In all but one of these five ceased reactors a pure culture of the bacillus mallei was obtained. In this case the lesions found were characteristic, and it is probable that the bacilli were present. Only two guinea pigs were used for this inoculation.

The following very striking record is that of a horse which has ceased to react no less than three times in the course of the last three years. This animal is still isolated under close supervision, and although performing ordinary farm work daily, is in the pink of condition, and, to all outward appearance, absolutely healthy.

King, Bay Gelding.

	Max. temp. before inject.	Max. temp. after inject.	Max. size swelling.
1st test, Aug. 26, 1903.	101	105	2x4
2nd test, Nov. 19, 1903.	100%	104½	4x4
3rd test, Feb. 26, 1904.	100%	103½	2x2
4th test, June 9, 1904.	101%	101	2x2
5th test, July 5, 1904.	101%	101	3x3
6th test, Nov. 14, 1904.	101%	104½	3x4
7th test, April 7, 1905.	101%	101	2x2
8th test, Nov. 1, 1905.	100%	104%	4x4
9th test, July 7, 1906.	100%	101	2x3

I append here three tables showing the different results obtained in testing, 1st, horses which have become permanent ceased reactors; 2nd, horses which after having once ceased to react, have again given a characteristic reaction to mallein after a period of from six months to 2 years; and 3rd, horses which have shown no improvement when tested at intervals of 30, 60 and 90 days, although never developing clinical symptoms.

Five guinea pigs were inoculated, and from the organs of one a pure culture of bacillus mallei was obtained.

12 Horses which did not show any improvement by injection of mallein at intervals of about 30, 60 and 90 days, although never developing any clinical symptoms.

No.		Maximum Temperatures at				Maximum size of Swelling at			
		1st Test	2nd Test	3rd Test	4th Test	1st Test	2nd Test	3rd Test	4th Test
1	Brown gelding, 13 yrs.	105½	105½	105	104½	2 x 3	4 x 4	3 x 4	4 x 4
2	Bay mare, 10 yrs.	106½	106½	106½		4 x 6	2 x 5	6 x 8	
3	Bay gelding, 8 yrs.	106	105½	105		3 x 4	5 x 8	5 x 6	
4	Roan gelding, 11 yrs.	106½	105½	104½	105½	3 x 7	4 x 5	3 x 5	5 x 7
5	Chestnut gelding, 14 yrs.	103½	105½	104½	105½	3 x 6	4 x 6	5 x 6	6 x 6
6	Black gelding, 9 yrs.	105½	105½	105		4 x 5	3 x 5	4 x 5	
7	Bay mare, 9 yrs.	105½	105½	105½		6 x 7	6 x 6	6 x 8	
8	Black gelding, 13 yrs.	105	105½	105½		3 x 4	2 x 3	4 x 7	
9	Brown gelding, 10 yrs.	104	105½	105		6 x 8	5 x 5	2 x 3	
10	Bay mare, 7 yrs.	105½	104½	103½	105½	1 x 1	3 x 6	3 x 4	2 x 2
11	Bay gelding, 12 yrs.	105½	105½	104½		1 x 3	2 x 3	2 x 3	
12	Chestnut gelding, 8 yrs.	104½	103½	104½	105½	4 x 6	6 x 6	2 x 3	5 x 6

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TWELVE Horses which became ceased reactors and did not react again at the end of periods varying from six months to one year and a half; retested at intervals of about 30, 60 and 90 days.

Never showed clinical symptoms at any time.

