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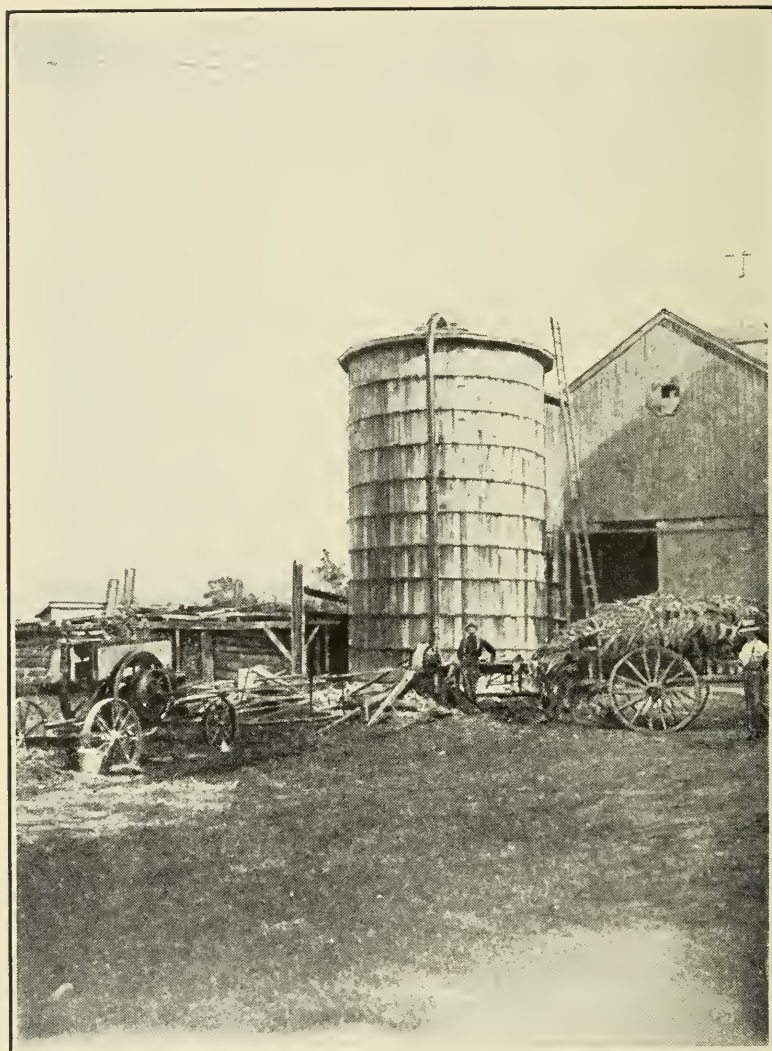
The Practical Farm Library



MAKING THE DAIRY PAY

By N. F. HULL

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THE SILO IS A NECESSARY ADJUNCT OF THE DAIRY FARM

Making the Dairy Pay

By N. P. HULL

*President American Dairy Farmers' Association; Lecturer National
Grange Patrons of Husbandry*



N. P. Hull and his brother farm 350 acres. Their father died when the author was four years of age and his brother two. The mother rented the farm for ten years. Then the boys worked it for four years and it was rented for five years while they went to college and studied medicine. After graduation the young men started as partners to fix up and sell the farm, and they have been fixing up ever since. They have bought all the land surrounding the original farm, and have enlarged or built new buildings. They run from 30 to 50 Holstein cows and sell whole milk to a condensery.

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Table of Contents

	Page
CHAPTER I	
A Word to Readers-----	1
CHAPTER II	
Dairying with General Farming-----	5
CHAPTER III	
Essentials for Profitable Dairying-----	10
CHAPTER IV	
Building a Herd by Breeding and Selection-----	12
CHAPTER V	
Improvement by Selection and Elimination-----	18
CHAPTER VI	
Feeding Dairy Cows for Profit-----	35
CHAPTER VII	
Care of the Dairy Herd -----	57
CHAPTER VIII	
Summer or Winter Dairying -----	63
CHAPTER IX	
Dairy Barns and Equipment -----	65
CHAPTER X	
Crops for the Dairy Farm-----	71
CHAPTER XI	
Silos and Silage -----	74
CHAPTER XII	
Farm Care of Milk and Cream-----	76
CHAPTER XIII	
The Outlook for Dairying -----	79
ADDENDA	
By-Laws for Testing Associations -----	80

CHAPTER I

A Word to Readers

I do not want to call the first chapter of this book an introduction, for readers usually skip the introduction. I want this to be as much my introduction to the reader as his to the things written. More and more each year the busy and discriminating reader endeavors to select from the great mass of matter offered not only that which is true, but that which is most practical for him. He desires exactly the sort of information that will give him the greatest ability to so handle his business and solve his problems as to economically accomplish the ends sought.

I shall not attempt to make this work a new contribution to the science of dairying. It is rather a plain statement of the absolute essentials of practical dairy farming. I shall not attempt to exploit new theories nor settle disputed questions. Rather shall I attempt to set forth in a plain, understandable way just how I, like thousands of others in very ordinary circumstances and with limited capital, have succeeded in making dairying a valuable adjunct to my farm operations.

HOW I LEARNED IT

What I know about profitable dairying I learned in a dairy school taught by the dairy cow in my own barn. The many valuable suggestions from outside sources have been tested in my own dairy and adopted or rejected as results warranted. I only ask the reader who questions the practical value of the facts stated or the advice given in the following pages to test fairly their value for himself.

Years of farmers' institute work and special dairy work under the auspices of state dairy commissions and associations, and in dairy organizations nation wide in their scope have given me a splendid opportunity to study country-wide dairy conditions. This work has also enabled me to visit the dairies and learn the methods of many of the most successful dairymen of this country. The knowledge thus gained enables me to assure my readers that the principles that make for profitable dairying in one section of the country hold good in every other section. Likewise, I have learned beyond question that no man can achieve maximum profit in dairying who does not either consciously or unconsciously practice the essentials outlined in the following pages.

SUCCESSFUL DAIRYING IS PROFITABLE DAIRYING

Most of us count a venture a success if it ends as we purposed it should. My conception of successful dairying is that sort which pays a fair profit on the investment of time and money.

I have seen many dairies conducted, it seemed to me, for the mere fun of the game. At least no other result was apparent. To me it seems that to conduct a dairy so as to make it pay yields just as much fun and a great deal more satisfaction.

When a man puts a part of his time into his dairy operations the commercial value of that part of his life is determined by the profit of his dairy during that space of time. There is small excuse for most of us not making an honest and intelligent endeavor to get as large a value from our time as we honestly can secure.

Why any man should work hard to grow feed, milk cows and take care of the product without seriously endeavoring to make his work pay is a hard

question to answer, yet armies of men are wasting their lives doing just that thing.

DOES YOUR HERD PAY?

The majority of dairy herds in this country are making little or no profit. Is your herd one of them? Can you answer this? A large proportion of the cows kept in this country are inherently such poor stock that it is difficult, if not impossible, to make them produce at a profit. How many such cows are you keeping? Can you answer?



FIG. 1—How MUCH Do YOUR Cows MAKE?

The pictures show the product of a poor, a good and an exceptionally good dairy cow—120 lbs, 360 lbs and 800 lbs respectively. An exhibit at a western fair.

An untold number of inherently good cows are not yielding their owners a profit because they have not been properly fed and cared for. Have you done your part toward enabling your cows to yield profitably? Can you answer?

MONEY TO THE MAN WHO KNOWS

Two young men were engaged in dairying in the same neighborhood. Both were advised to study good dairy methods and to know their business at least to the extent of ascertaining the individual merit of their

cows. One accepted the advice, secured scales and Babcock tester at a small cost and used them. The other said he was too busy and hadn't time to fool with it.

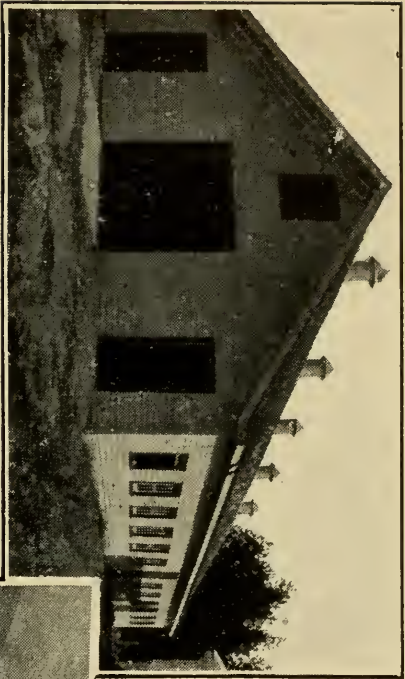
After three years the first young man was getting an average of 250 pounds of butter per cow, the second young man an average of only 200 pounds per cow. It required the proceeds from 150 pounds of this butter to pay for the feed the cows ate. Hence the one had a profit of 100 pounds butter per cow, the other of only 50 pounds.

The second young man thought he could not afford to take time to know his business. He has come now to a place where he must take time. He must take time to make up for what he did not know or practice. He must take time to plant crops and harvest feed for his cows for another year, milk and care for them for another year, and get another 50 pounds of butter, representing profit. He will then have the same profit from his two years' work that the first young man secured in one year. Evidently he was mistaken when he concluded he could not afford to take time to know his business.

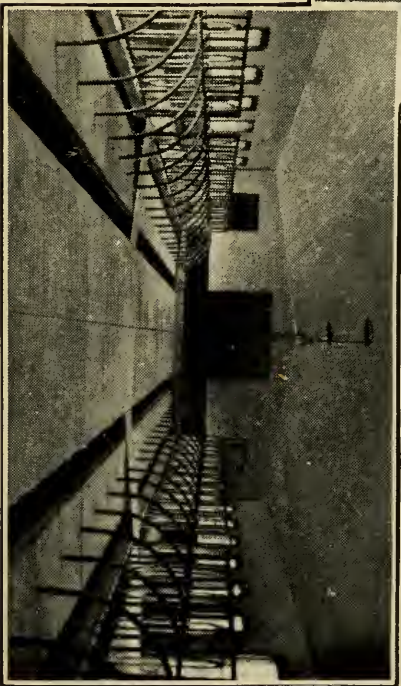
NOTHING TO BRAG ABOUT

America boasts that her farmers are the greatest producers of wealth the world has ever seen, yet we farmers are producing from our cows an average of only 145 pounds butter a year. The Danish farmer produces an average of 224 pounds per cow, and the Dutch farmer 250 pounds. Surely we have little reason to boast about our average dairy production.

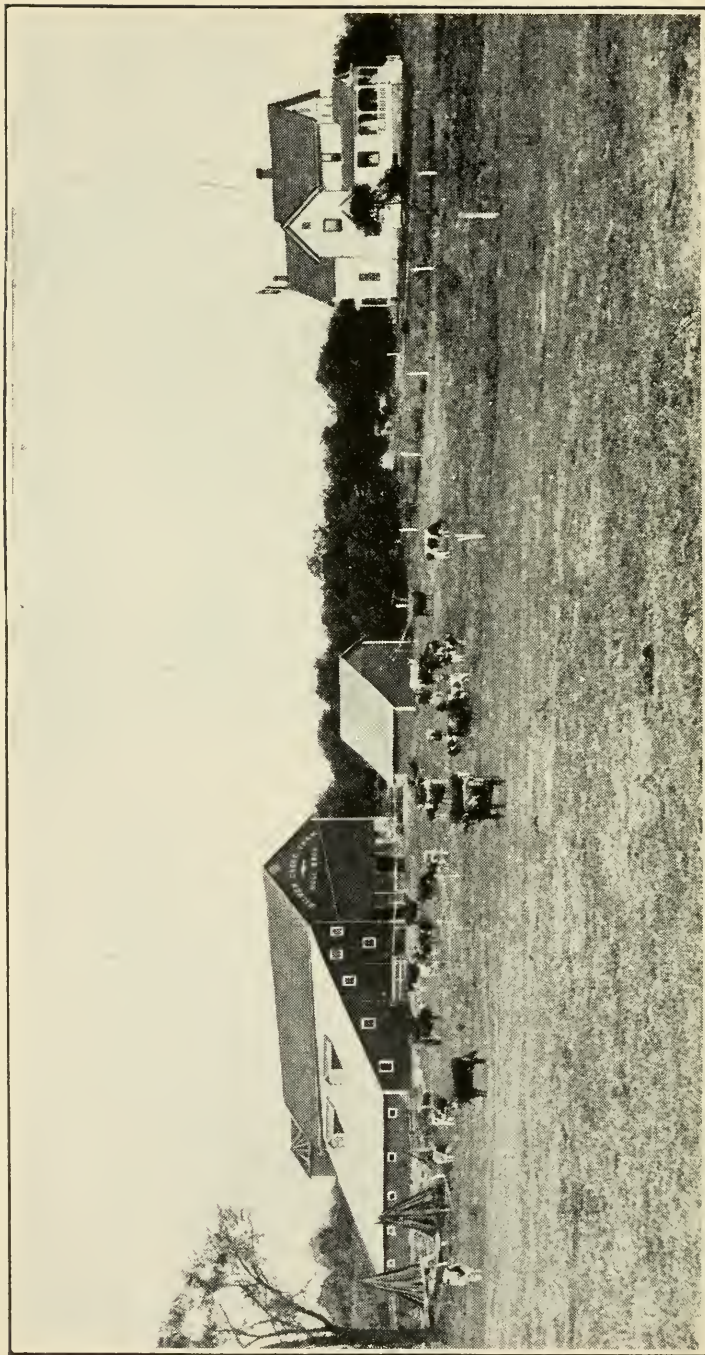
This book is written for those who are willing to join in an effort to increase the average production of the American cow and the profits of the American cow owner.



*A SANITARY
AND PRACTICAL
DAIRY BARN.*



*MAXIMUM PRO-
DUCTION MAY BE
EXPECTED HERE.*



DAIRY HERD AND BUILDINGS OF HULL BROTHERS

The covered barnyard recommended by the author is shown with the long roof and two dormers attached to the barn.

CHAPTER II

Dairying With General Farming

Practical farmers as well as students of agricultural production concede that the best method of maintaining the fertility of our farms is by live stock husbandry. Let the general farmer feed out the roughage and as large a part of his farm products as he profitably can on his farm, carefully husbanding the resulting manures and returning them to the land.

Farmers of past generations, and too many of the present generation, have been soil robbers. We are now at a point where we must become soil builders, or we shall see the importance of agriculture and its products gradually dropping to a lower plane, inevitably lessening our national greatness.

CHOOSING FARM LIVE STOCK

The general farmer feels that he must grow some variety of legume, such as clover, alfalfa, soy beans, or peas, to replace economically the nitrogen that other crops take from his soil. These crops should be fed on the farm, together with the corn stover and other roughage. Naturally we want to feed these crops, representing a certain part of our labor and investment, to the animal that will give us the largest return for them. That animal, one year with another, is *the good cow*.

The *good* dairy cow is the most economical producer of human food of any animal in existence. As time goes on, and the problem of feeding our rapidly increasing people becomes more difficult, meat production must give way largely to milk production.

The dairy cow is a more efficient machine than is a meat-producing cow. A *good* dairy cow will produce a pound of butter from but little if any more feed than is required by a steer to produce a pound of dressed beef. For some years past the farmer has been able to sell the pound of butter for about three times as much as he could get for the pound of dressed beef. More labor enters into the production of the butter than of the beef, but the difference is in no way commensurate with the difference in value of the product. The good dairy cow will, with generous and judicious feeding, yield in her milk three times the digestible nutrients fit for human consumption that the two-year-old steer will produce from the same amount of feed, used with equal judgment.

I say the *good* cow, and I mean just that. Many cows are kept that are not doing what I have claimed for the good cow, but there is no good reason why the intelligent farmer should keep poor stock for any great length of time.

DAIRY OFFERS CERTAIN PROFIT

We plant or sow our farm crops at a certain season, hoping to gather a liberal harvest at some future season. We are, in a sense, dealing in futures. We must accept the chances incident to drought, floods, heat, cold, insect pests and plant diseases. These elements of uncertainty we cannot foresee nor guard against.

Our ordinary farm animals are usually fed valuable feed until they reach a certain age, when they are sold. Here again we are dealing in futures—legitimate futures, to be sure, but often our profits are dependent upon market conditions that we could not foresee.

Some of these uncertainties enter into dairying, but many of them do not. When we get a good cow she is kept in the herd for 10 or 12 years. Except for a short period of rest she should have each year she is converting our grain, coarse feeds and grass into a valuable product and yielding that product twice each day.

The farmer may know, nearly if not quite, what it costs to feed the cow and what values she returns for it. No animal can vie with the cow in yielding quick and steady returns, unless it is the hen, and she pays but once a day.

On my farms I have both raised and bought steers and fed them. Some years they have made a profit and some years a loss. I have grown and fed hogs, usually at a profit, some years at a loss. I keep sheep, both wool and mutton breeds. Some years they have not paid. In all the years I have been keeping a dairy, however, there has never been a year that cows did not pay a liberal profit.

STEADY CASH RECEIPTS INSURED

Every farmer has a steady demand on his resources in such forms as bills for groceries, dry goods, repairs and hired help. It is most satisfactory and most economical to meet these bills promptly with cash. I know of nothing that comes so near insuring the farmer a steady cash income throughout the year as a good dairy herd well managed.

INCREASING THE FARM FERTILITY

The fertility of the farm is increased by plowing under such crops as clover, peas and soy beans, and by using commercial fertilizers. When crops are plowed

down, however, and fertilizers bought, all the farmer gets from the use of his land and money is fertilizer. If, on the other hand, these crops are harvested and fed to good cows, money invested in commercial feeds and fed to good cows, and the manure carefully conserved, the farmer may get good pay for the use of his land, get his money back from his purchased feed with a profit and still have three-fourths of the original fertilizing value of crops and purchased feed to apply to his land. Thousands of farmers have proved beyond question that a *good* dairy herd may make *liberal profits*, at the *same time increasing the fertility of the farm*.

IS DAIRY FARMING TOO CONFINING?

It is often asserted that dairying is confining and requires closer application than most other lines of farming. This is undoubtedly true. Cows must be milked twice a day, and must be fed and cared for regularly and systematically for best results. To some this offers a valid objection against dairying; to others it does not. It should not deter the young farmer who is anxious to succeed and who is made of the right material. He will learn, if he does not already know it, that very few people succeed in any business who are not willing to give close personal application to it.

THE HELP PROBLEM IN THE DAIRY

More labor is required in dairying than in other lines of animal husbandry. In some sections hired men are averse to milking cows. In many instances the farmers themselves are to blame for this prejudice. Too often they expect the help to work 10 hours in the field and then milk several cows. If the milking is

made a part of the day's work most men had as soon milk as to do other farm work. I have found that dairying has helped solve the farm labor problem, as far as I have it solved.

Before I kept a dairy I wanted men to work about seven months of the year. I found that good steady men want steady employment. With a dairy I am able to give them such employment. I now have tenant houses and hire married men by the year. When I get a good man I keep him for a term of years if possible. On the whole, the dairy farmer is not at a disadvantage concerning hired help.

CHAPTER III

Essentials for Profitable Dairying

By no means would I have readers conclude from the foregoing chapter that success comes to all who keep cows. There is a decided difference between cow-keeping and dairying. The dairy equation may be stated briefly thus: *The dairy herd equals the dairy man.* Seldom is a dairy herd found that excels in production the degree of wisdom and ambition attained by the man who selects, maintains, and manages the herd.

Good cows, generous and judicious feeding and proper care are the three essential factors in developing maximum profit in a dairy herd. They are essential in every herd and in every section of the country. They are the cornerstone upon which rests profitable herd production. The degree of success attained by

every dairyman is in direct proportion to the degree in which these factors are appreciated and intelligently incorporated into his plan of dairy procedure.

The best herds are not gotten together by chance nor accident; they are rather the result of years of careful selection and breeding. It is encouraging rather than otherwise that painstaking, intelligent effort may develop a good

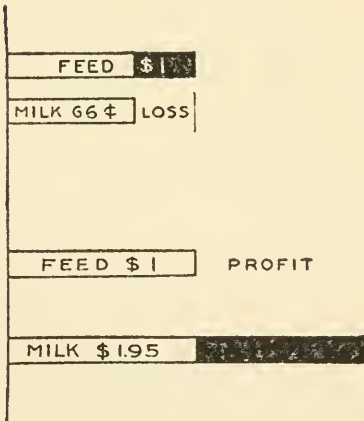


FIG. 2—PERFORMANCE OF TWO HERDS SUPPLYING SAME CREAMERY.

herd of cows that may be so fed and handled as to insure liberal profits.

A few years ago I had occasion to make a somewhat close examination of dairy conditions about a certain creamery. One farmer received from the creamery only \$22 a cow, which was a return of but 66 cents for each dollar's worth of feed consumed. Another farmer received \$79 a cow, a return of \$1.95 for each dollar's worth of feed consumed.