No.	Maximum Temperatures at					Maximum Swellings at					Remarks.
	1st Test	2nd Test	3rd Test	4th Test	5th Test	1st Test	2nd Test	3rd Test	4th Test	5th Test	
1	105	105	103½	100½	101½	3 x 4	3 x 5	5 x 6	1 x 2	2 x 2	Retested 17 months after ceasing to react.
2	104	103½	102½	102	101	2 x 2	4 x 6	2 x 6	2 x 3	1 x 2	
3	104½	102	101	100	101½	1 x 2	2 x 2	1 x 3	1 x 1	2 x 3	
4	103	102½	101½	101	101	1 x 2	1 x 1	3 x 4	2 x 3	2 x 3	
5	104½	105	101	100	102½	2 x 2	2 x 2	2 x 3	2 x 3	2 x 3	
6	104	103½	103	101	100	3 x 6	3 x 4	3 x 4	3 x 3	3 x 3	
7	104½	101	100½	100	102½	6 x 8	3 x 4	2 x 3	1 x 2	2 x 2	
8	103½	102½	101	100½	101	1 x 1	2 x 2	1 x 1	None.	1 x 3	
9	104½	104	103½	101	102	2 x 2	2 x 2	1 x 1	1 x 1	2 x 3	
10	103½	103½	101½	100	101½	1 x 3	1 x 1	2 x 4	2 x 3	2 x 3	
11	104½	102½	100½	101	101½	4 x 5	3 x 6	2 x 3	2 x 2	2 x 2	
12	104½	102½	101½	101½	101½	3 x 3	2 x 3	2 x 3	2 x 2	2 x 2	

Horses which became ceased reactors, but on being retested after an interval of from six months to a year and a half, again gave a characteristic reaction.

No.	Maximum Temperatures at :—										Maximum Size of Swellings at :—									
	1st Test.	2nd Test.	3rd Test.	4th Test.	5th Test.	6th Test.	7th Test.	8th Test.	9th Test.	1st Test.	2nd Test.	3rd Test.	4th Test.	5th Test.	6th Test.	7th Test.	8th Test.	9th Test.	Remarks.	
1	Bay gelding, aged,	106	104½	100½	104½	103½				2 x 2	2 x 3	2 x 3	4 x 6							
2	Black mare, 10 years.	104½	104	104½	100½	103½				2 x 0	3 x 3	3 x 3	2 x 3	3 x 3						
3	Grey gelding, aged	105½	104	104	101½	104½				3 x 4	2 x 2	3 x 3	2 x 3	3 x 4						
4	Bay gelding, aged	106½	106	103½	102	104½				2 x 2	2 x 2	4 x 5	2 x 3	4 x 6						
5	Grey mare, aged	105½	105½	103½	100½	104½				3 x 8	None.	5 x 6	3 x 3	6 x 8						
6	Grey gelding, 16 years.	105	105½	101½	101	104				6 x 6	4 x 5	2 x 3	3 x 4	3 x 6						
7	Grey mare, 8 years	104½	105	104½	102½	101½				4 x 4	6 x 8	6 x 6	5 x 6	3 x 3	4 x 5					
8	Bay mare, 9 years	104½	105½	104½	102½	101				2 x 2	4 x 8	4 x 5	4 x 5	2 x 2	3 x 6					
9	Chestnut geld., 18 years.	104	103½	100½	100	104½				2 x 4	4 x 8	3 x 3	2 x 2	4 x 6						
10	Bay gelding, 15 years.	100½	101	101	100½	103½				2 x 4	4 x 7	3 x 6	1 x 1	6 x 12						
11	Bay gelding, 7 years.	105	104½	103½	101	104½				2 x 4	4 x 4	2 x 2	2 x 2	3 x 4	1 x 2	2 x 2	4 x 4		Ceased to react twice	
12	Bay gelding, 12 years.	104½	105½	105	103	101½				1 x 8	5 x 7	5 x 5	4 x 4	2 x 2	4 x 4	2 x 2	2 y 4	5 x 6	Ceased to react twice	

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I do not think it necessary to make any extended comment on the facts brought to light by this series of retests. So far as the possibility of the latter reactions being due to reinfection is concerned, I would say that this danger was fully considered and guarded against. If reinfection occurred in any of these cases it was through one or other of the so-called ceased reactors, and not from any outside source.

I may add that while the work performed by Dr. Moore was the most systematic and thorough of any which we undertook on similar lines, the results obtained by him were corroborated by like retests conducted by other officers in various parts of the Dominion.

Further proof of the dangerous character of these horses, which, through an acquired tolerance to Mallein, are erroneously classed as ceased reactors, is, I am sorry to say, furnished by our own official records, several instances having occurred in which horses held under supervision for periods deemed sufficient to ensure safety, were permitted to mingle with healthy animals, with disastrous results.