Allowing the skim milk, the calves, and the manure to offset the labor costs of the dairies, the one farmer disposed of his feed at a decided loss, the other at a handsome profit. These farmers lived only a mile apart, on the same road. The same creamery handled the milk from both farms and they received the same price per pound for butter fat. Why such a difference in results? One man had put enough intelligence and painstaking care into his dairying to make it a success; the other had not.

I believe in dairying, but I would advise no man to go into the business unless he cares enough about success to be willing to put forth intelligent effort. I am at a loss to know what such a man had better do, but he certainly will not succeed in the dairy. Commenting on the results of a cow census conducted under his direction and comprising 2,163 herds in 13 of our leading dairy states, Hon W. D. Hoard, the noted Wisconsin dairy authority, said: "The one great and paramount conclusion overtopping all others is that a loss of profit in dairying is occasioned in nine cases out of 10 by lack of sound dairy intelligence on the part of the farmer who is behind the cow."

CHAPTER IV

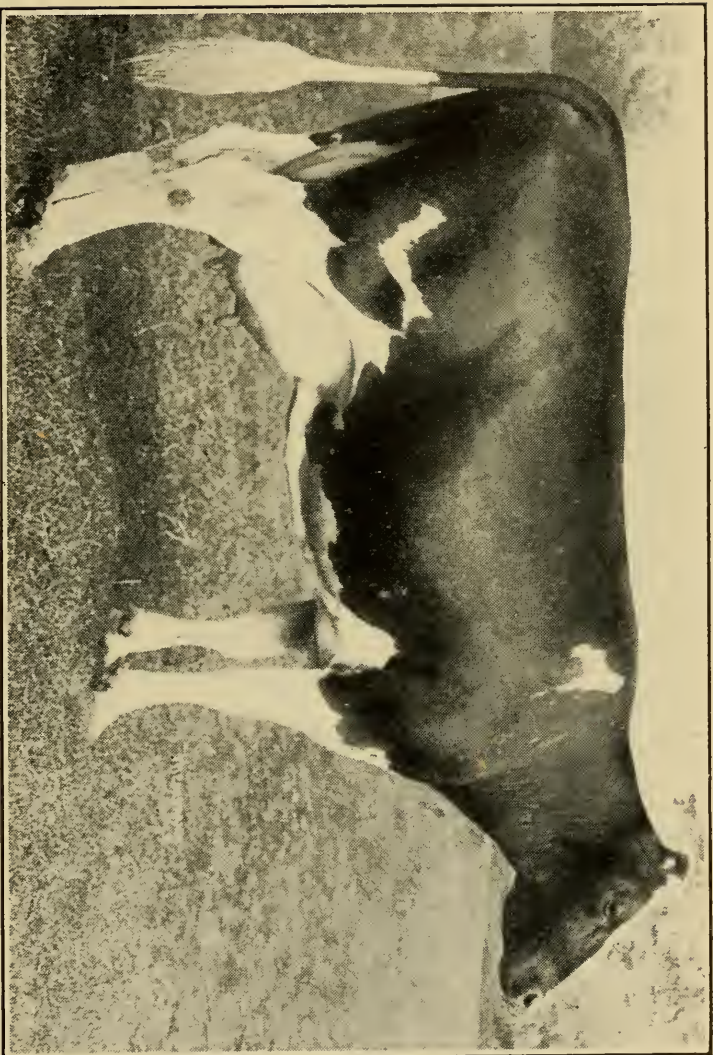
Building the Herd by Breeding and Selection

CHOOSING A BREED

The man who desires to build up a good dairy herd should first select a breed. In my judgment this should always be distinctly a dairy breed. Too much emphasis cannot well be placed upon a matter of selecting a special-purpose dairy breed. For generations, skillful men have carefully selected, bred, and handled certain breeds in an effort to improve and perfect their milk-producing function. It has been proved beyond question that the breeds so developed will produce milk much more economically than will a breed developed for another purpose or purposes. Why should not the dairy farmer of today profit by the skill of these breeders by introducing into his herd, as rapidly as he can, the inherited milk-giving function of dairy breeds?

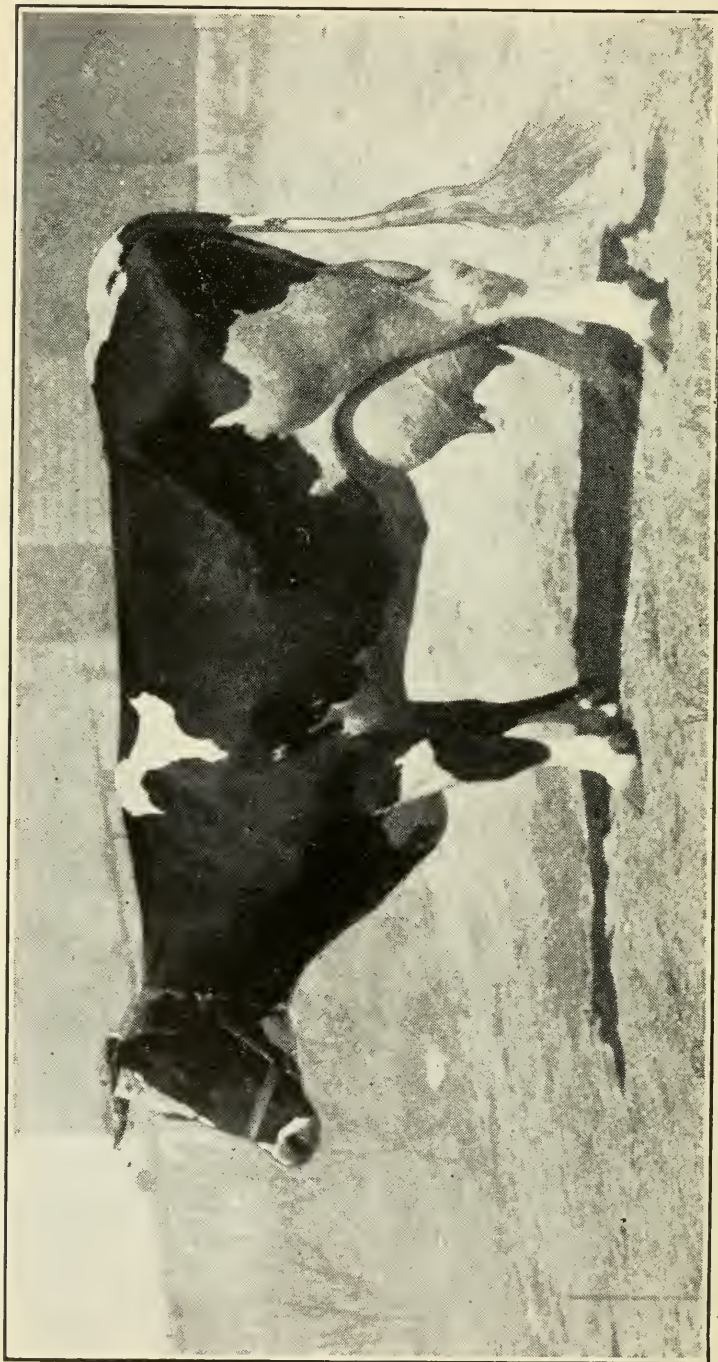
In selecting a breed, be guided first by personal preference, and second by the market for your product. In this country are four leading dairy breeds, Holstein, Guernsey, Jersey and Ayrshire. Any one of these in the hands of a competent dairyman will prove satisfactory.

I am not advising the beginner to buy pure bred cows of any breed, nor the farmer who now has a herd of cows to sell them and buy pure bred. Breeding and selling pure-bred dairy cattle is a business by itself. For the ordinary farm dairy the high-grade cow is nearly as liberal a producer as the pure bred.



HOLSTEIN Cow, K. P. PONTIAC LASS 106812

Champion dairy cow of the world with a record of 44.18 lbs. butter, 585.5 lbs. 6% milk in seven days, 171.5 lbs. butter in 30 days, 427 lbs. butter and 6787 lbs. milk in 90 days.



HOLSTEIN COW, CREAMELLE VALE

Record 1155 lbs. butter and world's record for milk, 29,653.4 lbs. in one year.

There are no more pure-bred dairy cows in the country than needed to supply the demand from breeders. There are, however, enough pure-bred bulls that by a reasonable outlay of time or money the use of one may be secured for nearly every dairy herd.

Select a breed and stick to it. Use in your herd only pure-bred bulls of that breed.

The improvement made by several years of wise breeding has often been nullified by a mistaken notion that some valuable quality could be introduced by using a bull of some other breed. For instance, men have used a Jersey bull upon high-grade Holstein cows, hoping that the heifers from such mating would produce the large quantity of milk characteristic of the Holstein, and containing the high fat content of the Jersey. Occasionally a good cow results from such breeding, but not often. More often the result is cows producing a small quantity of poor milk. When the first cross does bring a good individual producer her heifers are seldom her equal.

Cross breeding for meat production is often successfully practiced. It is well understood that such an animal should never be kept for breeding purposes. Efforts to incorporate in one animal the good qualities of all breeds by a mixture of the blood of those breeds have always been disappointing. Retain the heifer calves from your best cows, and if you have been wise in the selection of a bull your herd will improve from year to year.

SELECTING A SIRE

It has been said that the bull is half the herd. In the improvement of a grade herd it is safe to count upon the *good* bull as *more than half the herd*. The

rate of improvement very largely depends upon the wisdom exercised in the selection of the herd sire.

Breeding, individuality and prepotency are the three major considerations that should govern in the selection of the herd bull. The first great law of breeding is that like begets like, or the likeness of an ancestor. When possible to make a personal examination of the dam of the bull you think of buying or using, do not neglect the opportunity. His daughters will probably be like her. Note her form, her indicated strength, constitution, and capacity. Note the shape and texture of her udder, size and placement of teats, shape and size of her milk veins and milk wells. Ascertain, if possible, her actual performance at the pail both as to quantity and quality. After this learn what you can about his sire, and then his granddams.

When personal inspection of ancestors is out of the question judgment as to breeding will have to be based upon the animal himself and the producing record of his ancestors.

INDICATIONS OF MERIT

Indications of individual excellency and prepotency are so interlinked that they may be well considered together. First the bull should be distinctly masculine in appearance. He should be strong and of good constitution, as indicated by a large, bright, active but not restless eye; by a large heart girth, providing space for a large, strong heart, and capacious lungs. He should be active in movement, not sluggish.

Good dairy animals must be able to digest and assimilate a large amount of food. Ability to do this is indicated by a strong broad muzzle, well-muscled jaws, long, well-sprung ribs, fine, soft hair, and elastic skin. Dairy temperament in the bull is further in-

licated by a large prominent spine and well-developed rudimentaries.

A sire is said to be prepotent when he is able in a marked degree to transmit his qualities and temperament to his offspring. Hence, prepotency is one of the most desirable attributes of a good dairy bull. This quality can be fully demonstrated only when his daughters come to producing. Prepotency is usually found in a sire of strong individuality and is indicated by masculinity, strength, and vigor.

BREED TO MATURE BULLS

An unprofitable practice, not only of dairy farmers but of breeders, is to buy a young bull, put him in service as soon as he is old enough, use him a year or two and then sell him to shipper or butcher. Many dairy bulls that might have been of untold value to their owners and to a community have gone to the block before they had an opportunity to demonstrate their worth. More care should be used in selecting sires, and when once put in service they should be kept until their get demonstrates their ability. If their daughters show marked merit the bulls should be kept in service to a good old age.

There is a popular belief that dairy bulls become cross as they grow old and are dangerous to handle. This is partially true, but bulls become ugly largely through abuse, improper handling and lack of exercise. As long as the practice of retiring mature bulls in favor of young, untried ones continues, our dairy herds will not show the improvement they should.

Inbreeding should be practiced only to a very limited extent. Dairymen must introduce new bulls into their herd every two or three years. However, mature bulls may be purchased or exchanged and thereby good bulls kept in service.

GOOD BULL PROFIT TO COMMUNITY

I have observed that in communities where some farmer keeps a good dairy bull, his neighbors often fail to improve the opportunity of securing his services. This is a flagrantly shortsighted policy. Perhaps no better proof of this can be offered than that contained in Bulletin 164 of the federal department of agriculture, which contains a summary of the cow census taken under the direction of Hon W. D. Hoard. This census covered the operations of 2,163 herds containing 28,487 cows and located in 13 different states. I will give here the records bearing upon the above point of the first five localities canvassed, which are fairly representative of the whole.

DAIRY TYPE MAKES THE MONEY

Locality	No. of herds	Type of herd	Annual profit per cow
Jefferson County, Wis.	76	Dairy	\$17.53
Jefferson County, Wis.	24	Dual purpose	6.67
Five Iowa Counties	17	Dairy	20.43
Five Iowa Counties	83	Dual purpose	.54
Five Ohio Counties	39	Dairy	23.80
Five Ohio Counties	20	Dual purpose	8.56
Delaware and Otsego Counties, N. Y.	40	Dairy	8.93
	50	Mixed Breeding	3.43 Loss
Susquehanna Co., Pa.	15	Dairy	20.85
Susquehanna Co., Pa.	21	Not Dairy	1.70

These tables show at a glance the superior value of cows of dairy breeding. A summary of all the herds canvassed shows that cows of dairy type pay their owners \$1.51 for each dollar's worth of feed consumed, in

contrast to the \$1.06 returned by cows lacking in dairy type.

In the census as a whole, cows of good dairy type showed an annual profit more than eight times greater than the cows lacking dairy type. This shows that farmers who have good cows get as much profit from their herds in one year as those with poor cows receive in eight years. In other words, *good* cows as compared with *poor* ones *multiplied the value of the time their owner put into dairying by eight*.

SECURING GOOD DAIRY BULL

When there is no good bull of your favorite breed within driving distance, some sort of arrangement should be made to get one. *Individual ownership*, *joint ownership* by a few under private agreement and a *bull association*, are three available plans for securing one. The advantages of individual ownership are apparent. Where this seems out of the question a few neighbors can join together and purchase one. Many communities have made great strides in dairy improvement by organizing bull associations. Plans and by-laws for such an association may be obtained by writing the dairy division of the department of agriculture, Washington, D. C.

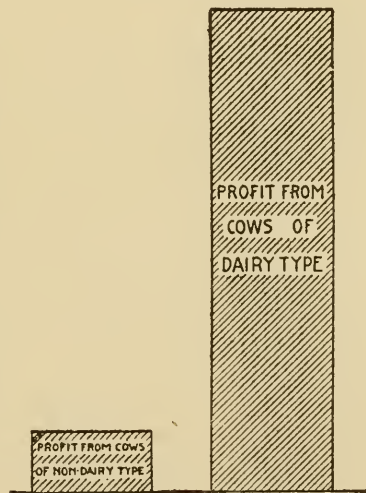


FIG. 3—RESULT OF CENSUS OF 28487 COWS IN 2163 DIFFERENT HERDS.

CHAPTER V

Improvement by Selection and Elimination

Every man who keeps a herd of cows for dairy purposes, be the herd small or large, should remember that the value of the time he devotes to his herd is very largely determined by the dairy excellence of his cows. This, in other words, determines the volume of his profit or loss.

Many men have invested in dairy cows and dairy equipment and are putting much time into growing feed, feeding, milking and caring for their herd, but have not invested in enough dairy knowledge to enable them to get a profit, or as large a profit as they should, from the business.

Others who have the knowledge seem not to realize the necessity for using it. Every owner of dairy cows should adopt some method of determining the producing capacity of each cow and then should keep in the herd only those which return a fair profit.

KEEP GOOD COWS

Hundreds of times at institutes and dairy meetings I have been asked, "*What kind of cows shall we keep?*" I have always answered, "*Good cows.*" Some cows have the natural ability profitably to convert feed into milk. Others have not that ability, and no matter how judiciously fed and cared for will never make profitable dairy cows. There is usually not a wide difference in the profitable butter fat producing ability of the best cows in the leading dairy breeds, but there is a very

wide difference between the best and poorest individuals in a herd of any breed.

At the Louisiana Purchase Exposition at St Louis a breed test was conducted based upon economy of production. The best Jersey showed something over \$1 more profit on the feed consumed than the best Holstein, but there was over \$24 difference between the best and poorest Jersey in the test. In other tests cows from other breeds have won highest honors, but the results of all tests prove that individual merit wins rather than breed excellence.

THREE KINDS OF COWS

We might divide the cows kept at present by the farmers and dairymen of this country into three classes. One kind takes our feed, masticates, digests and assimilates it, and because of temperament, inherited tendency, predisposition, or the law of her nature converts a large part of it into milk. This cow is a dairy cow. It is this kind that the farmer should get and keep for she will do him good and not evil all the days of her life.

Another kind consumes feed, and because of her temperament, inherited tendency, or the law of her nature, converts a large part of it into flesh. She is a beef cow, and if her owner is looking for dairy profit he should make beef of her just as soon as he can. To be sure, she will give some milk, perhaps a good flow for a time after freshening. Her instinct of maternity prompts her to nurture her offspring, but if this cow is fed generously as a dairy cow should be, instead of giving a continuous heavy flow of milk for a long period she will shrink in milk and gain in flesh.

Still another kind consumes feed and gives no return of any kind for it. She seems neither to con-

vert it into milk nor flesh. She is, of course, of no value as a cow and should be disposed of at once. It would be interesting to ask the owner of each herd in this country how many of the two latter kinds of cows he has in his herd. Comparatively few would be able to answer. Few seem to have taken any special

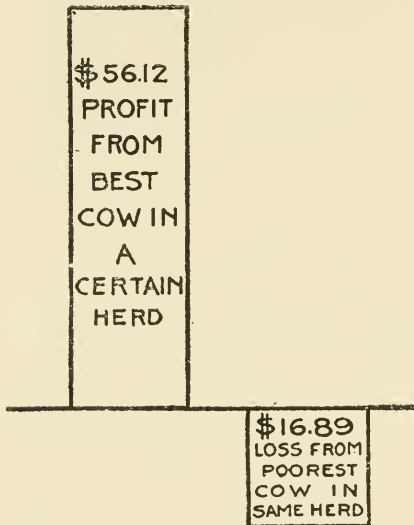


FIG. 4—SHOWING OF TWO COWS IN SAME HERD.

interest in the matter. It is surprising that this should be true when success or failure so largely depends upon this factor. During the last few years much light has been thrown on the matter of production by dairy-men who have kept a record of their herds and by cow-testing associations. I have before me many of these records.

Manifestly it is unfair to compare the cows of one herd with those of another, or those of one locality with those of another, because conditions and local prices vary so widely. It is, however, fair to compare cows in the same herd that have the same treatment, practically the same feed and the same market value per unit of product.

HERD RECORDS FIND THE PROFIT

The poorest cow in one herd shows a loss of \$16.89, the best cow a profit of \$56.12. In a herd of 30, comparing only mature cows, the poorest lacked

\$4.71 of paying for her feed for the year. The best cow paid for her feed and yielded a profit of \$42.47. In another herd, one cow made a profit of \$11.37, and another \$66.80. While both made a profit, one made nearly six times as much as the other.

In a Nebraska cow-testing association the best cow in a certain herd gave 12,959 pounds milk testing 3.46% fat, and producing 448 pounds butter fat. Another cow in the same herd gave 1,797 pounds of milk testing 2.82%, producing 50 pounds butter fat. From the first cow the owner made a profit of \$123.58, and from the second he sustained a loss of \$13.73.

Thousands of other records show in just as marked a degree the great difference in the ability of cows to produce at a profit. There are but few herds of cows that do not show a similar variation when tested for a year, unless they are herds that have been tested and the poor, unprofitable cows, and those showing low producing power eliminated.

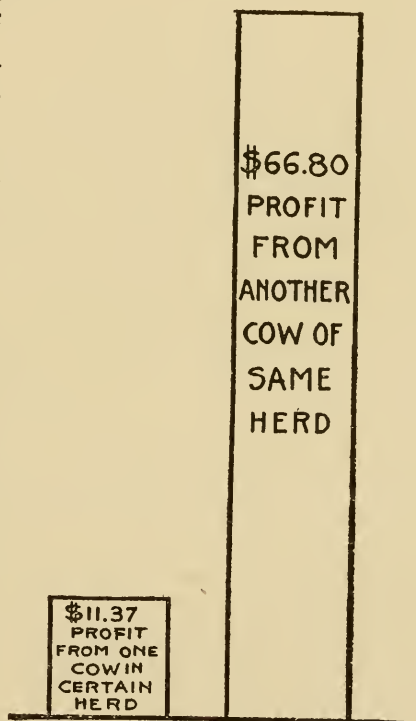
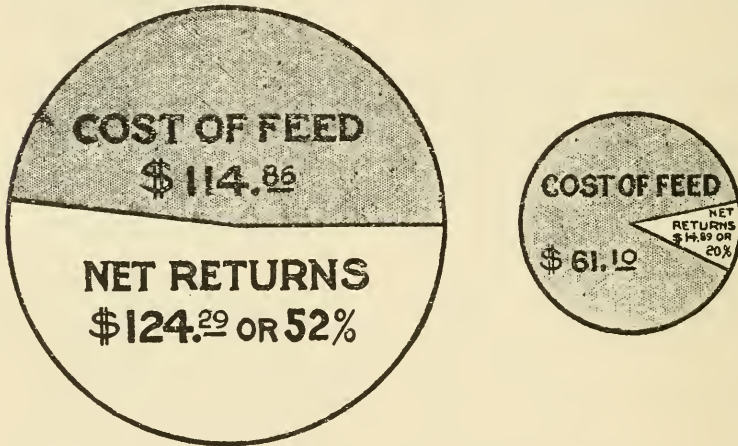


FIG. 5—ONE COW MADE SIX TIMES AS MUCH PROFIT AS THE OTHER.

An observant dairyman is, of course, able to detect a difference between a very profitable and an extremely unprofitable cow. Few of those, however, who do not test or keep records can at the end of the year tell

whether a certain cow has given 5,000 or 6,500 pounds of milk and whether that milk tested 3% or 4%. Such a difference may easily determine whether a cow is profitable or unprofitable.

It is my opinion, based upon observations of thousands of herds kept for dairy purposes, and from a vast amount of reliable data, that were the poorest 40% of the cows now kept in farm dairies disposed of, the remaining 60% would produce a much greater ag-



The area in the circles represents the products of the best ten and poorest ten cows in Wisconsin dairy competition.

gregate profit than is now obtained. From data at hand bearing upon this point let me give the figures from one herd where an accurate record has been kept for two years. There were 26 cows in the herd the first year. The whole milk was sold at a fair price, and these cows showed an average profit of \$22.93. Even at this average some of the cows were unprofitable. Nine of the poorest were sold and the remaining 17, their milk selling at the same price per gallon, made an average profit of \$55.74. The owner of this herd received \$351.40 more profit from his 17 best cows in a year than he received from his original 26 cows the

year before. He had fed and milked nine fewer cows, with the attendant saving of time and energy.

It would seem that when the dairy farmers of this country are assured that by keeping fewer but better cows, and doing less work they can make more profit, they would gladly do so. On 85% of the dairy farms of this country the adoption of an accurate method of identifying and eliminating the poorest cows will assuredly bring such results.

Simply wanting better results is not enough. Wishing alone never will accomplish anything. Having the way pointed out will never get the dairy farmer anywhere unless he follows the way. Many dairy farmers who milk their own cows have told me that they know all about their cows and do not need to adopt new and accurate methods for improvement. A few such farmers have been induced to join a cow-testing association or to test and keep records of their cows. As a rule they have been very much surprised at the records. Not infrequently the cow they had considered the best has proved of little value, while others thought to be only medium have proved to be their best. Since it is profit we work for, does it not seem logical to first find where we get our profits and then try to increase them?

PICKING OUT THE PAYERS

It is not enough to know that our herd pays a profit. We must know that each cow is a profit-producing animal. Why keep a cow unless she makes money? No man should be content to stop even when each cow pays a profit, but should so breed and select as to constantly improve his herd.

Some dairymen have many fads and fancies, but the hard-headed practical business farmer wants to know, and should know, the value of the feed each

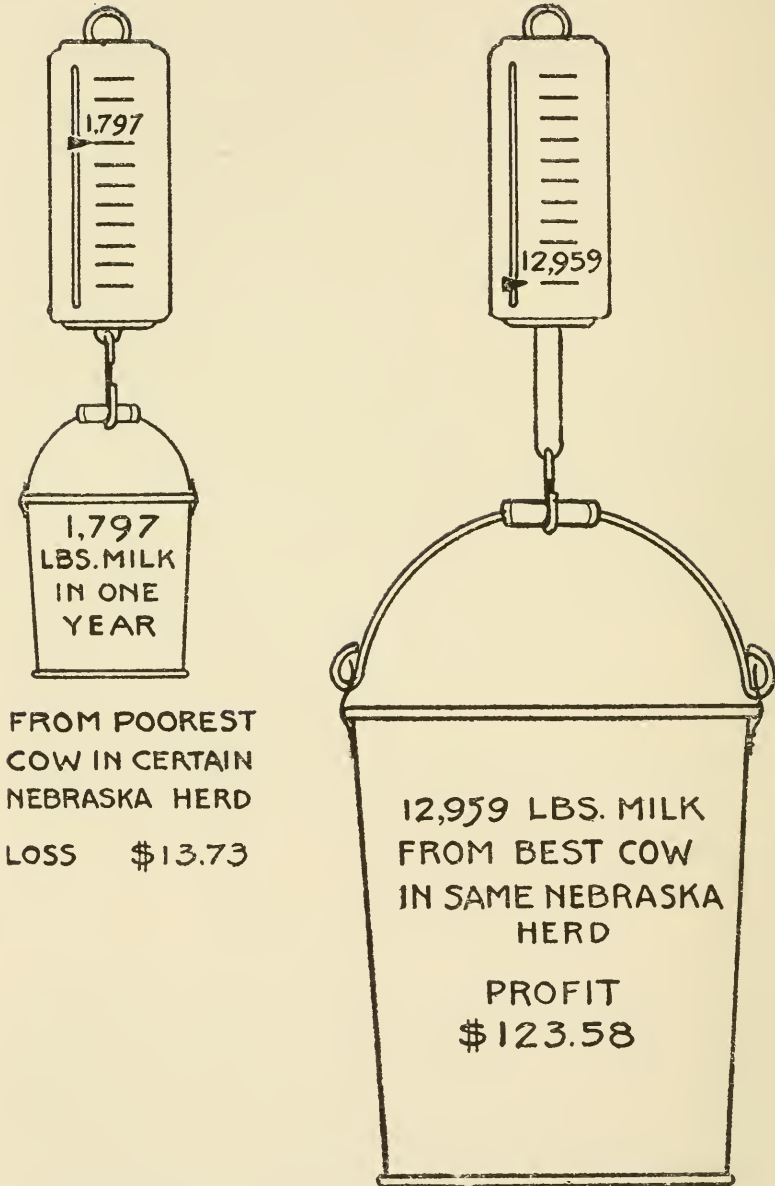


FIG. 6—PROFIT AND LOSS FROM COWS OF SAME HERD

cow consumes and what she returns for it. His cows furnish a market for his feed right on his farm; they are a good or a bad business proposition just in proportion to the excellence of the market they afford. I have talked with many dairy farmers who seem to think it would require too much time and effort to ascertain the value of the feed eaten by each cow and the value of the product she returns. This is not true.

To be sure, considerable time and effort is required by the experimenter, who must ascertain exact values, and therefore must weigh all feed that the cow receives and weigh and test each milking. Such exact work is not required on the part of the dairy farmer, who needs only to know exact enough values for practical results.

If a dairy farmer observes the following instructions in his practice, he will have sufficient knowledge for practical results. The only extra equipment necessary is a spring balance scale and a hand tester. The scales cost \$1 and the tester about \$5.

FINDING THE VALUE OF FEED

In winter feeding weigh the hay fed to individual cows two or three times. The amount fed from day to day will vary a little, but not enough to be material. Likewise weigh the silage and other roughage fed. A few weighings during winter will suffice. Feed grain from a small measure and



FIG. 7—SUCCESSFUL DAIRYING BEGINS WITH USING MILK SCALES.

MILK RECORD		FOR THE MONTH ENDING _____ 191
NAME AND NUMBER OF ANIMAL		
1	A.M. P.M.	
2	A.M. P.M.	
3	A.M. P.M.	
4	A.M. P.M.	
5	A.M. P.M.	
6	A.M. P.M.	
7	A.M. P.M.	
8	A.M. P.M.	
9	A.M. P.M.	
10	A.M. P.M.	
11	A.M. P.M.	
12	A.M. P.M.	
13	A.M. P.M.	
14	A.M. P.M.	
15	A.M. P.M.	
16	A.M. P.M.	
17	A.M. P.M.	
18	A.M. P.M.	
19	A.M. P.M.	
20	A.M. P.M.	
21	A.M. P.M.	
22	A.M. P.M.	
23	A.M. P.M.	
24	A.M. P.M.	
25	A.M. P.M.	
26	A.M. P.M.	
27	A.M. P.M.	
28	A.M. P.M.	
29	A.M. P.M.	
30	A.M. P.M.	
31	A.M. P.M.	
TOTAL FOR MONTH		
PER CENT. FAT		

FIG. 8—CONVENIENT FORM FOR KEEPING DAILY MILK RECORD

weigh that measure of grain, or of the different grains fed, a few times, and use these weights as an average.

It is well to mark above the stanchion of each cow the number of measures of grain she is to have. In

this way it is easy to ascertain the value of the daily ration. Weighing is done only as often as the ration is changed.

The value of summer pastures must be estimated. The value of any supplementary feed may be determined as in winter feeding. This is certainly not an arduous task.

VALUE OF THE PRODUCT

To determine conveniently the value of the product, enough milk pails should be secured of the same weight to accommodate each milker. The movable hand on the dial of the scale should be moved backward so that when the empty pail is hung on the scale, the hand will be at zero. Have a milk sheet arranged convenient to the scale. These milk sheets may be procured from any dairy supply house, or heavy paper can be so ruled as to provide a space for each day in the month. These spaces should be wide enough to allow placing the weight of the morning milking above and the evening milking below. The name or number of each cow is placed at the left.

I firmly believe that it pays from every viewpoint to weigh every milking. Weighing one day a week, or once each 10 days and multiplying these weights by seven or 10, as the case may be, will give quite accurate results. There is no question, however, that milkers take more interest in their work, and do it more thoroughly when a record is made of each milking. This may not be true of all milkers, but I have noted that even the owners of herds detect more quickly variations in the milk flow, and are more likely to remedy the abuses in feeding and care that may cause such variations.

It requires but a short time at the end of each

month to total these sheets and at the end of each year to total the monthly yields. If one is selling whole milk regardless of the test, the difference between the value of the feed consumed by each cow and the value of her milk tells the story of her efficiency as a market for her owner's feed.

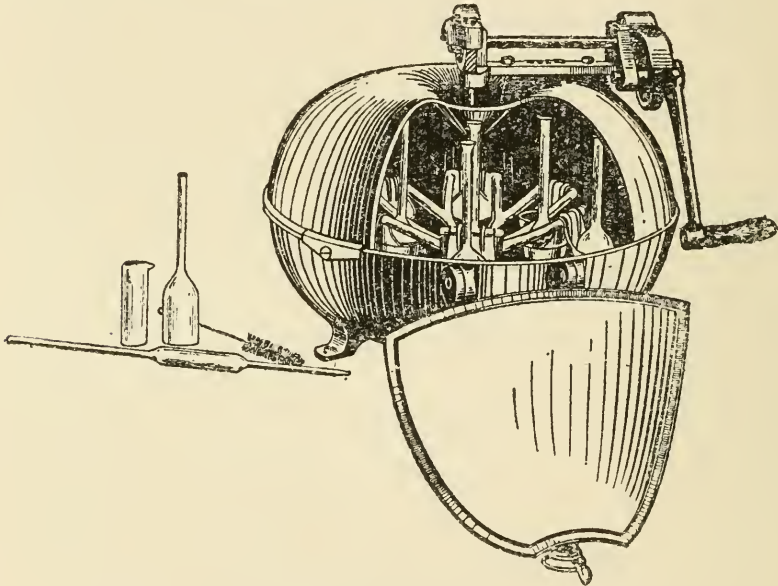


FIG. 9—A BABCOCK MILK TESTING OUTFIT

If the milk is sold on its test, or the fat is made into butter either at the creamery or on the farm, another element enters into determining values.

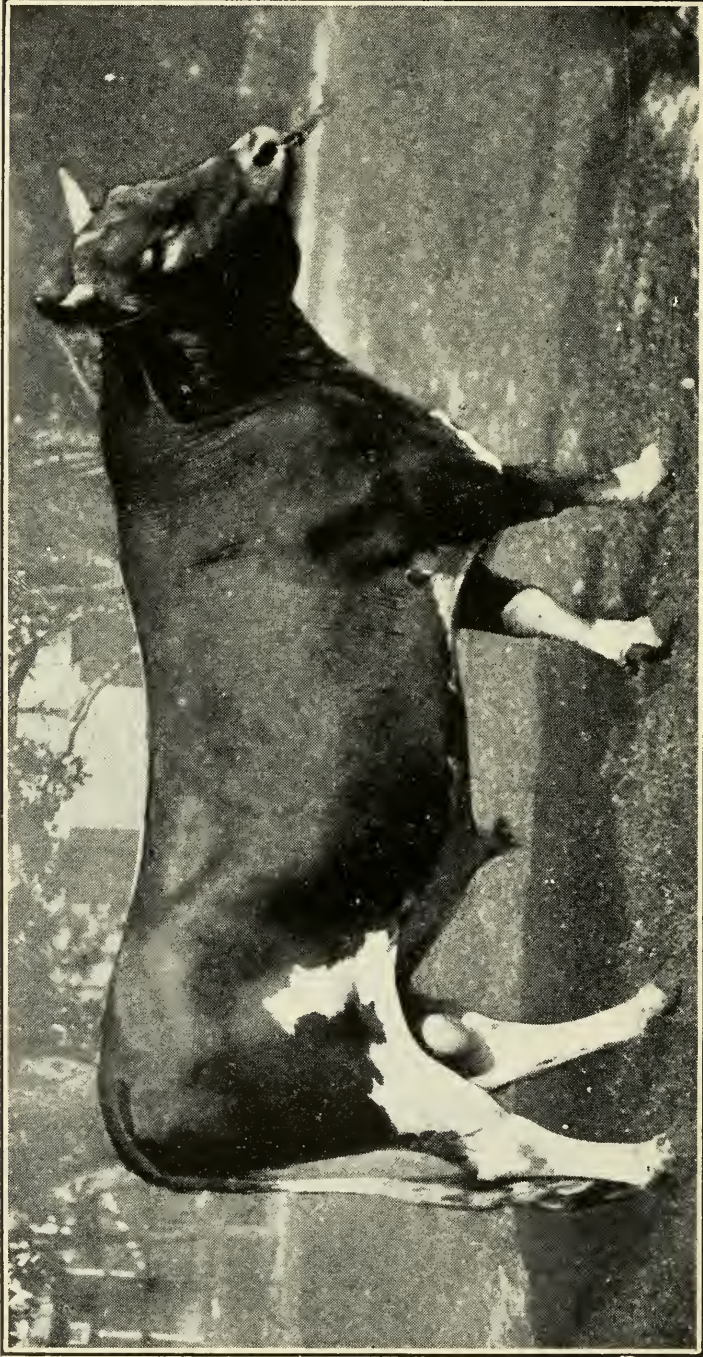
USE THE BABCOCK TESTER

Testing milk with a Babcock tester is not a difficult operation. Almost any one after a little practice can use a tester, and with reasonable care secure quite accurate results. When there is a creamery or a cream-testing station in the neighborhood, the farmer can usually get milk samples tested at very small cost.



HOLSTEIN BULL, KING OF THE PONTIACS

The greatest living sire of the breed. Has 83 A. R. O. daughters, 50 of which have records of over 20 lbs. butter in seven days. Sire of K. P. Pontiac Lass, 44.18 lbs., and of three other heifers with records of over 30 lbs. butter in seven days.



GUERNSEY BULL, DAIRYMAID'S GLENWOOD OF PINEHURST, 10548 A. R.

An excellent type. The sire of two advanced register cows with records of 656 and 750 lbs. butter in a year.

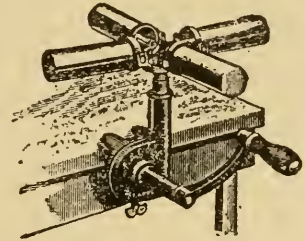
When there is no such place near it is necessary for the dairy farmer to buy a tester or for a few neighboring farmers to club together and buy one, if they are to test the milk from their cows. They are so inexpensive that any dairy farmer can afford to own one. Full directions for operating come with the machine.

Tests should be made each month, or at most each second month. In taking a sample for testing an equal amount of milk should be taken from the morning and the evening milkings, as it has been found that the two milkings often vary in fat content.

Mix the milk thoroughly before the sample is taken. This is best done by pouring from one vessel to another. If the milk is so poured three times, it will be thoroughly mixed unless it has set until the cream is quite fully separated. A half-pint of milk, or even less, is sufficient for the sample.

Before filling the pipette from this sample see that it is thoroughly mixed and that no cream adheres to the sides of the vessel. The number of pounds milk given during the period between tests multiplied by the test gives the yield of fat for that period.

Normal cows vary somewhat in their yield from year to year, but if a cow is in good condition and her yield does not show a fair profit, she should be disposed of at once, especially if she shows a tendency to put on flesh.



A SMALL FOUR-BOTTLE
BABCOCK TESTER

COW-TESTING ASSOCIATIONS

Individual farmers *can* test their herds, but they usually *don't*. Few dairy farmers will or do undertake

to test their herds although they may fully realize the value of so doing; furthermore, those who start the work do not always keep it up as they should. These facts lead me to strongly recommend that in every section where there are enough cows the farmers organize a *cow-testing association*.

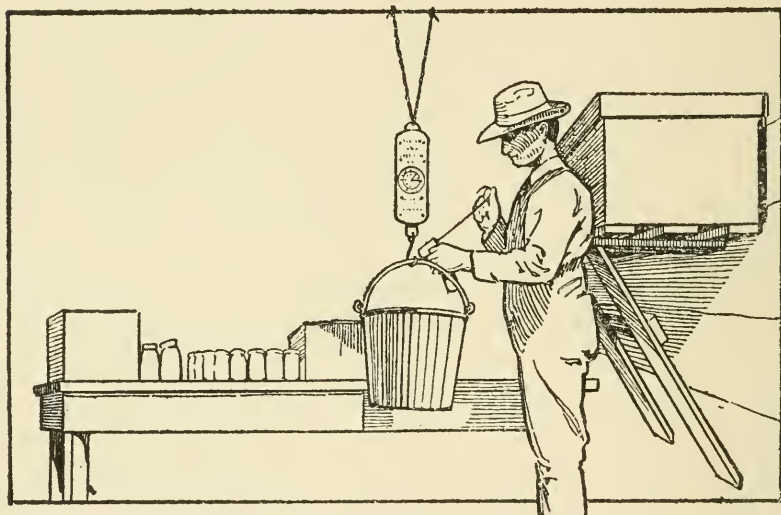


FIG. 11.—THE TESTER AT WORK

Co-operative testing gives accurate results cheaply.

Cow-testing associations were introduced into this country by Mr Helmer Rabild, now with the department of agriculture at Washington. The first association was organized in Michigan in 1905. At the close of 1912 there were 118 of these associations in the United States.

The plan is to hire a man to put in all or part of his time testing the cows belonging to the members of the association. The tester visits the farm of each member once a month, weighs the feed given each cow for the one day and computes its value, weighs and tests her milk for the one day, and computes its value.

This one-day record is taken as the average for the month.

At the end of the year the tester furnishes the owner of the herd a complete record of each cow. A glance at this sheet shows the value of the feed consumed by the cow for the year, the pounds of milk she gave, its test, the pounds of butter fat it contained, the value of this fat, what it cost to produce a pound butter fat with this cow, the cost per 100 pounds milk, how much she paid for each dollar's worth of feed eaten, and the net profit or loss she made for her owner.

This sheet shows the farmer just what he ought to know about each of his cows. The ordinary rule in these associations is for each member to pay \$1 per cow tested, board and lodge the tester while he is testing the herd, and transport him to the home of the next member.

The results that should be directly credited to these associations abundantly prove the wisdom of Mr Rabild and those associated with him. As proof, consider the following summary of results obtained in the first four years' work of a Michigan cow-testing association:

FOUR YEARS OF TESTING

	No. of cows	Average pounds milk	Average pounds fat	Average value of fat per lb.	Value of fat	Average cost of feed	Average profit
First year	239	5,336	215.0	23.3 cents	\$50.27	\$29.28	\$20.99
Fourth year	272	6,170	264.5	31.2 cents	\$82.43	\$41.99	\$40.44

During these four years the value of the fat per pound increased 34%, but the value of feed shows 43% increase. The higher value of feed was due partly to

a rise in prices and partly to the fact that a heavier grain ration was fed. The remarkable showing, considering the number of cows and the 26 herds in the association, was in net profits, which nearly doubled.

When this association was organized, many farmers questioned whether they could afford to pay \$1 per cow to have their herds tested. The results fully prove that they could not afford not to. Communities wishing to organize such an association can receive assistance by writing to the dairy division of the department of agriculture at Washington, D. C. The by-laws used by several successful associations are printed on pages 80 to 83.

CONFORMATION AS SELECTION GUIDE

It has long been recognized that certain functional capacity in animals is usually recognizable by outward indications. Thus cows with highly developed milk-giving functions usually indicate such functional capacity by their form, conformation, or type.