Not the least remarkable feature of these cases is the fact that they seldom develop clinical symptoms themselves, although, beyond doubt, many of them are capable of transmitting infection to others.

This report has already exceeded a reasonable length, but I cannot well close without giving the consensus of opinion arrived at by our inspectors as to what constitutes an actual and typical Mallein reaction. Ability to differentiate with certainty, at least in the majority of cases, between typical and non-typical reactions, is, for obvious reasons, perhaps the most important factor in the use of Mallein.

We are fortunate in having on our inspection staff a number of careful and closely observant men, and the results of their experience have been condensed as follows:

In horses affected with glanders from the 4th to the 15th hour after the injection of the usual dose of reliable mallein a distinct rise of temperature takes place, except in certain cases which will be specially mentioned later. The temperature gradually rises until the 14th or 15th hour after injection, when, after remaining at about the same height for a longer or shorter period, it gradually declines, the downward course being not unfrequently preceded by a slight secondary elevation.

This thermal disturbance should, under ordinary circumstances, indicate a rise of at least 2.5 degrees Fahrenheit over the highest control temperature taken before injection. The wide variation in normal temperature shown by the equine species, especially in Western America, demands the application to this rule of certain definite limitations. For instance, if invariably followed, a horse having a pre-injection temperature of, say, 99°, would be condemned at 101.5°, which might be well within his normal range. On the other hand, an animal with a pre-injection temperature of 102°, which is not at all strikingly abnormal in the west, would be allowed to reach without condemnation 104.4°, a point entirely outside of the normal range.

Other things being equal, 103° Fahrenheit would appear to indicate the danger line, but no fixed rule can possibly be adopted, close observation and sound judgment in the operator being of more importance than hard and fast ruling.

The thermal rise is accompanied, or rather followed, by a hard, tense and exceedingly painful swelling at the point of injection. This swelling is usually circular, and shows a tendency to increase from the eighth hour after injection, at the same time becoming more painful, affecting the muscles and causing marked lameness in the forelimb of the side on which the injection was made. It is often accompanied by swelling of the surrounding lymphatics, which also become intensely painful.

The local reaction does not, as a rule, entirely disappear for several days.

Besides the thermal and local reactions mallein produces well marked constitutional effects on animals suffering from glanders. The pulse and respiration are increased, rigors are frequent, sometimes slight, but occasionally violent, and continuing throughout the whole reaction. There is great depression, while loss of appetite, staring coat and disinclination to move are also commonly noted.

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In clinical cases reaction is, as a rule, early and well marked, and most of our inspectors agree that the severity of the reaction is in direct ratio to the degree of infection or the stage which the disease has reached. Clinical symptoms not unfrequently make their first appearance during the test, generally from 24 to 30 hours after injection. In advanced cases they may persist, the animal rapidly breaking down, while in incipient cases they may gradually recede, the animal regaining a normal and comparatively healthy appearance. Clinical symptoms already evident are almost invariably aggravated by the test. One especially noteworthy feature is that in animals showing only a slight enlargement of the submaxillary lymphatic glands, these will become tense, swollen and painful as the test progresses. This also applies to other enlarged nodes. Dr. Moore describes one case in which both inguinal glands, slightly enlarged before the test, became, during its progress, so much swollen and so painful that the animal could scarcely walk. Post-mortem revealed specific lesions in both glands.

Occasionally all evidences of reaction are present, except the thermal rise, while in others the opposite is the case, and it may be noted that these eccentricities are not unfrequently shown by all the horses tested in certain outbreaks, and further that they persist throughout repeated tests of the same animals, although, under ordinary conditions, the local reaction has a tendency to become less well marked with each succeeding test.

In animals in the last stages of glanders, old horses, young foals and others of inferior vitality, a lowering of temperature not unfrequently follows the injection of Mallein. This is especially noticeable in advanced cases where the temperature is high at the time of injection. In actual outbreaks, contact horses, even when showing no clinical symptoms, but having a high initial temperature, dropping or remaining stationary after injection, should be condemned, especially when a local reaction occurs.

In fact it may be laid down as a general rule that a typical local reaction is proof positive of the existence of glanders, even when no thermal disturbance takes place.

There is not, as a rule, much difficulty in distinguishing between a typical and a non-typical reaction. The former has been already described. In the latter the thermal rise seldom exceeds 2° , and reaches its greatest height at or before the 12th hour, returning to normal before the 20th hour.

The swelling, when circular, rarely exceeds three inches in diameter. It is only slightly painful, is quite superficial, soft and moveable, does not increase after the 8th hour, and is rapidly absorbed during the course of the second day. It never affects the action of the muscles, nor does it cause lameness. Sometimes a fluctuating dependent swelling of considerable size follows a careless or unskillful injection, but this, as a rule, is absorbed rapidly during the first 24 hours.

With ordinary precautions septic infection seldom takes place, and abscess formation is rare except in typical reactions, when it is not uncommon. Occasionally considerable swelling, sometimes accompanied by a thermal rise, will occur in horses suffering from influenza and similar affections. Such so-called reactions are not typical, and should not be ascribed to the action of mallein, but to the already existing febrile condition of the animal.

Cases sometimes occur in which, at the end of 24 hours after injection, neither thermal nor local conditions are sufficiently definite to enable the veterinarian to reach a decision. In these circumstances the animal should be kept under close observation for a further period of 24 hours, when, if it is diseased, the increased swelling and marked lameness which almost invariably follow will remove any possible doubt. Suspected cases which have failed to give a decided reaction will not unfrequently develop clinical symptoms if put to hard work immediately after being tested.

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Reaction, both thermal and local, but especially the latter, is not as well marked in mules as in horses, but as in the former acute symptoms are more likely to develop early in the course of the disease, the risk from latent cases is less serious.

It may be laid down as a general rule that while an apparent improvement in health and condition may, and frequently does, follow the application of the test in mild or incipient cases, the effects of mallein on animals in advanced stages of the disease are invariably bad, and that the testing of such cases hastens a fatal termination.

Local reactions are more pronounced in hot weather than when the atmospheric conditions are moderate. In connection with this statement I would call attention to the fact that under temperate weather conditions, as, for instance, on the Pacific slope, the prevailing type of glanders, while decidedly infectious, is much milder than that seen in most other parts of the country.

Sudden changes of weather seem to favour the development of acute cases, while under steady heat or cold the disease frequently remains dormant. For this reason serious outbreaks are with us more common in spring and fall than in the steady weather of winter and summer.

I am aware that my conclusions as to what constitutes a typical reaction to mallein differ somewhat from those arrived at by the Eighth International Veterinary Congress held at Budapest last year. I have, however, been guided entirely by the results of our own work, and as these are most convincing, I am inclined to attribute the variation, which is, after all, more apparent than real, to a possible difference in conditions between Europe and America.

I need hardly point out that, in order to secure satisfactory results, the conditions surrounding the animals should be normal while the test is being conducted. The administration of water, and even of food, the regulation of body heat and of ventilation, must all be carefully watched, in view of their relation to thermal change. For the same reason no exercise whatever should be permitted while the test is being carried on.

In conclusion I would say that the operations which we have conducted, and their results, have shown in the most convincing manner the great value of Mallein as a diagnostic agent when intelligently used by careful and experienced veterinarians. The expressed views of our inspectors on this point indicate that it can be absolutely relied upon in about 98 per cent. of the animals submitted to its action.

I take this opportunity of expressing my sense of obligation to those Inspectors whose comprehensive reports have rendered it possible for me to thus summarize the results of our work.

I would add that on the occasion of the last annual meeting of the American Veterinary Medical Association, which was held in New Haven, Connecticut, in August of this year, I laid before that body the facts set forth in this report, with the result that the following resolution was unanimously passed by the Association:

'Whereas, in the presentation of Canadian state control work with Glanders by Veterinary Director-General Dr. J. G. Rutherford, it is apparent that the Canadian Government has undertaken control work with infectious disease of animals upon a scale that is highly creditable and in a way commensurate with the importance of the work, and

'Whereas, actual results shown in this report plainly justify the heavy expenditures incurred; therefore be it

'Resolved, That we commend those in higher Canadian Government authority for thus generously supporting this work, and commend the general organization and plan of the Canadian work to the consideration of the Federal authorities and to our various state authorities in so far as it may be applicable to their conditions and not already in force.'