The feeder selects an animal with a broad back, short limbs, and a compact, closely ribbed body, because he has learned that that conformation of body, or that type of animal, usually has the ability to lay on flesh quickly, economically, and when fat sells well.

Following the same principle, the wise dairyman selects cows that indicate by their type or conformation that they have the capacity to produce milk economically. Type is but an indication of function, and while the external indications may be right the internal machinery that does the work may not be operating to advantage.

We have all seen horses with short backs, long underlines, sloping shoulders, and other indications of speed, that were not able to trot a mile even in four minutes. Such would be an absolute failure in a race,

despite their conformation. We likewise find some cows possessing dairy type that when it comes to the test of efficiency prove absolute failures.

Despite the fact that some horses of the speed type are failures as trotters, an intelligent man who wished to develop a racing stable would not think of buying draft horses, from which to develop trotters. He knows that ability to go fast is not usually associated with that type.

Guided by like intelligence, the man starting a dairy herd or adding to the dairy he already has will select cows of dairy type. Experience teaches that it is among cows of that type that profitable producers are usually found.

TRUE DAIRY TYPE

In examining a cow to determine type, commence at the head. This should be broad between the eyes, a little dished, spare rather than fleshy, and should terminate in a broad strong muzzle. The eyes should be full and bright, and the head strongly coupled to the neck. The neck should be thin and of fair length, the spine large and prominent and the vertebræ not too close together.

Breadth between the eyes, a strong neck coupling, and a large spine indicate a strong nerve system, which is necessary for large dairy production. Large nerve trunks should go from the spine to the vital organs. Vertebræ set well apart indicate that such is the case.

The barrel should be deep and wide, and the ribs sloping from the spine should be well sprung. The large, deep, broad barrel provides large thoracic and abdominal capacity, or a large factory space for the organs upon which falls the work of milk production. A restricted thorax, or, as it is commonly called, heart girth, indicates lack of constitution and strength.

The rump should carry well up to the tail head. The hips should be broad and the pin bones wide apart. This gives pelvic capacity, and sufficient room between the hind legs for a large udder.

The udder should have a large place in determining the indicated value of a dairy cow. It should be large, joined to the body far out in front, and extending well up behind. Its tissue should be glandular and elastic, so that when milked out it will appear empty. The teats should be a fair distance apart, one at nearly the center of each quarter of the udder, and of fair size.

Large veins covering the outer walls of the udder, and large, tortuous, branching veins extending from the udder well forward and entering the abdomen through large milk wells, indicate that plenty of blood is being carried to the udder from which milk may be elaborated.

A cow having all the above excellent points will not be able to do good dairy work unless she is in a healthy and vigorous condition. General condition and vigor are indicated by a bright, clear eye, soft, elastic skin, fine, velvety hair, and a good carriage. A cow possessing this dairy type to a marked degree, if in good condition, seldom fails to be a good producer. It is not often that we find cows for sale that closely approach the ideal dairy type.

While these points of excellence should be known and considered in purchasing cows, the cows should be tested nevertheless. Their owner may then depend upon facts rather than probabilities.

CHAPTER VI

Feeding Dairy Cows for Profit

The profitable feeding of dairy cows involves the use of great judgment and care. Pigs and steers are kept on the farm for only a comparatively short time, when they are sold and slaughtered. Overtaxing their digestive powers, for instance, is not as serious as with a cow that is to go on doing work for many years.

The digestive power of the cow is much more heavily taxed than that of the flesh-forming animal, for the good cow in a year produces in her milk a greater amount of nutrients than does the steer in the production of beef. Many cows produce each year for a term of years solids in their milk equal to their own body weight. The cow must be supplied in her feed with material for her own growth, for sustaining body temperature, and supplying the energy for the vast amount of work she performs. Besides this, she must be supplied with material from which to manufacture milk, and nourish her unborn young.

THE DANGER POINT IN FEEDING

I am satisfied that the greatest mistake made by dairymen in feeding their cows is in not feeding enough. Many cows that are underfed receive all the feed they will eat, but there is a decided difference between having a cow fed and just filled up. A cow may be given all the material she can consume, but if from that material she cannot digest a proper supply of nutrients, she is underfed. Cows cannot consume enough hay, corn stover and straw to do good dairy work. It requires nearly if not all the nutrients that

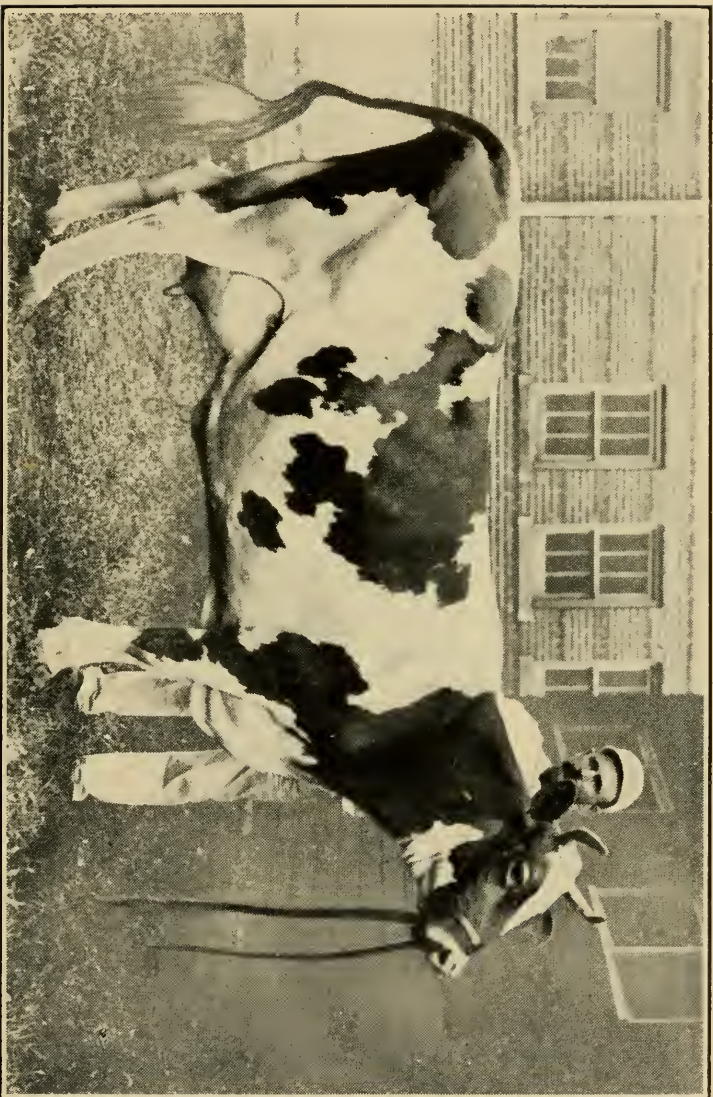
can be digested from straw to furnish enough energy to digest it, so straw may be considered as simply a filler and nothing more.

BRICKS WITHOUT STRAW

Many good men who read their Bible every Sunday, and perhaps every day, have read the story of Pharaoh and the children of Israel; how Pharaoh withheld from the Israelites their allotment of straw with which to make bricks, yet demanded that they should make their usual number of bricks. These good men have condemned Pharaoh as a tyrant because he demanded of his servants that they accomplish the impossible. These same men may have condemned their cows for not making them a profit, while demanding of them practically what Pharaoh demanded of the children of Israel—that they make bricks without straw; in other words, that they make a large quantity of milk without the material from which to make it.

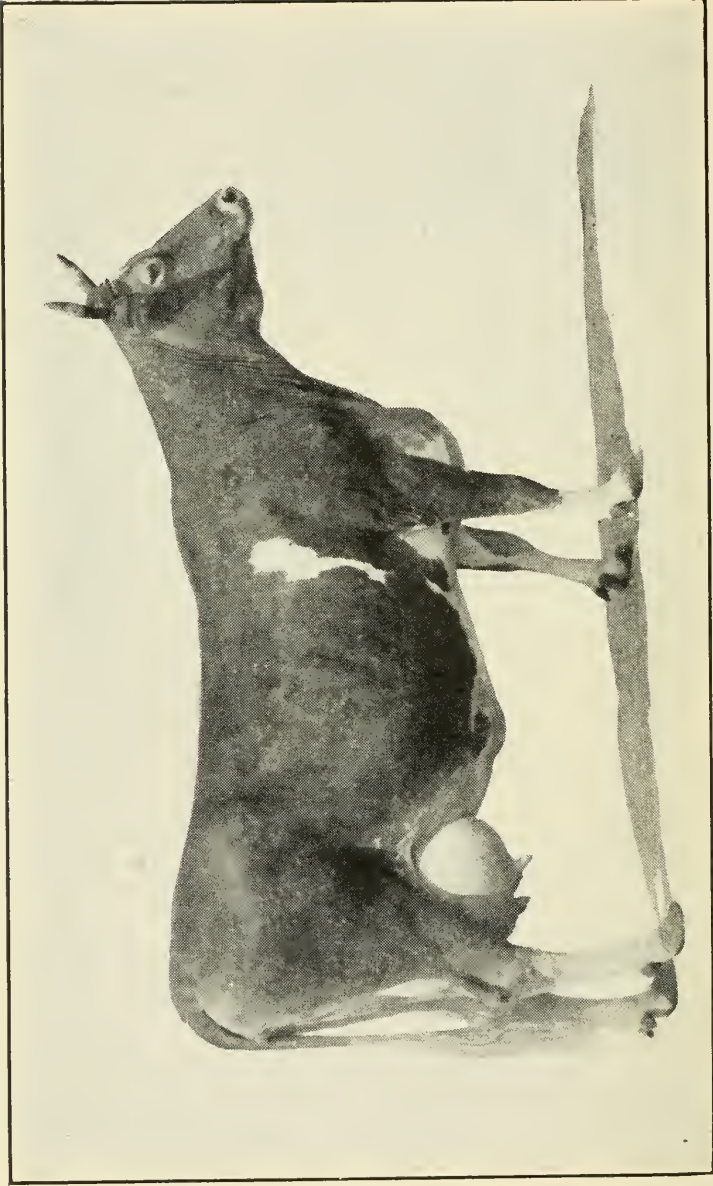
A MAINTENANCE RATION

It requires considerable feed to simply run a cow's machinery for a year, just to keep her a cow, just to maintain her body weight and temperature, furnish energy, keep her vital functions going and move her about. The amount of feed required daily to maintain a cow at a uniform weight, when she is not producing, is termed a maintenance ration. This ration varies slightly for cows of the same weight, and for different seasons of the year. It requires from seven to nine pounds digestible nutrients to maintain a 1,000-pound cow for a day. About 20 pounds corn silage, six pounds hay, and from three to four pounds grain is required to furnish these nutrients. A considerable



GUERNSEY COW, GLENCOE'S BOPEEP 18602, A. R. 1075

A wonderful dairy and show cow. Champion over all breeds at National Dairy Show 1910. Won milk and butter test Illinois state fair 1911. 25 cows competing. Record 13,121 lbs. milk. 622 lbs. butter fat.



GUERNSEY COW, SPOTTWOOD DAISY PEARL 17696

The premier cow of the breed, having an advanced register record of 18,602.8 lbs. milk and 957.38 lbs. butter fat in one year.

outlay of feed is thus required from day to day to maintain our milk-making machines, even though those machines are idle.

The practical farmer knows that if he keeps a cow weighing from 1,000 to 1,500 pounds for a year, although she gives no milk, she will cost him in feed from \$25 to \$50, depending upon locality and price of feed. At the end of the year he has only the same cow.

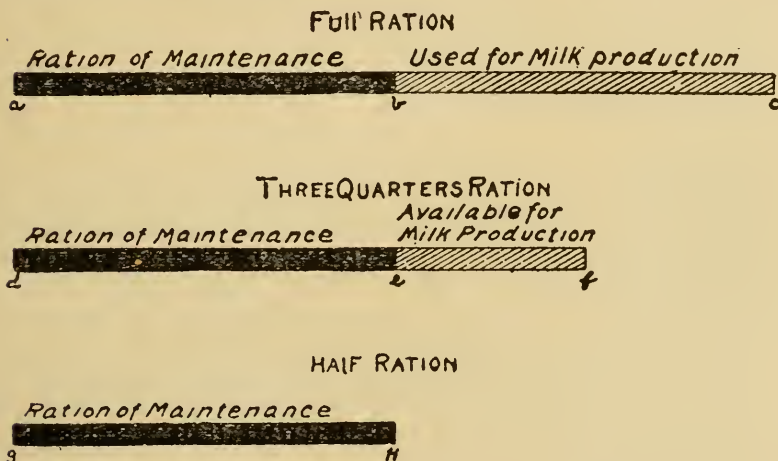


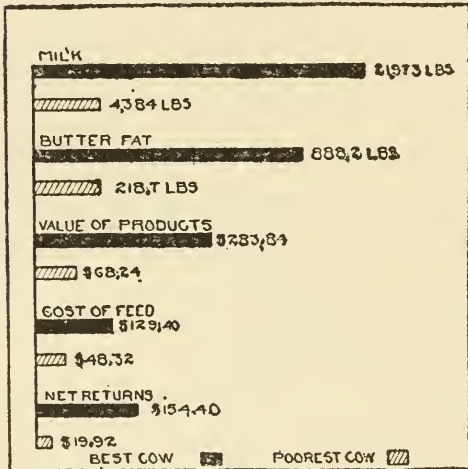
FIG. 12—NO MONEY IN SCANT FEEDING

Manifestly, then, the maintenance ration of the cow, as far as the dairyman or dairy profit is concerned, is a liability.

Were the dairy cow an inanimate machine, she would stop producing when furnished only enough energy to run her machinery. The real science of profitable dairy feeding would be then more quickly and forcefully understood and appreciated. Because she is an animate machine, however, and because her instinct prompts her to nourish her young, the cow goes on producing milk though receiving only a maintenance ration, or even less. Of course, she cannot do this indefinitely, but for some time, in response to

her instinct, she will produce milk by drawing on the material of her body and using stored energy to do the work.

Obviously, the dairyman gains but little from this.



Although the cow has produced milk, she has depreciated in value and the nutrients she drew from her body must be replaced before she regains her former value. If the above practice is carried too far, she will probably never regain her former efficiency because of the misuse of her machinery.

FIG. 13—RETURNS FROM HIGHEST AND LOWEST PRODUCING COWS, WISCONSIN COW COMPETITION.

Many first-class dairy cows have been practically ruined by this sort of abuse.

A PROFIT-PRODUCING RATION

Let us suppose, for the purpose of illustrating the principle of successful dairy feeding, that it requires \$35 worth of feed a year to maintain an average cow, not producing. In taking these figures I am in no way attempting to estimate the cost. In some localities, with some cows, this figure is too high, while in other localities, with perhaps larger cows, it is too low. Whatever the maintenance cost may be, the principle involved is the same.

Now let us suppose that the dairyman provides his cow with \$45 worth of feed. It will require \$35 worth

of this to run her machinery or to maintain her. This leaves \$10 worth for that machine to convert into milk. It is really not quite that, for a small part of the extra feed must be used to supply the extra energy required to convert this feed into milk. From this extra \$10 worth of feed suppose that the cow yields, in a year, \$45 worth of milk. She has made this extra feed pay for itself and for her maintenance ration.

Let us now suppose that this cow, instead of being given \$45 worth of feed, is allowed \$55 worth. Again it will require \$35 worth to run her machinery. Now,

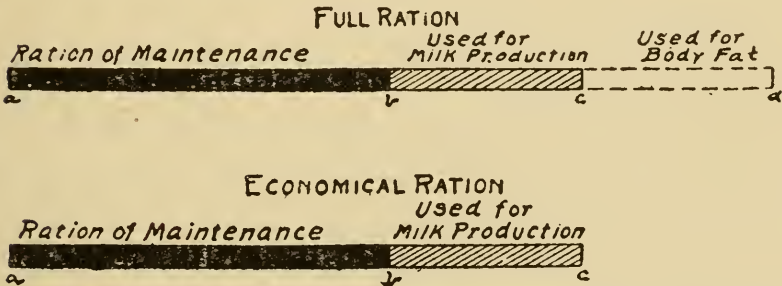


FIG. 14—COWS OF LOW PRODUCING POWER MAY BE OVERFED

however, she has \$20 worth of extra feed to convert into milk. Again she will use a part of this to supply the extra energy required, but it ought not to require a larger proportion than was used in the first instance. If she was able to yield \$45 worth of milk from \$10 worth of extra feed, why should she not yield as much again, or \$90 worth of milk, from double the amount of feed, above cost of maintenance?

If this proves true, she would in the first instance, just pay for her feed. In the second she would pay for her feed and show a profit of \$35. She did not, in the second instance, consume double the amount of feed eaten in the first, but only twice as much above her maintenance ration.

“But,” you ask, “will this, in practical experience, prove true, and by again increasing the feed above maintenance requirements could we again increase the profits?” It will prove true in practice if the cow is fed and cared for as she should be, providing she is a *good dairy cow*. It will hold true as feed is increased until we reach the full producing capacity of our cow.

It must be understood that there is a vast difference in cows. When it comes to dealing in absolute figures no two will work out the same. In considering dairy cows of high producing capacity the kind and quality of feed, manner of feeding and the care given materially affect returns per feeding unit.

The natural cow, under natural conditions, freshened in spring, gave milk enough to supply her calf and went dry in autumn. Man, by his intelligence and cunning, has developed the cow until she now freshens at any season of the year, gives milk enough to support her own and two or three other calves, and milks continuously for 11 months each year. By such development, he has made of her an artificial creature, in a sense, and she must be handled differently than her forebears were handled if she is to be kept up to her high standard.

In my own dairy practice I have demonstrated beyond question that up to the limit of the cow's capacity she will make a profit in proportion to the amount of digestible nutrients furnished above her maintenance requirements.

PRINCIPLE OF PROFITABLE DAIRY FEEDING

The principle of successful dairy feeding is embodied in the following rule: *Furnish the cow enough properly balanced digestible nutrients to enable her to run her milk-making machinery up to its full normal*

capacity. Men who successfully handle other kinds of machinery recognize this principle. What man who has a threshing machine with a capacity of 1,000 bushels of grain a day would think of restricting his efforts to 500 bushels? He knows that his machine will last just as long if run at its normal capacity, and will make him more profit. Although the majority of cow owners have not seemed to recognize it, this fact is equally true with milk-making machines. When feed is cheap and the market for dairy products especially good, a herd of cows may make a profit when under-fed; but when feed is high, and dairy products low, cows can make a profit only when well fed.

I have known men who actually study how to make their cows get along with less feed when they ought to be studying how to get them to consume more.

OVERFEEDING

Occasionally cows that are being fed to make phenomenal records are overfed to the extent of permanent injury. They are given a very heavy grain ration, often all the grain they can be induced to eat. This is not done with an idea of getting them to produce at full normal capacity, but away beyond normal capacity. Cows that are in perfect health and of naturally strong constitution may stand a strain of this kind without injury for some time. If the strain is too hard or continued too long, the health of the animals will be injured and the vital forces lowered. In ordinary dairy practice, this phase of overfeeding need not be seriously considered.

Now and then is found a herd of cows kept for ordinary dairy purposes that are in a sense overfed. Such a herd might yield a larger net profit if less grain were fed. A ration made up of less expensive feed might be substituted, with equally good results.

The most frequent cases of overfeeding are in herds where the cows are all fed practically the same amount of grain regardless of their individual capacity or the amount of milk they yield. No phase of successful dairy farming requires more care, closer observation, and better judgment than in determining the amount and kind of feed each cow should have to enable her to run her machinery up to normal capacity.

Of two cows with much the same appearance, one, because of her superior inherent ability in the way of dairy temperament, may not be able to do her best on less than 15 pounds grain a day, while the other may not be able to handle more than half that amount to the best advantage. The amount of nutrients each cow can best handle must be determined by individual tests.

After a cow has freshened, the judicious feeder will gradually increase her feed, especially the grain, and see that the per cent of protein in the feed increases as the milk flow increases. Results should be watched carefully, and the grain ration increased until the increase in milk no longer pays for the increased ration. When this is reached, drop back to the point where the increase did show a profit. You have gone beyond the point of greatest profit in the dairy ration when the cow ceases to give more milk and begins to lay on flesh. When a dairy cow gets fleshy, at least before the latter part of her lactation period, she is converting too much of her owner's feed into cheap cow beef. From a practical dairy standpoint she is being overfed.

I am satisfied that where one herd of cows are overfed in the United States, 75 herds are underfed. Cows may be given more feed than they can consume and still be underfed if that feed does not furnish enough protein to enable them to produce the maximum flow of milk.

FEEDING DAIRY COWS

Profitable dairy farming depends largely upon feeding a cow so she will do her best. To be so fed requires that she shall not only have enough digestible nutrients, but that they shall be of such kind and variety and so fed as to stimulate her appetite. I give here certain rules of feeding that I believe to be essential for best results. *Give the dairy cow a variety of palatable feeds. Feed regularly a balanced ration containing some succulent feed, and keep the mangers and surroundings clean.*

VARIETY IN DAIRY FEEDS

Any animal will do better on a variety of feeds than on one or two. Different feeds contain the elements of nutrition in different proportions. For instance, wheat bran has in its composition considerable mineral matter. Cottonseed meal has but little. Different feeds, of course, taste and smell differently to the cow, and a change stimulates the appetite and aids digestion.

If any one is inclined to think that variety is not a valuable attribute of an animal's ration, let him try living on meat and potatoes alone for a season. Clover and alfalfa hay, pea and oat hay, corn stover, corn silage, and sugar beets, mangels or carrots, with two or three different kinds of grain, furnish a fair variety, and if properly combined make a good ration.

PALATABLE FEED A NECESSITY

The longer I feed cows the more firmly I believe that there is no attribute of a dairy ration of greater practical value than palatability. A cow or any other animal will eat more feed that tastes good than of feed less palatable. Feed that the cow relishes she

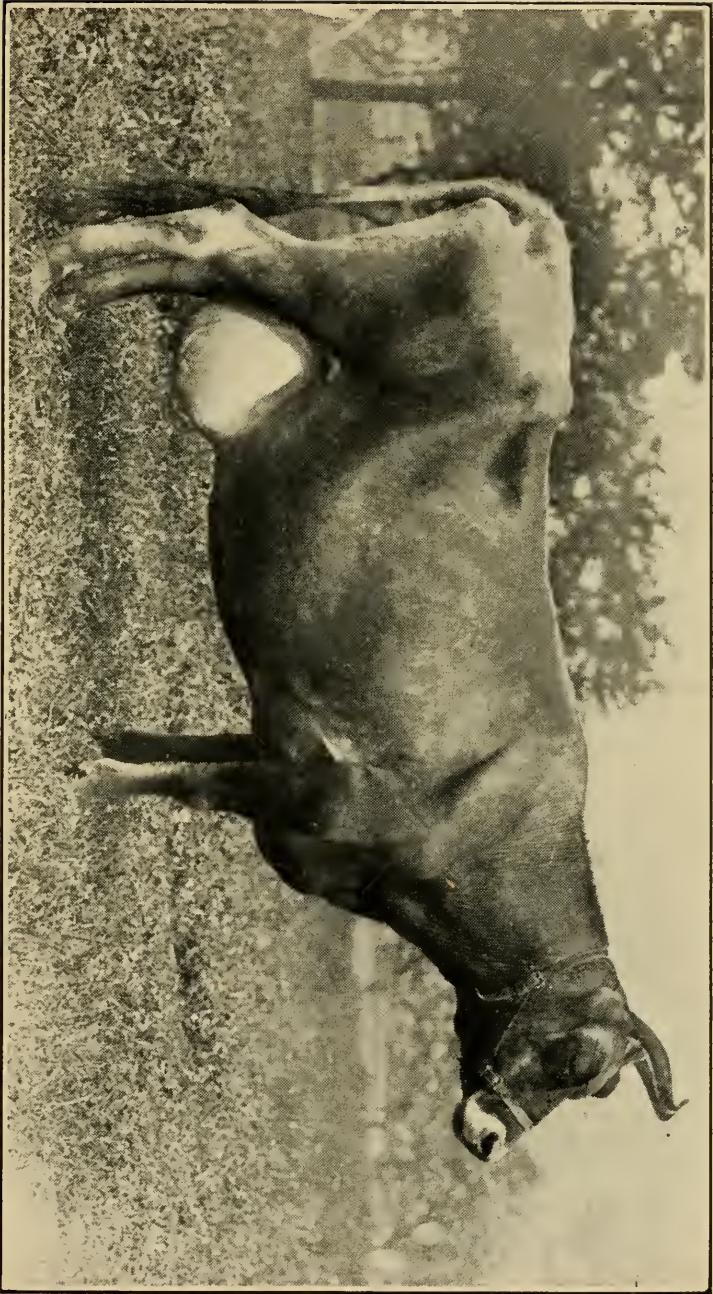
digests better. Feeds that taste good to an animal stimulate the nerves controlling the glands that secrete the digestive juices, aiding digestion.

Chemists tell us that a corn crop converted into silage will not contain much more of nutrients than the same crop field cured. The practical dairyman knows, however, that his cows make a great deal more milk from the crop as silage than when field cured. Part of this difference is accounted for by the succulent nature of the silage, but I am satisfied that one of the greatest advantages of silage is its increased palatability. Any stockman who sees a herd of cows eating good silage will feel that he would like to have silage for his own cows. Nothing pleases a stockman better than to see his animals take hold of feed as though they enjoyed it.

SECURING GOOD FEED

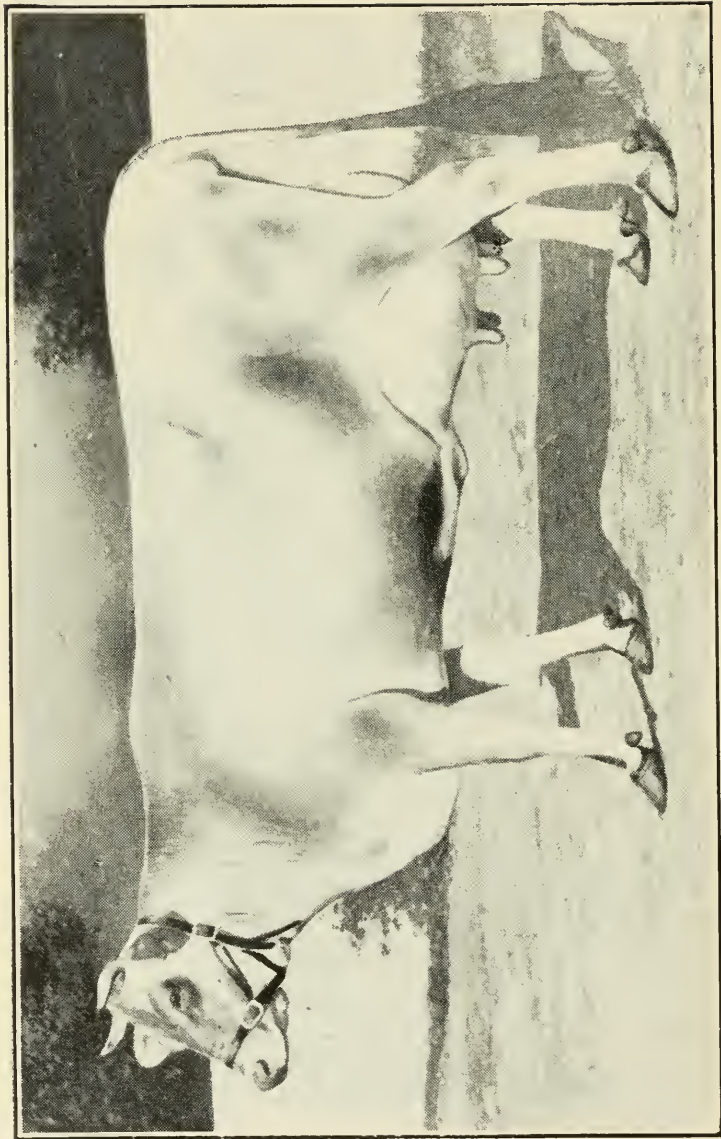
Palatable cow feed, as a rule, does not *happen* except in the form of natural grass pasture, but rather *comes* from *wisdom and care in preparation*. A blind man who knows anything about hay can judge quality of alfalfa and clover hay by smelling it. If it has the right aroma, he knows it must have been cut before it was too ripe and properly cured, for hay of high quality cannot be secured in any other way. A cow may eat sour or partly spoiled silage if forced to, but she should not be compelled to do so. Good silage can be secured only from corn cut about the time it comes to maturity, and stored in an air-tight silo. Musty and moldy grain can be gotten rid of by forcing cows to eat it, but cows cannot be swindled into paying a good price for worthless feed.

In actual farm practice, we are, of course, sometimes unable to secure our cow feeds in as good condition as we would like. Sometimes a dairyman may



WORLD'S RECORD JERSEY COW, JACOBIA IRENE 146643

A famous cow with a record of 69.8 lbs. milk in one day, 17,253.2 lbs. in one year, 31,508.9 lbs. in two years; 29.3 lbs. butter in seven days, 1121.13 lbs. in one year, 2053 lbs. in two years. Photo in her 15th year.



WORLD'S CHAMPION JERSEY COW, SOPHIE 19th OF HOOD FARM

She has given on authenticated test, in four years, with first four calves, 46,669 lbs. 6 oz. milk, 3253 lbs. 8 oz. butter. With fifth calf, in four months and 11 days, 7443 lbs. 8 oz. milk, 488½ lbs. butter. Champion cow 1910, Champion and Grand Champion Authenticated Test cow 1912.

be forced to feed timothy hay and grains that are not first class. If this is the case, he should by no means condemn his cows if they do not pay a high profit.

A BALANCED RATION

Much has been said and written about a balanced ration. Some of it is understandable to the ordinary dairy farmer and some not. Science has done a great work in enabling us to know how to balance a ration. The reason for balancing a cow's ration after we know how is just a matter of plain, ordinary common sense. Balancing a cow's ration means no more nor less than furnishing her with just the material from which her milk is made, and her body and energy sustained, furnishing such materials in the proportion needed.

Nature provides every cow with a formula for making milk, and as long as the cow remains normal she will produce milk after this formula. Suppose this formula for a certain cow calls for milk containing 3.5% fat, 3.6% casein and albumen, 4.8% milk sugar, .7% ash, and 87.4% water. Suppose this cow is giving 50 pounds milk a day and weighs 1,200 pounds. To supply the necessary material from which to make this milk and run her machinery, she must have each day about 3 pounds digestible protein, 18.25 pounds digestible carbohydrates and .85 pound digestible fat.

To supply the required nutrients, feed 40 pounds corn silage, 10 pounds clover hay, 15 pounds corn stover, 1 pound oats, 3 pounds corn, 6 pounds dried brewers' grain, and 2 pounds linseed meal.

Instead of feeding this ration, suppose we feed 5 pounds more corn meal, only 3 pounds dried brewers' grain, and no linseed meal. By so doing we would lower the cost of our ration, by perhaps three cents, but with what ultimate result? The ration substituted lacks

half a pound of furnishing the digestible protein the cow must have to produce 50 pounds milk. It will furnish enough protein to maintain the cow and enable her to make 39 pounds milk, and her milk must shrink to this figure if we continue the latter ration.

If milk is worth only one cent a pound, we have lost 11 cents worth of milk to save three cents worth of feed. The milk will probably be worth not less than $1\frac{1}{2}$ cents a pound, and in this case we lose $13\frac{1}{2}$ cents a day. We make 34% less profit on the feed consumed by our failure to give the cow enough protein.

Protein is the highest priced element, and the one most likely to be lacking in a ration made up wholly or largely of home-grown material. Protein is the part of feeds that contains nitrogen. It is the element from which the cow must obtain the nitrogen she requires for the casein and albumen in her milk.

All natural feeds contain protein, but only a few of our ordinary farm feeds contain as much as is required by the cow giving a good flow of milk. Hence if these ordinary home-grown feeds alone are fed to our cow and enough furnished to supply her with the protein required for large production, she will be compelled to consume more of the other nutrients than she requires. This excess of nutrients will be largely wasted.

Nearly all cow feeds contain enough ash for the cow's requirement. Carbohydrates are a class of nutrients rich in carbon. These with the fats, which are also rich in carbon, furnish the material from which she secures the fat and the sugar of her milk.

When the ration contains just the amount of digestible protein the cow requires to maintain her and furnish material for the albumen and casein of the milk, and just the amount of carbohydrates and fat she requires for maintenance and for supplying material for the fat and sugar in her milk, the ration is balanced.

It should be readily apparent to every dairy farmer that such a ration is of greatest economy and profit. There may have been a time, when home grown feeds were very cheap, that the dairy farmer could better afford to waste some carbohydrates than to buy protein to balance his ration. If that were ever true, it is not now in any section of the country with which I am acquainted.

BALANCING A RATION

It has been learned by those who have made long and exhaustive studies of the matter that a good cow on full milk requires for maintenance and milk flow from five to six times as much digestible carbohydrates and fat in her ration as digestible protein. This relation between digestible protein and digestible carbohydrates and fat in a ration is called its "nutritive ratio."

It has been found that one part digestible fat is equal in feeding value to 2.4 parts digestible carbohydrates. So, having given the digestible nutrients in a ration, multiply the amount of fat by 2.4, add this to the carbohydrates, and divide the sum of the two by the amount of protein. The nutritive ratio of this ration will be as one is to the quotient. For example, a ration contains two pounds digestible protein, 11.5 pounds digestible carbohydrates, and .5 pound digestible fat. $.5 \times 2.4 = 1.20 + 11.5 = 12.70 \div 2 = 6.35$. Nutritive ratio = 1 : 6.35. This computation shows that in the above ration there are practically 6.35 pounds carbonaceous food to each pound protein.

Before we can compute a balanced ration we must know the amounts of the different digestible nutrients in our feeds. To assist our readers in compounding their rations, a table is here inserted, showing such nutrients in the more common dairy feeds. These fig-

ures are taken from "Henry's Feeds and Feeding," the standard work on this subject.

DIGESTIBLE NUTRIENTS IN DIFFERENT FEEDS

Name of feed	Dry matter in 100 lbs.	Pounds digestible nutrients in 100 pounds		
		Protein	Carbohydrates	Fat
Red clover hay -----	84.7	7.1	37.8	1.8
Alfalfa hay -----	91.9	10.5	40.5	0.9
Timothy hay, all analyses	86.8	2.8	42.4	1.3
Oat hay -----	86.0	4.7	36.7	1.7
Cowpea hay -----	89.5	9.2	39.3	1.3
Fodder corn, field cured ears remaining on stalk	57.8	2.5	34.6	1.2
Corn stover -----	59.5	1.4	31.2	0.7
Oat straw -----	90.8	1.3*	39.5	0.8
Wheat straw -----	90.4	0.8	35.2	0.4
Corn silage -----	26.4	0.4	14.2	0.7
Corn, dent -----	89.4	7.8	66.8	4.3
Sweet corn, -----	91.2	8.8	63.7	7.0
Oats -----	89.6	8.8	49.2	4.3
Barley -----	89.2	8.4	65.3	1.6
Corn and cob meal -----	84.9	4.4	60.0	2.9
Canada field peas -----	85.0	19.7	49.3	0.4
Wheat bran -----	88.1	11.9	42.0	2.5
Wheat middlings (shorts)	88.8	13.0	45.7	4.5
Buckwheat middlings -----	87.2	22.7	37.5	6.1
Gluten meal -----	90.5	29.7	42.5	6.1
Gluten feed -----	90.8	21.3	52.8	2.9
Dried brewers' grains -----	91.3	20.0	32.2	6.0
Linseed meal, old process	90.2	30.2	32.0	6.9
Cottonseed meal -----	93.0	37.6	21.4	9.6
Sugar beets -----	13.5	1.3	9.8	0.1
Mangels -----	9.1	1.0	5.5	0.2
Carrots -----	11.4	0.8	7.7	0.3

PROFITABLE CROPS FOR DAIRY FEED

Because of the large amount of first-class cow feed it produces per acre in nearly all sections of this country, corn will probably continue to be a large feed factor in most dairy sections. Corn is by far the best crop for silage, and a silo is almost indispensable on a dairy farm. The corn plant is high in carbohydrates

and low in protein. The nutritive ratio of the whole plant, stalk and ear together, is about 1 to 14, and of the grain 1 to 9.7. After corn, clover hay is probably the most universal cow feed. This in itself is about properly balanced. Its nutritive ratio is 1 to 5.9. If the bulk of the ration is made up of the corn plant and clover hay some concentrated feed high in protein should be given to make up for the deficiency of that element in the corn plant.

NARROW AND WIDE RATIONS

Rations containing a relatively large proportion of protein are called narrow. Those containing a relatively large proportion of carbohydrates are called wide. Different experimenters have reached somewhat different conclusions as to the relative amounts of protein and carbohydrates a dairy ration should contain for the most economical and efficient feeding of cows of different weights, and giving varying amounts of milk. The first standard generally accepted in this country was a German standard known as the Wolff-Lehmann. This standard called for quite a narrow ration. According to it the requirements of a 1,000-pound cow when giving certain amounts of milk are as follows:

THE GERMAN FEEDING STANDARD

	Digestible Nutrients				Nutritive ratio
	Dry matter	Protein	Carbohydrates	Fat	
When giving 11 lbs. milk	25.0	1.6	10.0	0.3	1: 6.7
When giving 16.6 lbs. milk	27.0	2.0	11.0	0.4	1: 6.0
When giving 22 lbs. milk	29.0	2.5	13.0	0.5	1: 5.7
When giving 27.5 lbs. milk	32.0	3.3	13.0	0.8	1: 4.5

The conclusions reached by American investigators seem generally to agree that a ration somewhat wider will prove as efficient and more economical. Prof T. L. Haecker of Minnesota, who has given much time and study to the matter of American dairy rations, gives us the amount of digestible nutrients required to produce a pound of milk of given test. The following table is for mature cows:

HAECKER'S AMERICAN FEEDING STANDARD

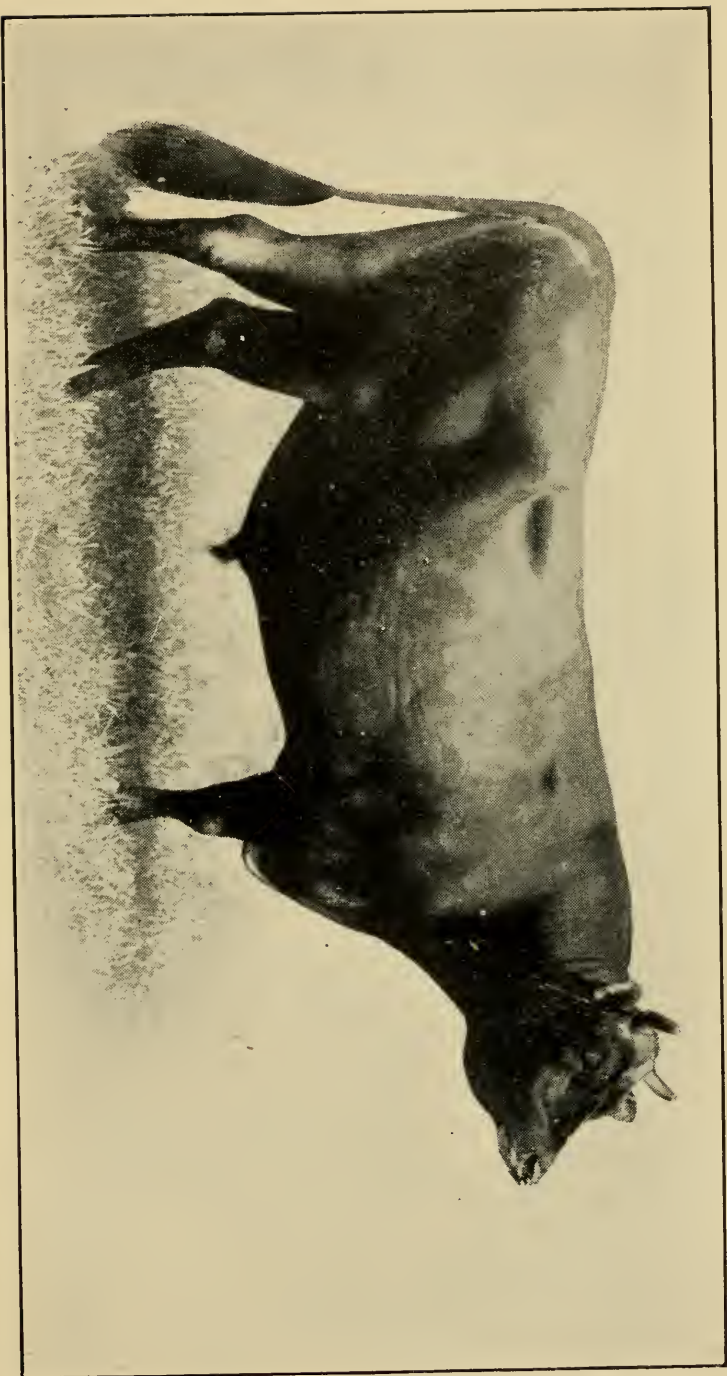
Maintenance requirements per 100 pounds live weight	Protein 0.07 lbs.	Carbohy- drates 0.7 lbs.	Fat 0.01 lbs.
For each 1 lb. milk testing 3 % add	0.04	0.19	0.015
“ 1 “ “ 3.5% “	0.042	0.21	0.016
“ 1 “ “ 4 % “	0.047	0.23	0.018
“ 1 “ “ 4.5% “	0.049	0.26	0.02
“ 1 “ “ 5 % “	0.051	0.27	0.021
“ 1 “ “ 5.5% “	0.054	0.29	0.022
“ 1 “ “ 6 % “	0.057	0.031	0.024

Knowing the weight of the cow, and the test of her milk, by referring to the above table and to the preceding table showing the digestible nutrients in our ordinary dairy feeds the farmer can compound a ration that should closely meet the requirements according to Prof Haecker.