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This hearty endorsement of our policy by the leading veterinarians of this continent is very gratifying, especially when considered along with the movement now on foot in Great Britain to bring about the adoption of measures similar to those in force here.

I have the honour to be, sir,
Your obedient servant,

J. G. RUTHERFORD,
*Veterinary Director-General and Live
Stock Commissioner.*

The Honourable, The Minister of Agriculture.

THE COMMERCIAL LIVE STOCK INDUSTRY IN WESTERN CANADA.

March 31, 1908.

SIR,—Early in the month of June, 1907, acting under your instructions I attended the annual meeting of the Central Alberta Stock Growers' Association. I listened to the various discussions that took place and learned much regarding the conditions under which ranching is carried on in Central Alberta. I also had an opportunity of meeting many of the ranchers, as well as a number of prominent cattlemen, some of whom represented large dealing concerns in Canada and the United States.

BRITISH COLUMBIA MEAT MARKET.

Returning from Erskine to Calgary, I proceeded direct to Vancouver to investigate the source of the imported meat supply of British Columbia. I interviewed your representative, Dr. S. F. Tolmie, and also met a number of inspectors connected with the Health of Animals Branch, all of whom gave me what assistance they could in obtaining information.

With regard to the importation of Australian meat, I found that there had been imported between the 1st of January and the 14th of June, 1907, 774,104 lbs. of mutton and 4,022 lbs. of veal. The mutton carcasses would average from 60 to 75 lbs., and the cost laid down in Vancouver was about 7½ cents to 8 cents per lb. It was of fairly good quality and apparently gave good satisfaction to consumers. It was not all used in British Columbia as a considerable quantity of it found its way into Alberta. The importations of Australian mutton are made during the winter months. One firm does all the importing as it controls all space on the Canadian Pacific Railway boats.

From the United States the importation returns for 1908 up to the 16th of June show:—

To Victoria, 7,026 sheep; to New Westminster and Vancouver, 4,390 sheep and 74 cattle; via Gateway, Kingsgate, Midway, Grand Forks and North Portal, 456 cattle and 134 calves.

The above figures may include a number of animals imported by settlers. From Alberta, for the first six months of the current year, the reports, as far as I have been able to obtain them, show the shipments of cattle to have been 6,989 head. In addition to this, there were large shipments of dressed beef, pork, &c., from Alberta to British Columbia, but of this I was unable to obtain statistics.

I also obtained some information as to the importation of horses, &c., for the first six months of the current year, as follows:—

From United States to Victoria, 116 horses; from the United States to New Westminster and Vancouver, 340 horses, 4 mules, 24 goats, 1 swine, pure bred.

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Via Gateway, Kingsgate, 288 horses; Midway, Grand Forks, 19 mules; North Portal, 2 hogs, pure bred; from Alberta, 288 horses.

LOCAL WESTERN MARKETS.

During the month of July conditions of the local markets were investigated. I spent some time in Winnipeg stock yards and visited Brandon, Regina, Moosejaw, and some of the other small towns in order to learn if possible from whence the local meat supplies were derived. All the above towns obtained practically their total supply of fresh meat from the farmers in the district immediately surrounding them—Moosejaw, however, was importing considerable dressed meat in refrigerator cars from the Winnipeg abattoirs.

WINNIPEG HOG MARKET.

In Winnipeg I found that the average price for live hogs from January 1 to July 25, weighed off cars was $7\frac{1}{2}$ cents. Eighty-five per cent of the hogs received were from Manitoba points, the remainder from Saskatchewan and Alberta with a very few from Ontario. The packers reported that farmers had been marketing great numbers of brood sows, which movement was doubtless occasioned by the high price offered and the general scarcity of money. During 1906 the J. Y. Griffin Co. imported 3,000,000 lbs. of pork products from the United States, upon which they paid \$60,000 in duty. They imported about the same quantity from Ontario, and doubtless the Gordon Ironsides and Fares Co. imported about the same quantity. This shows the splendid market which is still open to the farmers in the western provinces in supplying this demand.

HORSE MARKET.