My own experience indicates a somewhat narrower ration than suggested by the above table as most profitable. It is safe to assert that dairy cows should not receive a wider ration than that prescribed by the Haecker standard, while often it will be of advantage to give more protein than the table calls for.

RELATION OF GRAIN TO ROUGHAGE

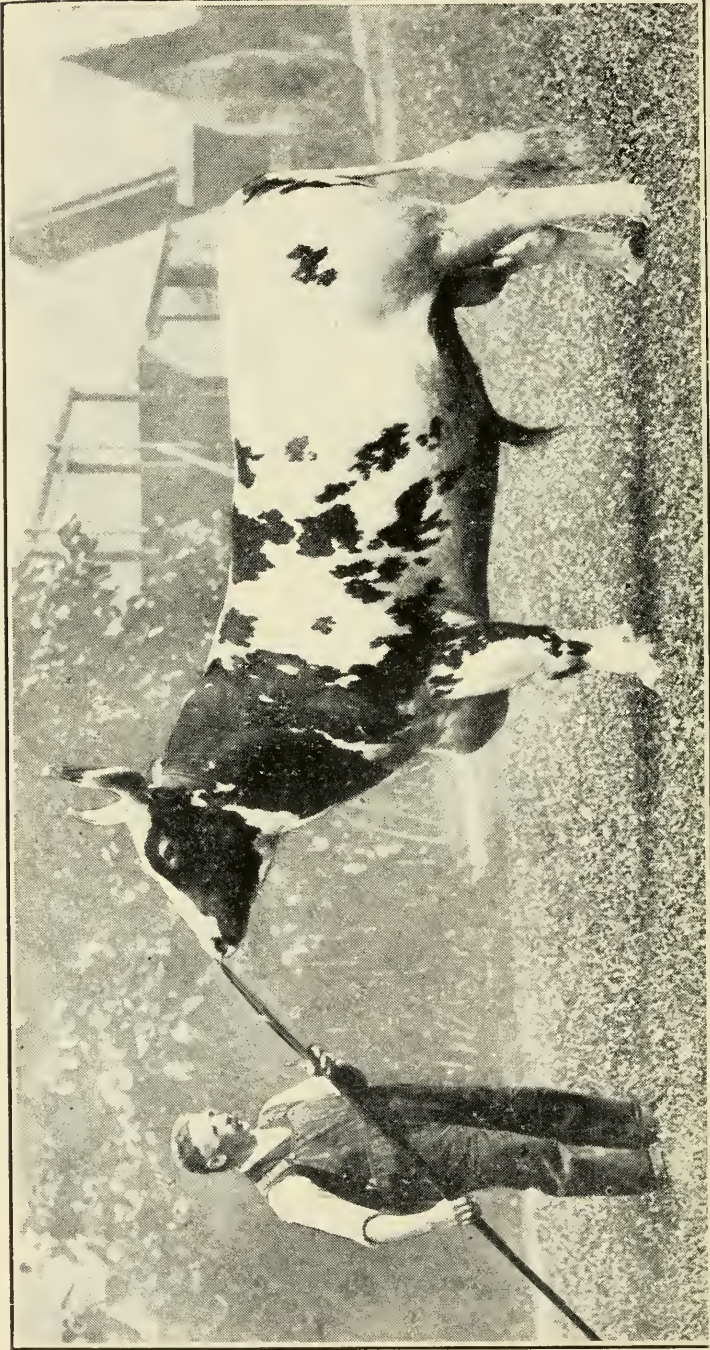
A ration should not only be balanced as to nutrients, but there should also be a certain balance between



JERSEY BULL, RALEIGH'S FAIRY BOY

Considered by many judges as the greatest dairy and show bull living.
Score 97.6 points

Register of Merit sire, class A.



AYRSHIRE BULL, BEUCHAN PETER PAN 12971
Grand champion over Great Britain and America.

the amounts of grain and roughage fed. This relation differs with the capabilities of different cows, the kind of roughage fed and the yield of milk. All cows should have enough roughage to properly distend the abdomen, and with this enough grain to furnish the nutrients required. Perhaps a fair general average for cows in full milk would be to furnish three-fifths of the digestible nutrients in the roughage, and two-fifths in the grain. This ration will be varied by the judicious feeder to meet the individual requirements of his cows.

SHALL WE GROW PROTEIN OR BUY IT?

As a general principle we should grow our feed. If, however, we are equipped to grow some cash crop, and our soil is especially fitted for it, it is often wise to grow it and then buy the needed protein feeds. In many sections the soil and climate are not adapted to growing grains rich in protein. If a dairy farmer can grow a crop the proceeds of which will buy more protein than he could raise on the field, it is good business to do so. In some sections, Canada field peas or peas sown with oats can be grown successfully. If so, they make a very good protein feed. In other sections the cowpea and soy bean may be used. Either clover or alfalfa or both should be grown on every dairy farm. *Good alfalfa hay is a wonderful dairy feed*, and is destined to accomplish great things for the dairy farmer.

PROTEIN IN PROFITABLE FORM

Dairy farmers can usually procure protein most cheaply by purchasing the by-products of some industry. Such by-products as bran, middlings, gluten meal, gluten feed, brewers' grains, linseed and cottonseed meal make splendid dairy feeds. By consulting the table on page 48 you will note that these by-products

are all relatively high in digestible protein. This is because part of the carbonaceous material contained in the whole grain has been taken out in the manufacturing process.

The relative values of these feeds as sources of protein alone are determined by the amount of digestible protein they contain. By this rule cottonseed meal would be worth three times as much per ton as wheat bran, but there is a greater amount of digestible carbohydrates in a ton of bran than in a ton of cottonseed meal, and this should be considered in determining values. The other by-products mentioned will be found more palatable than cottonseed meal. Cottonseed meal is a very heavy feed, and is quite constipating in its effects.

I would by no means discourage the feeding of cottonseed meal, but would advise that it be fed in only moderate amounts, and in connection with silage, roots, or some other laxative feed. I have fed considerable cottonseed meal, and with good results, but have never made a practice of feeding more than three pounds a day. Judging by digestible protein alone, cottonseed meal would be worth about 16% more than linseed meal, but in actual practice linseed meal is often worth as much or more than cottonseed meal, pound for pound. This is because of its greater palatability and conditioning effects.

Many proprietary dairy feeds are good, but they should be bought upon their analyses, or their digestible protein content rather than for their name or because of the high-sounding phrases used in advertising them. I refer here to strictly dairy feeds, not to medicated mixtures advertised as cure-alls. These are usually sold for from five to 10 times their actual value, granted that they have a value.

According to the table on page 48 one might conclude that wheat middlings are of more value per unit

than wheat bran. In actual practice the reverse is usually true. The glutens and brewers' grains are first-class dairy feeds and valuable in balancing dairy rations in about the proportion of digestible protein they contain. The table on page 48 gives the average digestible contents of these feeds, but individual samples vary considerably. It is therefore well to get a guaranteed analysis from the seller.

WHEN TO FEED

Feed the cows at about the same time each day. They are creatures of habit and will do better when encouraged to form good habits. Cows that are fed at certain regular hours learn to expect their feed then, and not until then. They will, as a rule, be found contentedly eating, or chewing their cuds, and thereby working to the advantage of their owners. Cows that are fed irregularly are always expecting or looking for something and instead of being contented are usually dissatisfied. This feeling never yet helped make a herd of dairy cows more profitable.

SUCCULENT FEED

A dairy farmer cannot afford to be without some sort of succulent feed for his cows. The natural plant juices are not only loosening in their effect upon the bowels, but something about them stimulates digestion and assimilation. Every farmer has doubtless noticed that if any of his live stock gets out of condition when eating dry feed in winter, the best tonic they can be given is fresh, succulent grass when it comes in spring. The dairy farmer cannot have fresh grass in winter, but he may approximate it by having a good supply of such succulent feed as corn silage and roots. It has been found that even where plenty of good corn silage is fed cows do better if given a few roots each day.

CLEAN MANGERS AND SURROUNDINGS

Filth and vile odors never contributed to the health nor appetite of the dairy cow. If a cow is to do her best as a profit maker, she must be induced to consume large quantities of feed. To do this her appetite must be keen. I have already emphasized the need of furnishing the cow with palatable feed that she may be encouraged to consume all she can convert into milk. I have asserted that early-cut, well-cured alfalfa and clover hay are excellent and palatable, but it avails a dairy farmer little to provide a generous amount of good feed and then feed it in a stable where vile odors overcome its aroma.

I have often seen mangers partially filled with refuse that had been collecting for some time. The cow had been breathing upon this, and the animal matter, moisture, and heat from her breath had started decomposition, the odor of which would overcome the aroma of the best hay ever made.

Mangers should be cleaned of all refuse at least once each day. The voidings of the cows should all be removed at least once a day, and an occasional application of quicklime made to keep floors and gutters sweet. If this is done and the stable properly ventilated and lighted, there is no reason why the cow stable should be an ill-smelling place. Time and care spent upon the cow stable to make it a fit place in which to feed and keep the cow, will add materially to dairy profits.

SUMMER FEEDING

The preceding discussion of feeding refers especially to winter feeding. More mistakes are made in the winter feeding of cows than in summer feeding. Nature has, in a measure, provided feed for summer and does her best to provide in summer just what I

have urged that the cow be given in winter. The various grasses and green legumes furnish, if the pasture is good, a generous amount and variety of palatable, succulent feed that is properly balanced, or nearly so. This she obtains regularly under conditions that are clean, sweet and wholesome.

Should there come a bad drouth or should we have more stock than our pastures can supply, nature's efforts must be supplemented by the farmer if his cows are to do as well as they should. I have often seen herds on pasture so meager that they were only able by hard work to get enough grass for maintenance. Unless they supply other feed to supplement this pasture, the owners must expect a loss, for as I have already pointed out a maintenance ration alone is practically a waste. In many dairy sections, land has become so high in value that the owner cannot afford to use it for pasture. An acre of tillable land planted to corn, and well cared for, will, as a rule, furnish about three times as much cow feed as the same acre in pasture.

Many of our most successful dairymen have little or no pasture for their cows, but feed them in a yard or stable throughout the year. When sufficient pasture is lacking, corn silage should in most sections be supplied liberally for summer feeding. This can be supplemented with green crops in the following order: Early rye, clover, peas and oats, early sweet corn, and evergreen sweet corn. In some sections, such crops as cowpeas, soy beans and millet are grown and fed to advantage.

Cows giving a good flow of milk should have grain in summer, whether on pasture or not. If approaching the latter part of the lactation period and abundant pasture of mixed grasses is available, they may do without grain for a time, if already in good flesh.

Many dairy farmers seem to have the notion that silage, hay, and grain are to be fed to cows only in winter. This is a decided mistake. Keep prominently in mind that you are running a dairy for profit, and as much profit as you can fairly obtain. Do not forget that the only kind of feeding that enables a dairy cow to yield maximum profits is generous feeding, be the season summer or winter.

FEEDING DRY COWS

Cows should be dried up from four to six weeks before calving. This period should be considered as a time of partial rest, and preparation of the cow for the hard season of work just before her. Too often during this period the cow is neglected, allowed to shift for herself, and perhaps become weakened. This is poor preparation for hard work.

A few years ago dairymen feared to have their cows freshen when in good flesh and thriving because they thought they were more likely to have milk fever. This may have been true, but the dairyman need no longer fear milk fever. If the cow is milked out for the first three days after calving, only enough to relieve the pressure on the udder, there is little likelihood of the disease. If she does show symptoms she can readily be relieved by filling the udder with air.

When feeding grain to dry cows or to cows on pasture, we do not always get returns at once, but the returns for the years as they go prove that we cannot afford to let our cows become weakened or low in vitality. The dry cow that is to freshen soon should be so fed as to maintain her, nourish the developing calf and allow her to gain in flesh and vigor. Unless pasture is abundant she should be given a fair ration of grain.

CHAPTER VII

Care of the Dairy Herd

A dairy farmer may have a herd of cows, each individual of which is a splendid dairy animal. He may feed them generously with the best kinds of feed, but if they are not so cared for as to keep them comfortable and healthy, they will be unable to make large profits to their owner.

I once heard a great dairyman say, "A cow is a lady, and if she is to do her best, she must be treated like a lady." A better statement of the case is that a cow is a mother, and if she is to exercise her instinct of maternity to the greatest advantage to her owner, she must be treated as a mother should be treated. This may savor of sentiment, but I guarantee that if practiced it will prove very sensible.

If a cow owner has a malevolent feeling toward his cow, loud boisterous language and the use of the milk stool as an instrument of chastisement may relieve his feelings; it will also relieve him of dairy profits. Quiet, contented and comfortable cows are in condition to do good dairy work. When not in this condition they cannot do good work.

During my lifetime I have seen but two dogs that I thought might be an asset to a dairyman. I have seen hundreds of them on dairy farms that I knew were greater liabilities than their owners could afford. When dairy cows are hurried from the pasture to the barn by a dog snapping at their heels, the owner may calculate that he has saved some time, but he may know with equal assurance that the saving of time has cost too much. His cows give less milk, and what they do give is not as rich.

To keep a cow profitable she must be kept warm. One of the best cows I ever owned I bought from a man who sold her because she did not give enough milk. He said that after she freshened in the fall she would give a good flow of milk until cold weather and then the flow would shrink badly.

I knew he had a warm barn where the cows were kept nights, but I knew also that no matter how cold it was his cows were turned out in the morning and kept out all day. I bought this cow, put her in a warm barn, and kept her there. She freshened in October and in less than a year gave over 14,000 pounds milk. She was probably the best cow that the man who sold her ever owned. She was spare and thin, and after freshening converted most of her feed into milk. This left her poorly fortified against the cold, and when she was forced to stand out of doors all day she was so uncomfortable that she could not do good dairy work. The other cows of his herd were not as good dairy cows as she. They carried more flesh and used more of their feed for fuel, hence did not suffer from the cold to the same extent.

Some will say that it has been proved that fattening steers will do nearly if not quite as well in open sheds as in warm barns. The steer, with a thick layer of fat on his body and using a large part of his feed for fuel, is a different proposition. The good dairy cow is spare in flesh, and is depleting her system every day to yield bountifully at the pail.

Have a warm barn for your cows. It need not be an expensive one. Keep your cows in this barn when it is too cold for them to be outside. It is too cold for a dairy cow to be outside for any great length of time when it is too cold or windy for you to stand outside in your ordinary winter clothing for an hour without feeling chilled.

For some years my own cows have not been outside the barn and the covered and inclosed barnyard from the time they came in from pasture in the fall until they went out to pasture in the spring. Some say that cows should move around when outside on cold days, and thus keep warm. Good dairy cows when turned out in the cold usually hump up and suffer. Even should they keep warm by moving briskly about their owners should know that a cow cannot use her feed to furnish energy and muscle and still have that feed to convert into milk. It is much more profitable to protect the cow from the cold than to force her to use her feed for fuel. When you see a dairy herd out of doors and unprotected for any great length of time in cold, windy weather, you may safely assert that the owner is advertising a system of dairying that never has proved very profitable and never will.

Some dairymen say they want their cows to have exercise. They should understand that a cow elaborating from 35 to 40 pounds of good milk in a day is doing as much work as a horse that helps plow two acres of sod. If you are keeping your dairy cows to produce milk, you had better keep them at it, and furnish them conditions under which they can work to the best advantage. It will, of course, do cows good rather than harm to be allowed to move about somewhat, provided they can do so under comfortable conditions.

WATERING COWS

Cows need constant access to pure, clean water of moderate temperature. Individual drinking pots are good if kept clean and supplied with running water. Cows do very well if allowed to go to a water tank twice a day. They should not be forced to drink ice cold water. When forced to do so they will not as a

rule drink until quite thirsty and will then drink a large quantity. This is especially true if they must go outside to get the water. Even if returned to the barn at once they will be chilled for a time.

Rather than have the cow chilled, carry water to her in the barn. If the cow is watered at a tank, the water should be raised to a moderate temperature by the use of a tank heater. To say nothing of the evil effects of chilling, it is cheaper to use wood or coal to warm water than to use high-priced dairy feeds as fuel.

HEALTHY COWS AND PROFITABLE DAIRYING

All animals that are to continue in perfect health must have plenty of pure, fresh air and sunshine. These essentials are free, so we certainly cannot afford to deny them to our cows. Some adequate system of ventilation should be provided in every dairy barn. The barn should be so located and have windows of such size and so placed as to allow the direct rays of the sun to reach every part of the stable.

KEEP THE COWS CLEAN

Cows do not eliminate so much of the waste of the body through the skin as does the horse, so it is not quite so essential that their skin be kept clean. Despite this, however, the cow will keep in better health and give more milk if her skin is kept reasonably clean. If the stable is supplied with properly constructed gutters, so that the cow does not become fouled by her own excrement, going over her with a good stiff brush is sufficient.

HOW TO MILK

A good milker can do much to keep up the milk flow. Cows should be milked quickly and stripped out

clean. A gentle kneading of the udder will usually enable the milker to get a little more milk, and this last milk is much richer in fat than the average of the whole milking.

Occasionally we may have a cow that is an excellent milk producer, and in spite of the fact that she is treated kindly is restless when milked. Unless prevented she may cause a good deal of trouble by

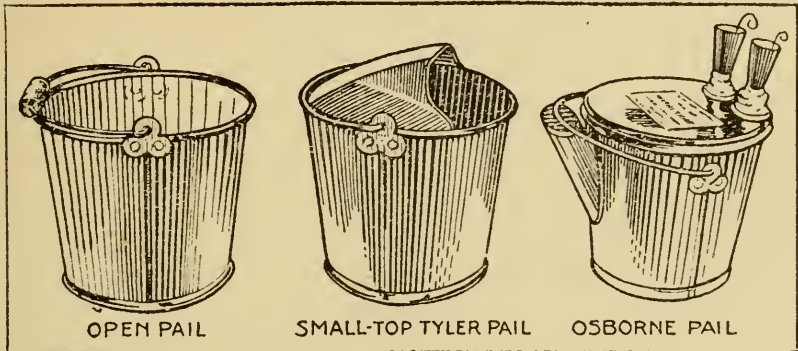


FIG. 17—THE SMALL TOP PAIL KEEPS DIRT FROM MILK

The middle pail is most desirable for farm use.

quickly lifting her foot and disturbing the milker, and perhaps upsetting the milk pail. The first impulse is to punish her, but this will more often exaggerate the fault than cure it.

Punishment is almost sure to produce a vicious cow. The best plan is to strap her legs. Fasten two straps to a ring and buckle them tightly about her legs just above the hock joint. As long as she stands still the straps are not uncomfortable, but they prevent her moving her feet very much and are uncomfortable when she tries to do so. Every dairy should be supplied with such straps. They often can be used in breaking a heifer to milk, and in milking cows that happen to have sore teats or an inflamed udder.

REGULARITY IN MILKING

Regularity in milking as in feeding counts for a great deal in profitable dairying. Each milker should have certain cows that are his to milk. There should be a time set for milking, and heroic effort made to begin on time. If milk scales are used and a record kept of each milking the milkers can be held responsible for results. This, as I have pointed out before, will encourage milkers to do their best.

DETAILS OF FEEDING

To me it has seemed of advantage to feed the grain with silage. Our cows are turned into the inclosed barnyard while the stables are being cleaned. While this is being done the mangers are swept clean and the silage placed in them. The grain is placed on the silage and once each day about four ounces salt added. Silage, grain and salt are then mixed together by lifting the middle of the pile of silage with a fork, allowing grain and salt to sift through. By feeding silage and grain together the whole mass goes to the first stomach and then is brought back to the mouth and remasticated.

PLENTY OF SALT PAYS

The physiological effect of salt is to aid and stimulate the secretions. Milk is a secretion, and experience teaches that cows yield more milk if well supplied with salt. Some dairymen keep salt before their cows so they may help themselves. I prefer to furnish it with their feed. Each cow is given from three to five ounces a day, depending upon her size, the amount of milk she gives and the amount of feed she consumes.

CHAPTER VIII

Summer or Winter Dairying

Shall we have our cows freshen in spring or in autumn? Some dairy farmers, because of the nature of their market, must strive to maintain a constant and uniform supply of milk all the year. Much more butter is produced in summer than in winter, and the price of summer butter is correspondingly lower.

I am satisfied that the dairy farmer who sells milk or cream to a creamery, cheese factory or condensery, or who makes butter on the farm, can make larger and more satisfactory profits by having his cows freshen in the fall. The months of September, October and November are, in my judgment, the best season.