The market for horses for both farm work and railway construction was exceedingly active up to July, when it became quiet and dealers do not look for an early arrival. The stock yards returns show receipts of horses from the south and east for the first six months of the year, of 19,843 head. In addition there were probably 600 to 700 horses picked up from Manitoba farms at about \$200 a piece to the farmers. Most of these horses were disposed of in Saskatchewan and Alberta, a few going to British Columbia—about 75 per cent for settlers and railway work and the remainder for city draying purposes. Prices run about as follows:—

For teams averaging 2,800 lbs., \$400 to \$550 per team; for teams averaging 3,200 lbs., \$650 to \$900 per team; express horses from 1,200 to 1,300 lbs., \$225 to \$300 per head.

There has been a good demand for carriage horses and one shipper from Iowa brought in two carloads which sold at an average of about \$600. Ontario shipments are usually fed and watered at North Bay and Schreiber. Toronto and Montreal freight for ordinary stock cars are $58\frac{1}{2}$ cents per 100 lbs.; palace cars, $87\frac{1}{2}$ cents per 100 lbs. Dealers usually figure for freight and expenses, \$10 to \$12 a head.

WINNIPEG CATTLE MARKET.

The average price for cattle from January to July on the Winnipeg market was $4\frac{1}{2}$ to $5\frac{1}{2}$ cents. On July 25 I saw a train load of western export steers weighed at Winnipeg stock yards. These cattle were said to be from P. Burns & Co., Calgary, and sold to Gordon, Ironsides & Fares, at 5 cents, Winnipeg weights. They were fed hay during the past winter and arrived in Winnipeg in fair condition, the 349 head, weighing 470,770, an average of 1,350 lbs. per head. They were billed through from Calgary to Montreal with stop-over privileges at Winnipeg to cull out. The through rate was 85 cents per 100 lbs. from Calgary to Montreal and 45 cents per 100 lbs. from Calgary to Winnipeg.

MOVEMENT OF RANGE CATTLE.

The range cattle began to move to market about a month later than usual owing to the severe winter and the backwardness of the spring. The first shipments were made in the latter part of August. On the 19th of that month I arrived at Moosejaw and saw a train load of cattle unloaded there. They had been shipped from Carstairs on Friday night the 17th, arriving at Moosejaw on Sunday morning, there they were fed and watered, and reloaded at 4 p.m., leaving that evening at 7.30 and arriving in Winnipeg at 10 p.m. on Monday night, taking 72 hours, with the Moosejaw stop-over included, to make the trip. These cattle were a mixed lot of butchers and exporters (the latter would average about 1,350 lbs.), consigned to J. Y. Griffin & Co. The price weighed off cars at Winnipeg was about 4½ cents. These cattle arrived at Winnipeg in fair condition, much better than another lot of cattle I saw unloaded there on the same day that came through without feeding at Moosejaw. I also saw two train loads of cattle that came through from Calgary to Winnipeg without feeding at Moosejaw. I learned that they made the run in 48 hours. The shipper being anxious to get them east to catch a certain boat, they were run through without feeding at Moosejaw.

The custom of dealers is to buy at a given price per pound weighed off cars in Winnipeg, consequently it is to their advantage to bring cattle through without feeding at Moosejaw. It is also to the advantage of the C.P.R., as it saves them the expense and delay of holding over the trains. For cattle for immediate slaughter it appears no detriment, as of course they will not shrink in dressed weight. It does, however, appear to be a hardship on the rancher who sells under such conditions, as the cattle shrink from 100 to 150 lbs. from the time they are loaded until they arrive in Winnipeg, and it is a hardship on the cattle as they are frequently held on board the cars from 40 to 70 hours making the run. This, in addition to the fact that they are frequently held on bare ground in the neighbourhood of the loading platforms for many hours waiting for cars and to be unloaded, makes a long period without feed and water. Shippers all agree that the principal shrinkage in range cattle takes place between the point of shipment and Winnipeg. After resting and feeding at Winnipeg the cattle generally do not shrink much more.

It must be remembered that these range cattle are very wild and every time they are handled in and out of the cars and yards they bruise themselves and knock themselves about badly, so that considering all things it is difficult to lay down any hard and fast rule that might be applied. For instance if they were well watered and fed immediately before loading and got a good run through from loading point to Winnipeg, say 35 or 40 hours, it might be better for all concerned, including the cattle, not to be unloaded until they arrive in Winnipeg yards, where they will generally settle down and feed better than they will if unloaded before they are thoroughly hungry.

MOOSEJAW YARDS.

I examined the Moosejaw Yards and found them well constructed and supplied with good water and fairly good hay. The yards are leased from the railway company to the Moosejaw Brewing Co., at rates for the different seasons as follows:—

For months of July, August and September:—

Hay for lots of ten cars or more, \$12. per ton or 20 cents per head.

In smaller lots 22 cents per head of \$14. per ton for 1 feed.

Each individual yard \$4.50, well hayed and watered.

For October, November and December:—

In lots of 10 cars of cattle or more, hay \$13.50 per ton or 22 cents per head.

In smaller lots 25 cents per head or \$15. per ton for 1 feed.

Each individual yard \$5.00 well hayed and watered.

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For January, February, March, April, May and June:—

Loose hay \$16. per ton, baled \$20. per ton.

The company agrees to keep one man at the Stock Yards continually and when reasonable notice is given they have sufficient help on hand to assist in taking care of all stock passing through.

CANADIAN CATTLE SHIPMENT TO THE UNITED STATES.

I was in Moosejaw again on September 11th and inspected the loading of a train of 21 cars that were going through from the Red Deer country billed to Chicago. They were a mixed lot of steers 3 or 4 years old and cows. These cattle paid the duty of 27½ per cent on an appraisement per head as follows:—cows \$20; 3 year old steers \$30; and 4 year old steers \$40.

17 steers averaging	1396 lbs.	brought	\$610	grossing	\$85.18	per head
21	"	1374	"	5.50	"	75.57
122	"	1245	"	5.30	"	66.00
66	"	1159	"	4.60	"	53.34

Cows medium weights grossed \$40 to \$60 per head.

I next proceeded to Strathmore and saw a shipment of cattle loaded for Chicago. They were a select lot of Hereford grades, and very uniform. The lot included 360, 3 and 4 year olds, and were American cattle that had been on Canadian grass for less than 2 years, and consequently were entitled to re-enter the States duty free—I afterwards learned that they were sold as follows:—

360 head, averaging 1,233 lbs., brought \$5.75.

7 head (the tail enders) brought \$4.40.

Later in the season (early in November) I had an opportunity of seeing a shipment of Alberta cattle unloaded in the Chicago yards. This particular lot were shipped by C. J. Reed and C. Gissenger from Red Deer, which point they left on Saturday, October 26. They were fed and watered at Moosejaw for 24 hours; at Velva, N.D., 16 hours at St. Paul, 24 hours; arriving in Chicago, November 4th, making the trip in 9½ days. The shippers were well satisfied with the run and the accommodation en route, but complained that they were obliged to hold the cattle for a week after ordering the cars before they could ship, and further that they had to use a large number of box cars. The freight from Red Deer to Chicago is 83 cents per 100 lbs. This consignment was of a very mixed lot of two, three and four year old steers, and cows, upon all of which duty had to be paid.

13 steers averaging	1327 lbs.	brought	\$5.55,	grossing	\$69.66	per head
20	"	1405	"	5.10	"	71.65

Steers of other grades sold down from \$4.35 to \$4 per head, while cows sold at from \$3.90 to \$3 per head.

At this time the market was very bad. The shippers claim that they lost heavily on this shipment.

I also saw another shipment made by the Cresswell Cattle Co. from Swift Current, from which point the freight was 71 cents per 100 lbs. This bunch of cattle was not in good shape. The tops only brought \$4.65; the next grade \$4.05 with cows selling from \$3.60 to \$2.80. They entered the United States free of duty.

WHITE RIVER YARDS.