REASONS FOR AUTUMN FRESHENING

First—Cows give their largest milk flow in the season of highest prices.

Second—The cows are giving their largest yield and need most attention and care when the farmer is most at liberty, and are dry or giving least milk through the heated season and the fly season.

Third—The herd requires the least time, care and attention when the farmer is busiest with farm work.

Fourth—A cow when well housed, fed, and cared for will give more milk in a year when freshening in the fall.

Fifth—Unless one has cheap pasture land, milk can be produced as cheaply or more cheaply in winter than in summer.

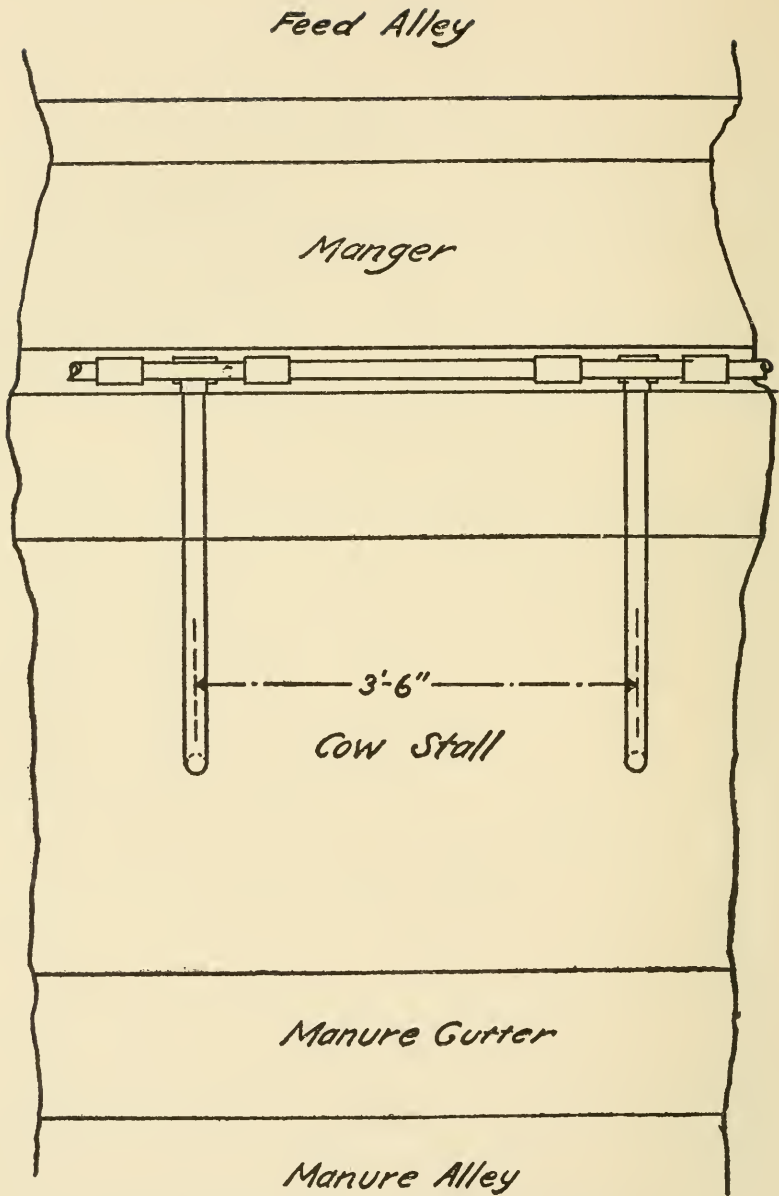


FIG. 19—FLOOR PLAN OF IDEAL COW STALL

CHAPTER IX

Dairy Barns and Equipment

It is not so much my purpose here to advise the building of new dairy barns as to point out inexpensive ways of improving those many dairy farmers already have. I shall give no consideration to fancy high-priced buildings. I have no prejudice against finely furnished and high-priced dairy buildings, but I hold that when it comes to a matter of profit a plain inexpensive dairy barn, if it meets the requirements of the cow, is most practical.

If storage room for feed is needed as well as stable room, a bank or basement barn, properly constructed, is quite satisfactory. In a basement stable extra care should be taken to secure good drainage and plenty of light. Have the floor of the basement high enough that surface water will drain away. Keep the second story enough above ground to allow for good-sized windows all the way around the basement.

Basement barns should have double-boarded floors above. When feed is stored above and dropped into the stable through chutes, there is sure to be more dust in the stable than when feed is brought in from the sides or ends. A satisfactory arrangement is a one-story stable with storage buildings for hay at one end and silo at the other.

THREE REQUISITES OF DAIRY STABLE

Whether building a new dairy stable, or altering an old one there are *three positive essentials* to keep in mind. The stable should be made *warm*, should be pro-

vided with *plenty of windows*, and with some system of *ventilation*.

If you have a cold stable put on new siding, chink it, or cover it with building paper. Building paper and chinking may make the stable unsightly, but your cows will more quickly make the profits from which you may build a new stable. Window glass is so cheap that any cow owner can afford to light his stable. It is not expensive to cut out the siding every few feet and put in windows. It pays to do it. One-fourth of the space all the way around at the window level

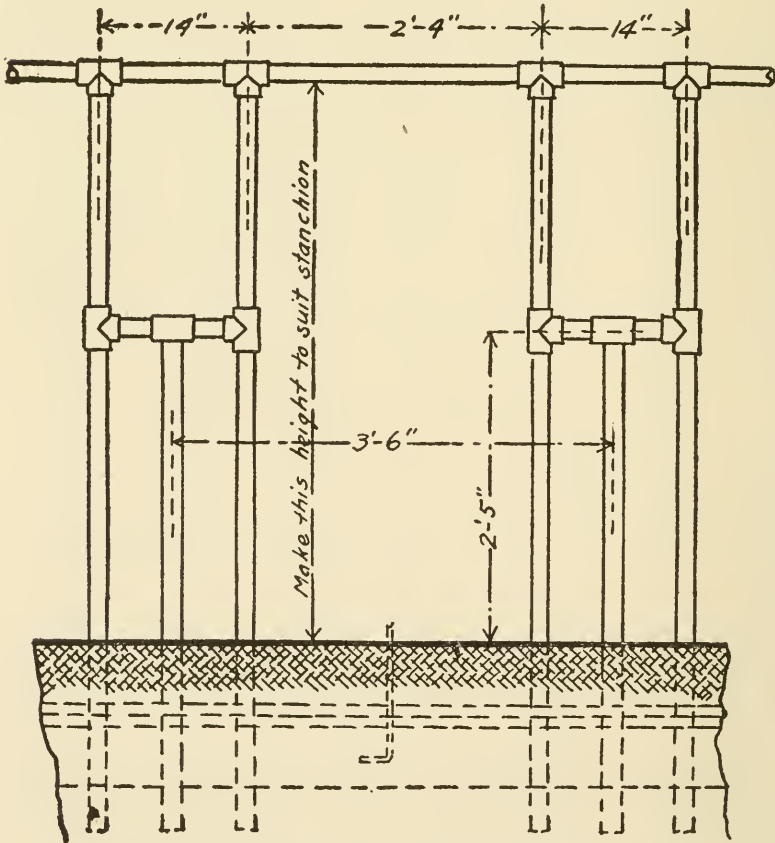


FIG. 20—FRONT ELEVATION OF IDEAL COW STALL

should be devoted to windows. The direct rays of the sun are fatal to filth and to most disease germs. A stable is much more healthful if it is well lighted.

VENTILATION A BARN NECESSITY

Ventilation means simply a change of air. Barn ventilation is good if it provides for changing the air often enough to keep it reasonably pure. It may be provided by opening windows, but this creates a draft and in cold weather unduly lowers the temperature inside. If ventilation is to be secured in this way muslin should be tacked over the openings in cold weather.

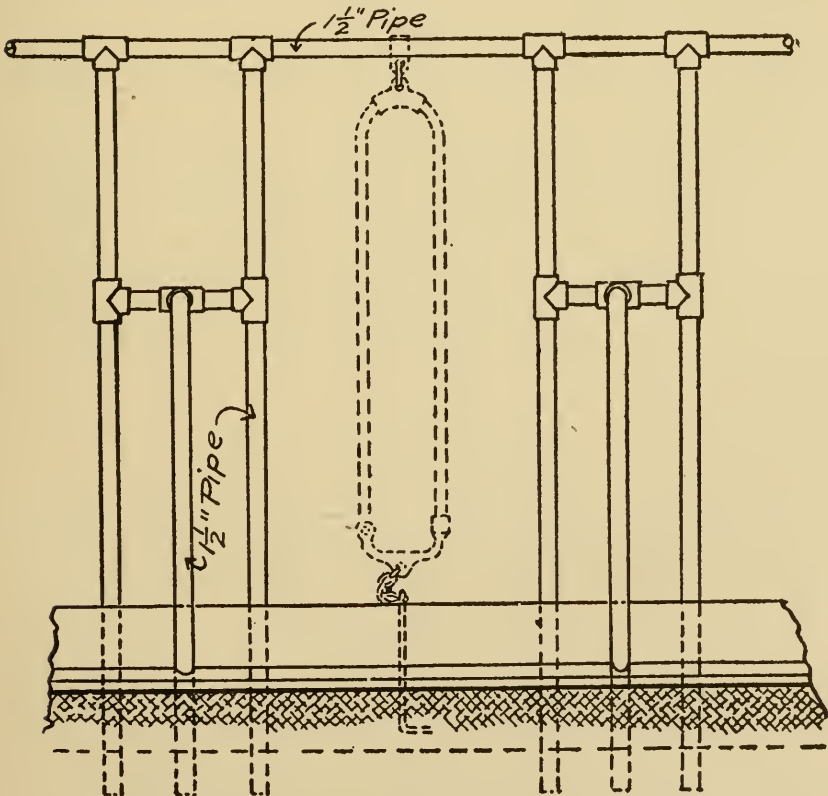


FIG. 21—REAR ELEVATION OF IDEAL COW STALL

A better system is to let fresh air into the stable through small openings and pass it out through openings in the ceiling.

The best known method of ventilating a stable is by the King system. This consists of a system of flues. The fresh air flues open on the outside three or four feet below the ceiling, run upward along the wall and open into the stable near the ceiling. There should be several of these fresh air flues, and they should be on at least two sides of the stable.

The impure air is drawn out through one or more flues opening near the floor and extending up to a point a few feet above the ridge of the roof. All these flues are air tight. By this system the fresh cold air enters the stable near the ceiling and is mixed there with the warm air. The air drawn off is the cold air near the floor.

The intakes should be about six inches square and the outlets two feet square. One such outlet will provide for 20 cows. If there are 30 to 50 cows, provide two such outlets, one at each end of the stable. The intake flues should be provided with valves so that in very cold or windy weather the circulation of air may be controlled.

HITCHING THE COW

There are many ways of fastening cows in the stable. I do not care to recommend any one way. Give them as much liberty as is consistent with cleanliness.

STABLE FLOORS

Cement is the best material for the floor of a cow stable. If desired the bench upon which the cows stand and lie down may be covered with wood, cork

CHAPTER X

Crops for the Dairy Farm

To fairly cover the above subject would require a book by itself. I shall not attempt here to even speak of the numerous crops that can be grown to advantage some years, or in some sections, either for winter feeding or for soiling. I wish, however, to offer a few suggestions worth considering in every section every year.

Corn should be grown on every dairy farm where it is possible to grow corn. It should mostly be stored in silos for winter and summer feeding. For the silo, grow corn that will produce a large tonnage, but grow corn that will mature in your climate. Immature corn makes sour, unwholesome silage, low in nutrients. Rather than grow very large stalks plant the corn thick, thus growing more and smaller stalks. When planting corn for silage I use 50% more seed than when planting corn to husk. Cut the corn and put it in the silo just as it reaches maturity.

ALFALFA AND CLOVER

Many farmers are just beginning to realize something of the immense value of alfalfa as a dairy feed. Possibly there are sections in this country where alfalfa cannot be grown, but it is now being profitably produced in many sections where a few years ago it was thought impossible. When you consider that a ton of good alfalfa hay is worth nearly as much for feed as a ton of oats or wheat bran, and that even as far north as northern Michigan three crops a year can be

grown, you are forced to conclude that a special effort to get this crop started on your farm is well worth while.

But little trouble has been experienced in getting the seed to grow on almost any soil. The trouble is to get the young plant to live and thrive through the first year. I feel like urging every dairy farmer to try growing a small plot of alfalfa on his farm. Nearly every experiment station has been studying alfalfa. I advise each farmer to write the station of his state asking for information on growing the plant in his locality.

I am sure that the following advice to those who have never grown alfalfa will be found practical in every section. Select a plot of fertile, well-drained soil. Plow it early and work it well. If the plot is not too weedy, sow part of it as early in spring as you can. Cultivate the rest of the plot thoroughly until late June or July, or until the land is in good condition for germinating the seed, then sow it. Use about 15 pounds seed per acre.

If there is an old alfalfa field within reasonable distance where a load of soil can be obtained, get it and scatter it over at least a part of the plot. If soil cannot be obtained secure an inoculating culture from your experiment station. If they cannot furnish it they will be able to tell you where to get it. This should be used on the seed before sowing. Directions for using it accompany the culture. Sowing 400 pounds an acre of soil from an old alfalfa field and covering immediately is a successful way to inoculate your soil.

Alfalfa will not do well where the soil is sour or lacking in lime. Scatter over at least a part of each plot a liberal supply of air-slacked lime. If you fail in the first attempt, try again. By treating different

parts of your plot differently you may be able to learn when to sow the seed and what to supply to make the crop successful. If you learn how to grow the crop the results will many times over repay you for the effort.

When a good stand of alfalfa is secured it should stand for a term of years. It will be some years yet before the average dairy farmer is ready to discard clover entirely, if that time ever comes.

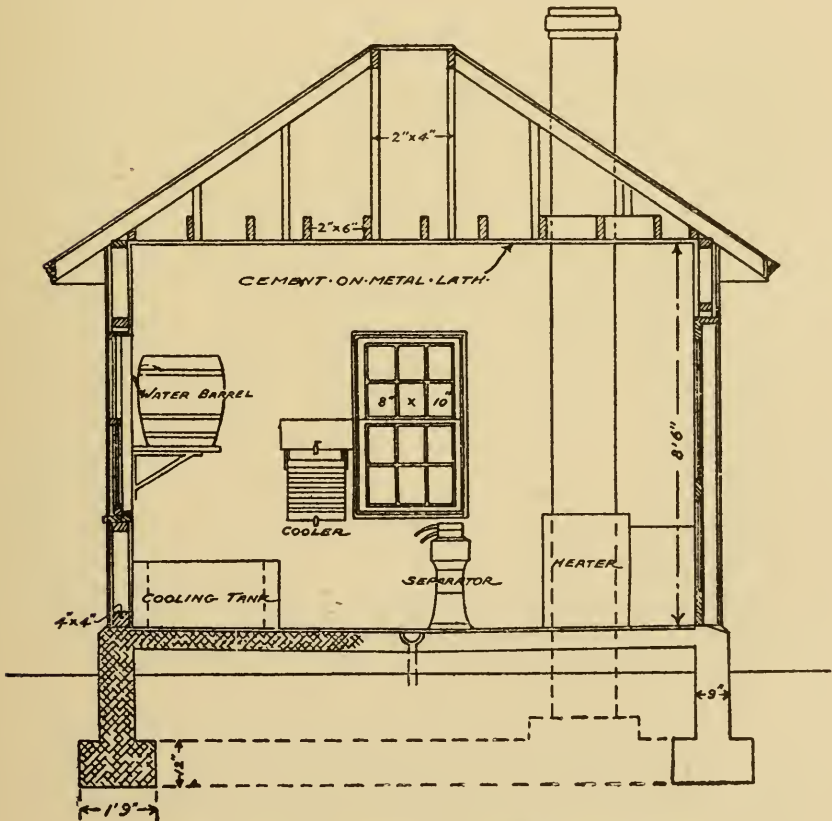


FIG. 23—CROSS SECTION OF FARM MILK HOUSE

CHAPTER XI

Silos and Silage

At one time silos were considered a sort of rich man's luxury; now they are recognized as the poor man's necessity. A few dairy farmers are putting off building a silo until they have rearranged or built a dairy barn. Others are not yet persuaded that they need one or can afford it. To these I submit the following facts:

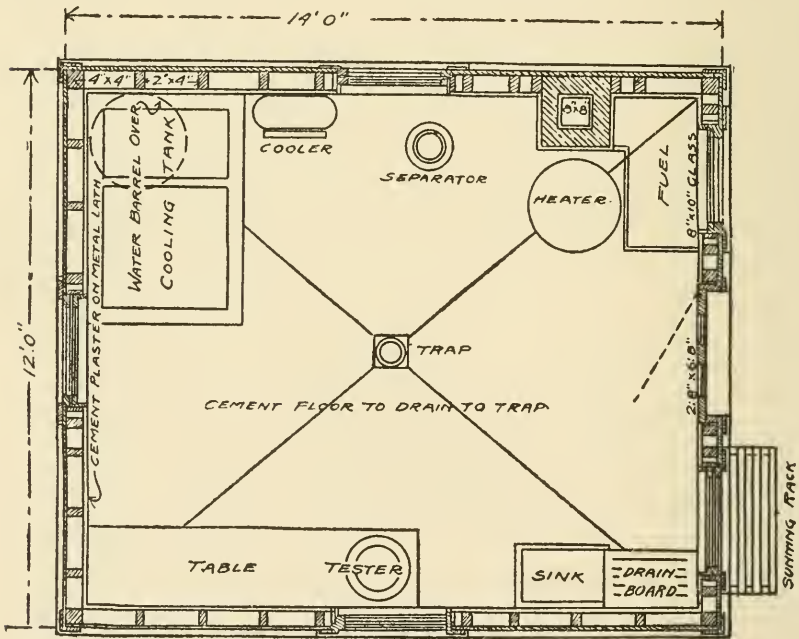


FIG. 24—FLOOR PLAN OF FARM MILK HOUSE

The silo is one of the cheapest forms of a successful storage building. What sort of a building can you erect for the same cost that will successfully store so much good cow feed?

A corn crop can be harvested and put in a silo at less cost than it can be husked and stored.

By placing a field of corn in the silo the farmer conserves a greater proportion of its feeding value than is possible in any other form.

As silage, the cows eat and relish the stalks as well as the leaves and grain.

As silage the crop is more palatable than when field cured and this is of immense advantage to the cow owner. The crop retains its natural plant juices, which materially aid the cow in digesting and assimilating this and other feeds.

Silos should be round, perpendicular, smooth on the inside, and air tight. They may be built of wood, tile, or cement. Cement silos are rapidly coming into use, and where suitable sand for building can be secured within reasonable distance, are not much more expensive to build than wooden ones. The foundation of a cement silo should be broad and strong, the walls well reinforced with strong wire, and the inside plastered with a rich cement mortar. A farmer with six cows can afford to have a silo. If he has more than six he cannot afford to be without one.