Acting under instructions I left Winnipeg on October 10 for White River. While there a train load of cattle were unloaded and fed. These cattle had left Lethbridge on October 9, at 4.30 p.m. They were fed and watered at Moosejaw and arrived in Winnipeg on the 12th at 1.30 p.m., arriving at White River at 3 p.m. on the 14th, leaving again at 9 p.m. the same day for Montreal where they arrived at

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6 p.m. They were again shipped from Montreal at 11 a.m. on the 17th for Boston, making the trip from Lethbridge to Montreal in about 7 days. The short stop at White river did not allow the cattle much time to feed but a liberal supply of hay was put in the cars. This particular consignment was being rushed through to catch a boat. The man in charge reported some delay between Winnipeg and White river, but made no complaint regarding other portions of the trip. The yards at White river were in first class order and very conveniently arranged for handling large numbers of cattle. They were charging \$24 a ton for hay at that time.

EARLY WINTER CONDITIONS OF ALBERTA CATTLE.

Early in the month of January, 1908, I made a careful investigation of the live stock conditions throughout Alberta, inquiring into the live stock and range conditions. Up to the time of my visit, the winter had been very mild and favourable, I found that a very large number, probably twelve or fifteen thousand head of cattle were being hay fed during the winter, and they were reported doing remarkably well under the favourable weather conditions.

In order to see some cattle that were being fed, I went out on the Stettler Branch to Alix, and from there drove out 6 miles to Mr. Wm. Graft's where 190 head were being fed. As the method followed by Mr. Graft is very similar to that in vogue throughout Central Alberta, I shall describe it. A small lake surrounded with steep, partly wooded banks provides abundant water and some shelter. The feed which consists chiefly of hay is drawn direct from the stack and scattered on the ground, along the banks of this little lake. In addition to hay an allowance is given of one sheaf and a half of green cut oats per head per day. The cattle were three and four year old range steers selected from the surrounding district. They were, when I saw them, in fine thrifty condition, and should make early exporters. The intention of the feeders was to ship them early off grass, if they continued to thrive. At the time of my visit buyers were offering to contract for spring delivery at the rate of 4½ cents for hay fed cattle, and 4¾ cents for grain fed cattle, but there were not many 'takers' at these prices.

Owing to the favourable winter and the good quality and abundance of feed, there is no doubt that Alberta cattle will be shipped early and in better condition than during the year previous. This, however, may to a corresponding extent reduce the fall shipments.

Shipments have continued from Alberta throughout the winter up to the present time. During the month of January, from 1,400 to 1,500 head were shipped to the Winnipeg market, about 1,100 of which were forwarded as exports. The remainder can be classed as 'butchers' being mixed lots of cows and heifers. Butchers' cattle are bringing on the Winnipeg market from 3 to 3¾ cents per lb.

ALBERTA CATTLE SHIPMENTS FOR 1907.

The total shipments east off the Alberta ranges during 1907 amounted to 80,043 head, the following tables show the disposal of same:—

Shipped east via C.P.R.:—

Exports.	40,000
Stockers	4,000
Butchers (slaughtered in Winnipeg)	27,321
	71,321

To Chicago via C.P.R.:

Duty paid	2,158
Duty free	2,591

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To Chicago via Great Northern:—

Duty paid	2,733
Duty free	1,240
Total	80,043

HOGS.

A considerable number of hogs are now being shipped from farms in Central Alberta, and from interviews with a good many settlers, I gathered that this was a profitable industry, and with increased facilities, for obtaining cheap feed it is likely to grow into a very important branch of the live stock industry. While I was at Lacombe two car loads were shipped to British Columbia the price paid to farmers being 4 to 4½ cents.

THE SHEEP INDUSTRY.

The very heavy blow sustained by the sheep ranches during the severe winter of 1906-07 has, to a large extent, paralyzed this industry. During the two previous winters, a considerable number of sheep were fed at Moosejaw and Port Arthur on wheat screenings. Little feeding however is being done this winter. On my way west I saw a small bunch of about 300 being fed near Moose Jaw. They were Merino grades of rather indifferent quality but when seen on my return 2 weeks later had improved wonderfully. The method of feeding is very inexpensive, large, cheaply constructed sheds are built in a sheltered location, under a steep bank near a creek, where water is available. In these sheds self feeding pens are placed in which the screenings are dumped and to which the sheep had access at all times. In addition to the screenings hay is fed. The sheep made excellent gains at comparatively little expense and command the top market price.

JAMES F. ROBB.

The Live Stock Commissioner,
Ottawa.

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