CHAPTER XII

Farm Care of Milk and Cream

American dairy products might be much enhanced in value, and the health of infants and adults who consume milk materially safeguarded, were more care used in milking and in handling milk and cream. Milk sours and decomposes through the action of minute organisms that get into it during the process of milking and afterwards. Warm milk is almost a perfect medium

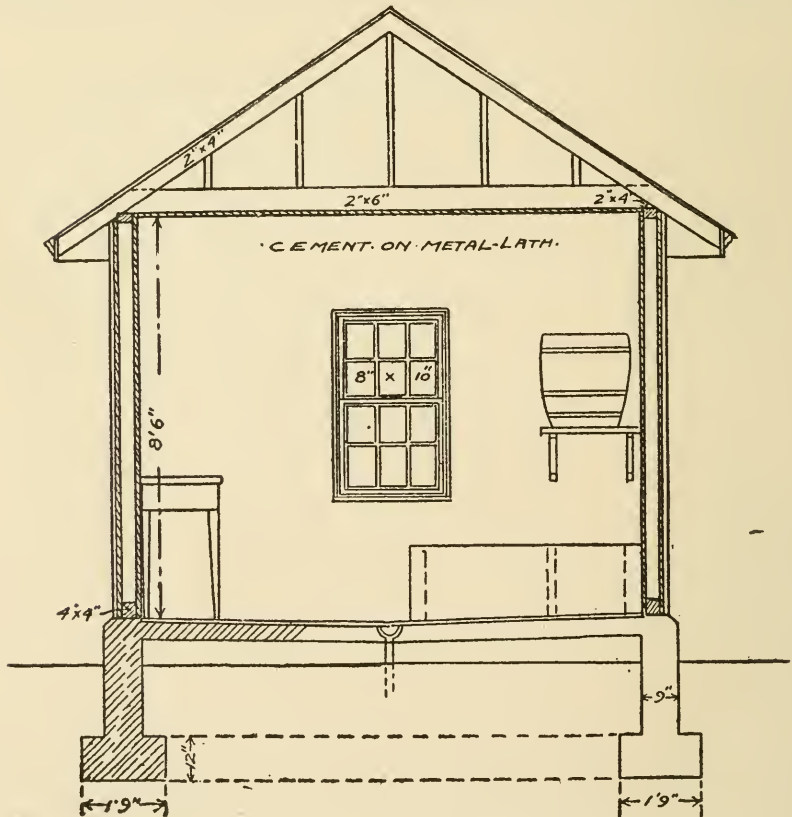
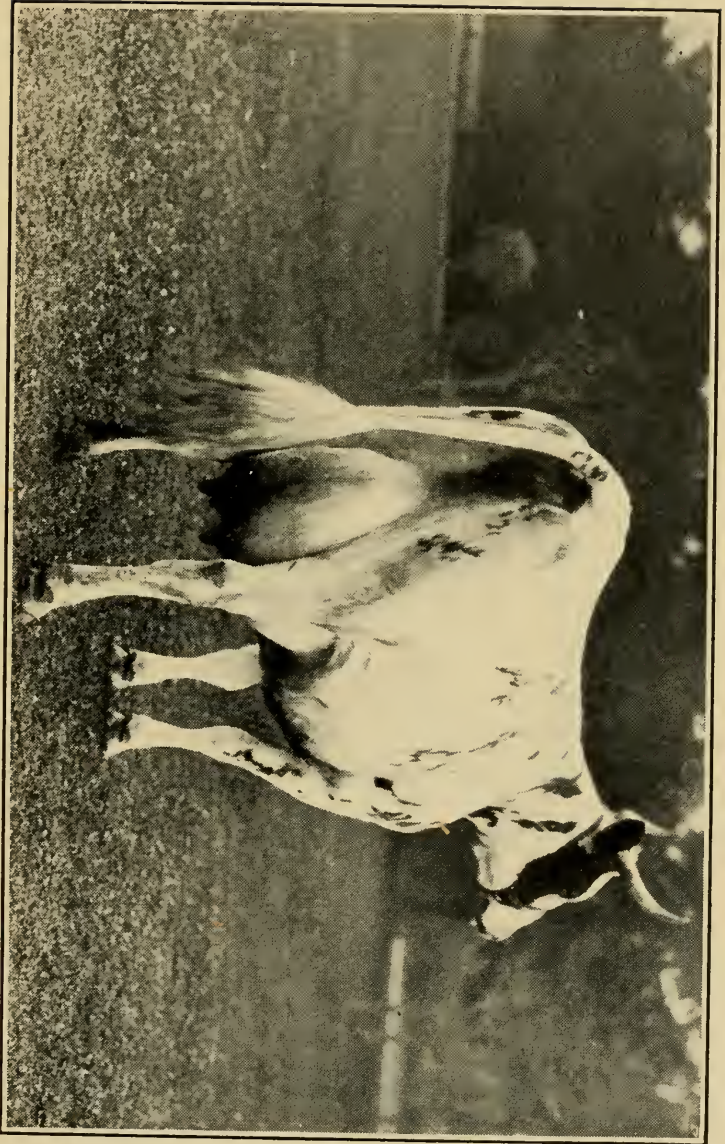
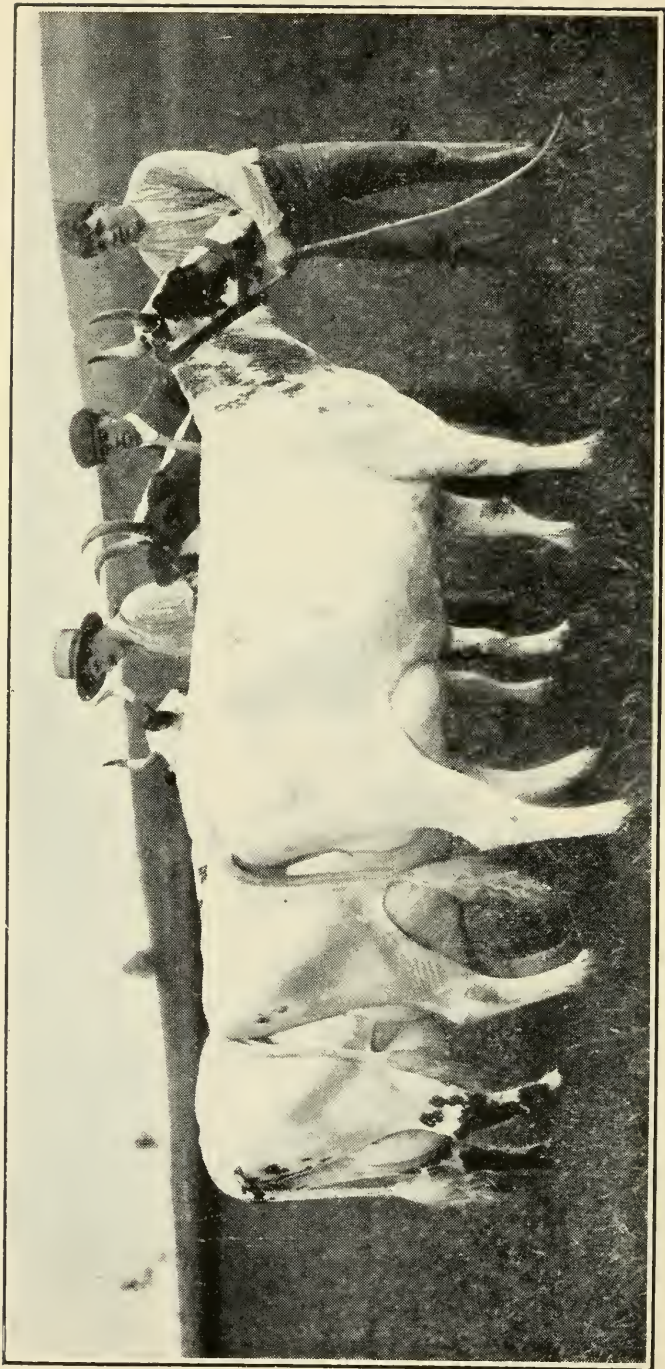


FIG. 25—CROSS SECTION OF FARM MILK HOUSE



AYRSHIRE COW, LILY OF WILLOWMOOR, WORLD'S CHAMPION OF THE BREED
Record, milk 22,106 lbs. in one year; per cent. 4.02; butter fat. 888.7 lbs., butter. 80%,
1,110.88 lbs.



TRIO OF AYRSHIRE COWS

Cow in foreground, Lessnessock Grace 26714 Imp., two-year-old daughter of the noted Dalriddle Grace 2d Imp. Middle cow, Castlemains Violet 25802 Imp.; first prize and grand champion cow at Toronto 1909; first prize and winner of the American Ayrshire Breeders' association silver cup for champion female at the New England fair 1910; record of 62 lbs. milk in one day. Cow at left, Barboig Big Nancy Imp. 25268; first prize and grand champion at Toronto 1908; milk record 59 lbs. in one day.

for the growth and multiplication of such organisms. The death of many babies as well as of older children and adults can be directly traced to the indifference of dairy farmers in drawing the milk and caring for it. Contrary to the belief of many, this is as true of those living on farms as of those living in cities.

Many diseases are the direct results of bad milk, and many other diseases prove fatal because the patient has been weakened by consuming unwholesome milk. Stable air and the air in unclean, poorly ventilated stables is loaded with organisms. Minute particles of filth that may drop into the milk from the sides or udder of the cow usually contain millions of such germs. These often double in numbers every 15 to 20 minutes while the milk remains warm. Cleanliness and cold, and keeping away from everything that pro-

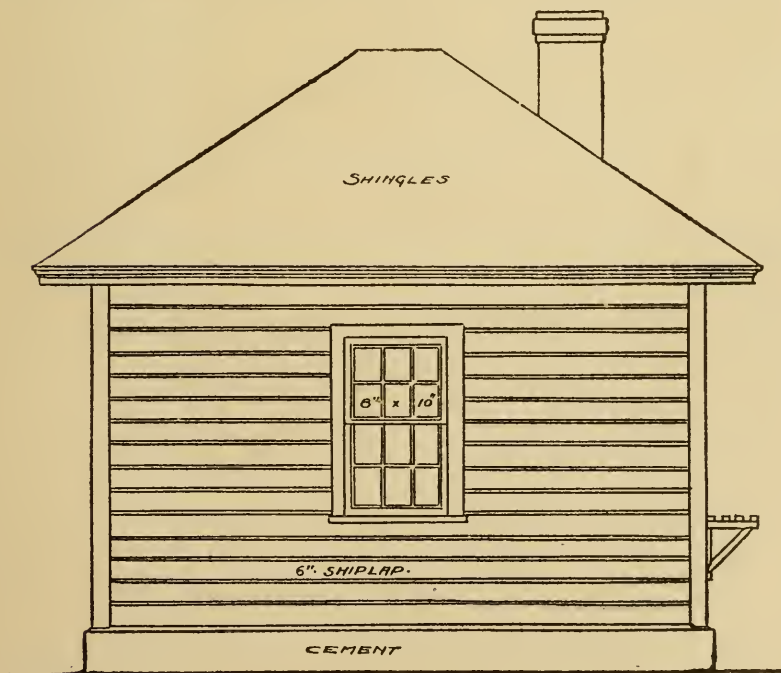


FIG. 26—SIDE ELEVATION OF FARM MILK HOUSE

duces odors are the essentials for good milk and other dairy products. Keep the cow and stable clean. Milk with clean, dry hands and remove the milk from the stable as soon as drawn. Cool the milk down to 50 degrees as quickly as possible or separate and cool the cream. Bacteria multiply very slowly in cold milk.

A farmer who kills an animal in hot weather will get the meat cool as quickly as he can to prevent its spoiling, but will often take but little pains to cool milk that, unless cooled, spoils much more quickly. Milk, cream, and butter absorb most quickly the disagreeable odors of a barn, of vegetables, of a damp cellar or of decaying substances. They should be kept away from such odors. Prevent as far as possible filth and germs getting into the milk, cool quickly, and keep in a clean, sweet, cool place.

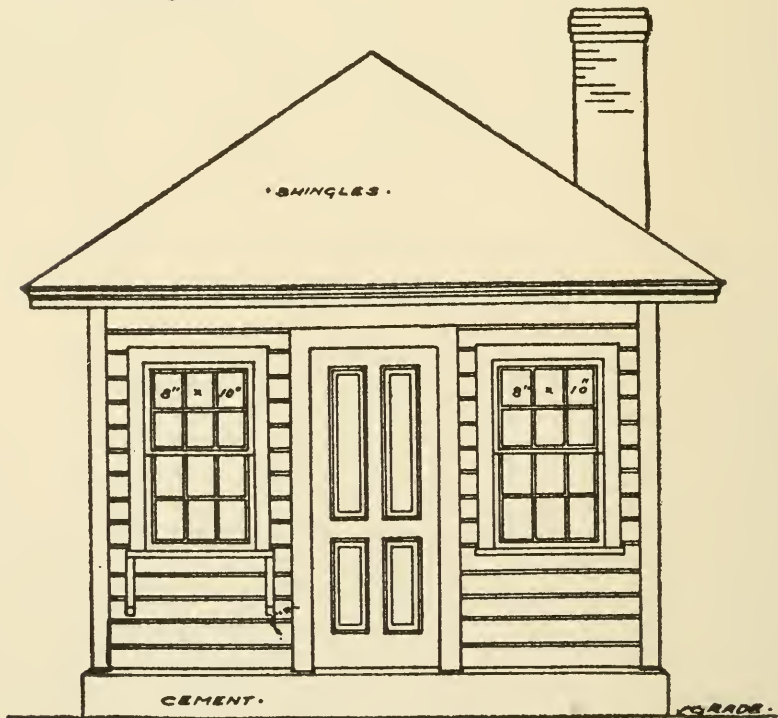


FIG. 27—FRONT ELEVATION OF FARM MILK HOUSE

CHAPTER XIII

The Outlook for Dairying

The outlook for dairying for many years to come is promising. The cow is an economical producer. The cities are constantly calling for more good milk. The consumption of ice cream is rapidly increasing. If our dairy products are good enough there is no danger of over-production.

The greatest menace to the dairy industry is the fraudulent, and dishonest competition of oleomargarine and other substitutes for dairy products. Oleomargarine is a legitimate product, and dairy farmers should not and do not object to it if sold for what it is. They do object, and should object, to its being made to look like butter and sold for butter. Millions of pounds are now being so made and sold each year. Oleomargarine makers do not color their product to make it taste better nor to increase its food value, but rather that it may go on the market masked under the characteristics of butter, and sold under a filched reputation. Farmers and consumers the country over should demand of Congress the enactment of a law preventing the coloring of oleomargarine in imitation of yellow butter.

By-Laws of Testing Associations

ARTICLE I

The name of this association shall be the —— cow testing association.

ARTICLE II

The purpose for which it is formed is generally to promote the dairy interests of its members and particularly to provide means and methods of improving the dairy qualities of cows and for the testing of cows of the members not less than once a month.

ARTICLE III

Its principal place of business shall be at ——, ——.

ARTICLE IV

SECTION 1. The board of directors shall consist of seven members, of whom a majority shall constitute a quorum. They shall be elected annually to hold office for one year and until the election of their successors, the first election to be held on the —— day of ——, 19—, and subsequent elections to be held on the —— day of —— in each year, except when such day falls on Sunday, in which case the election shall be held on the Monday following.

SEC. 2. The board of directors shall have the management and control of the business of the association, shall employ such agents and employees as they deem advisable, and shall fix the rates of compensation of all officers, agents and employees.

SEC. 3. Vacancies in the board of directors, or officers, may be filled by a majority vote of the remaining members of the board. The person so elected shall serve for the remainder of the unexpired term.

ARTICLE V

The annual meeting of the members of this association shall be held on the date above fixed for the election of directors in ——, ——, at a place to be designated by the board of directors.

Special meetings of the members may be called by the president or by the board of directors. Notice of all meetings of the members of the association, whether annual or special, should be given to the members by the secretary, or by mailing to each member a written or printed notice thereof, at least five days prior to the date of said meeting.

ARTICLE VI

The board of directors shall meet on the —— day of each month, unless there shall be a resolution to determine upon a different date. Notice of such meeting shall be given by the secretary by mailing to each director a written or printed notice thereof, at least three days before date of said meeting.

ARTICLE VII

SECTION 1. The officers of the association shall consist of a president, vice-president, and secretary-treasurer, who shall have the usual powers and perform the customary duties incident to these offices. The office of secretary-treasurer shall be held by one person who, besides performing the usual duties appertaining to the offices of secretary and treasurer, shall keep in a permanent form, subject to the direction of the board of directors, the cow-testing records of members of the association, and who shall be authorized to receive all moneys due the association and to pay any indebtedness of the association, and in general to transact all routine and other business of the association subject to the direction of the board of directors.

SEC. 2. The officers shall be elected by the board of directors from among their number, the election to be held immediately subsequent to the annual meeting of the members.

ARTICLE VIII

Election of officers shall be by ballot, each member being entitled to cast only one vote for each of the seven directors to be elected; *provided, however*, that each member making payment to the association of testing charges on more than 20 cows shall be entitled to an additional vote (for the full number of directors to be elected) for each additional 20 cows so paid for by him. Any member unable to be present at any meeting of the association may be represented by anyone interested in the management of the dairy of the member.

ARTICLE IX

Any dairyman entering into an agreement with the officers of the association binding him to pay the testing charges for

one year on the cows owned by him shall, subject to the approval of the board of directors, be considered a member of the association. Failure to make any payments agreed on as testing charges shall make a delinquent member liable to suspension, which may be imposed by the board of directors in such case at their option.

ARTICLE X

These by-laws may be amended, added to or altered, by a majority vote of all members present at the annual meeting or at a special meeting called for the purpose, each member in such case being entitled to one vote only.

TESTING OUTFIT ORDERED BY THE STANISLAUS (CAL.) COW-TESTING ASSOCIATION

1 24-bottle Twentieth Century tester,	\$23.40
6 dozen 6-inch 10 per cent. bottles at \$1.50,	9.00
2 dozen 17.6 c. c. pipettes at \$1.50,	3.00
½ dozen 17.5 acid measure,	.60
½ dozen O. B. skim milk bottles,	2.80
2 pair dividers,	.45
1 dozen milk test bottle brushes,	.30
1 60-pound automatic scale,	5.00
1 piece galvanized iron with holes for utility bath,	.50
1 carboy clear acid, about	3.50
1 utility bath, 24 6-inch bottles,	1.35
8 dozen 2-oz. aluminum screw-top sample bottles,	3.00
½ dozen brushes for same,	.60
3 feet 3-16-inch tubing, pinch cock, and pipette,	.50
1 oil stove,	2.00
1 copper kettle with nipple and tubing attachment,	2.15
2 glass stopper bottles for acid,	.50
1 coal oil can,	.25
	<hr/>
Total,	\$58.90
(The last four items were bought at local store.)	

CONTRACT FOR COW-TESTING ASSOCIATION

The following contract is used by a successful cow-testing association in California:

We, the undersigned dairymen, in consideration of the periodical (one day each month) testing of our cows during the season of _____ by _____, Secretary-Treasurer of the _____ cow testing association, hereby agree to pay the said _____, the sum of one and one-half (\$1.50) dollars for every cow so tested for us. We hereby agree to pay this sum per

cow in three installments in advance—75 cents per cow, March 1; 50 cents per cow June 1; and 25 cents per cow September 1.

We further agree that we will pay the first installment of 75 cents when due on the number of cows set opposite our names; and the 50-cent and 25-cent installments when due upon the number of cows set opposite our names and upon all other cows tested in like proportion. It is understood that each member may be allowed to replace not to exceed one-fifth of the original number of cows entered.

We further agree to provide suitable board and lodging for the agent of the association, and feed and stable for his horse, when said agent is actually engaged in testing our cows, including Sundays and holidays.

It is understood that this contract is not binding unless 700 cows have been entered by ———, 19—.

Dated	Signature	Number of Cows	Amount
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Index

	Page		Page
Alfalfa, how to grow it.....	71-72	Dairying always paid author	7
wonderful dairy feed.....	51	how author learned it	1-2
Balanced ration	45	comparative profits of	11
Balancing a ration.....	47-49	involves least risk	6
Barns, bank or basement	65	outlook favorable	79
essential for dairy	65-66	summer versus winter	63
floors for	68-70	versus cow keeping	10
light for	66-67	Farm labor problems	9
ventilation a necessity	67-68	Feed, necessity for succulence ...	53
warmth of	53	weighing	25
Barnyard, covered	59	Feeding, cleanliness essential ...	54
covered and inclosed	70	for dairy profit	40-41
Breed, choice of, for dairy.....	12	for normal production	42
Breeds, leading dairy	12	for profit	35
Breed tests of production	19	in summer	54-56
Brewers' grains	51	maintenance ration	36
Bull, age for use in breeding....	15	ration balanced	45-47
indications of merit	14	ration, proportion grain to	
selecting for dairy improve-		roughage	50-51
ment	14-15	standard, German	49
Butter, comparative cost of pro-		standard, Haecker's	50
duction	6	table, Henry's	48
Cement floor for barn	70	too heavily	41-42
Comparative profits, dairy versus		when to feed	53
non-dairy type	17	Feeds, digestible nutrients in ...	48
Cottonseed meal	51	for summer use	55
Cottonseed meal, relative value of	52	home grown	48-49
Cow, how to keep from kicking... 61		necessity for variety	43
testing associations	30-32	what kind needed	36
testing association, by-laws for	80-83	Freshening, most favorable season	
testing association, results se-		for	63
cured	21	German feeding standard	49
Cows, comparisons of dairy per-		Gluten meal	51
formances	20-21	feed	51
good dairy	18	Haecker's feeding standard	50
keep fewer and better	23	Henry's feeding table	48
which ones pay	23-25	Legumes supply nitrogen	5
Cross breeding, poor results of... 13		Linseed meal	51
Dairy, builds soils	5	Middlings	51
cattle, conformation of	32	Milk fever	56
census results	11	record	26
cow, development of	40	scales	25
cow, economical producer of		testing	28-29
food	5-6	weighing	27
cow, length of service	7	Milking, best methods of	60-61
cow, points of	33-34	regularity pays in	62
cows, 40% unprofitable	22	Nitrogen, securing it from legumes	5
farm crops	71-73	Oleomargarine, unfair dairy com-	
feeds, buying by analysis	52	petitor	79
herd, care of	57-62	Palatability necessary in feeds... 43	
increases farm fertility	8	Palatable feed, how to secure it.. 44	
insures steady cash income.... 7		Protein for milk production..... 46	
products should be clean 77-78		Ration, how to balance	47
profit, essential factors of 10		Rations, wide and narrow	49
type	33-34	Silage, corn best crop for	48
type, profit in	16-17	Silo, advantages of	75
		Ventilation, King system	68

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