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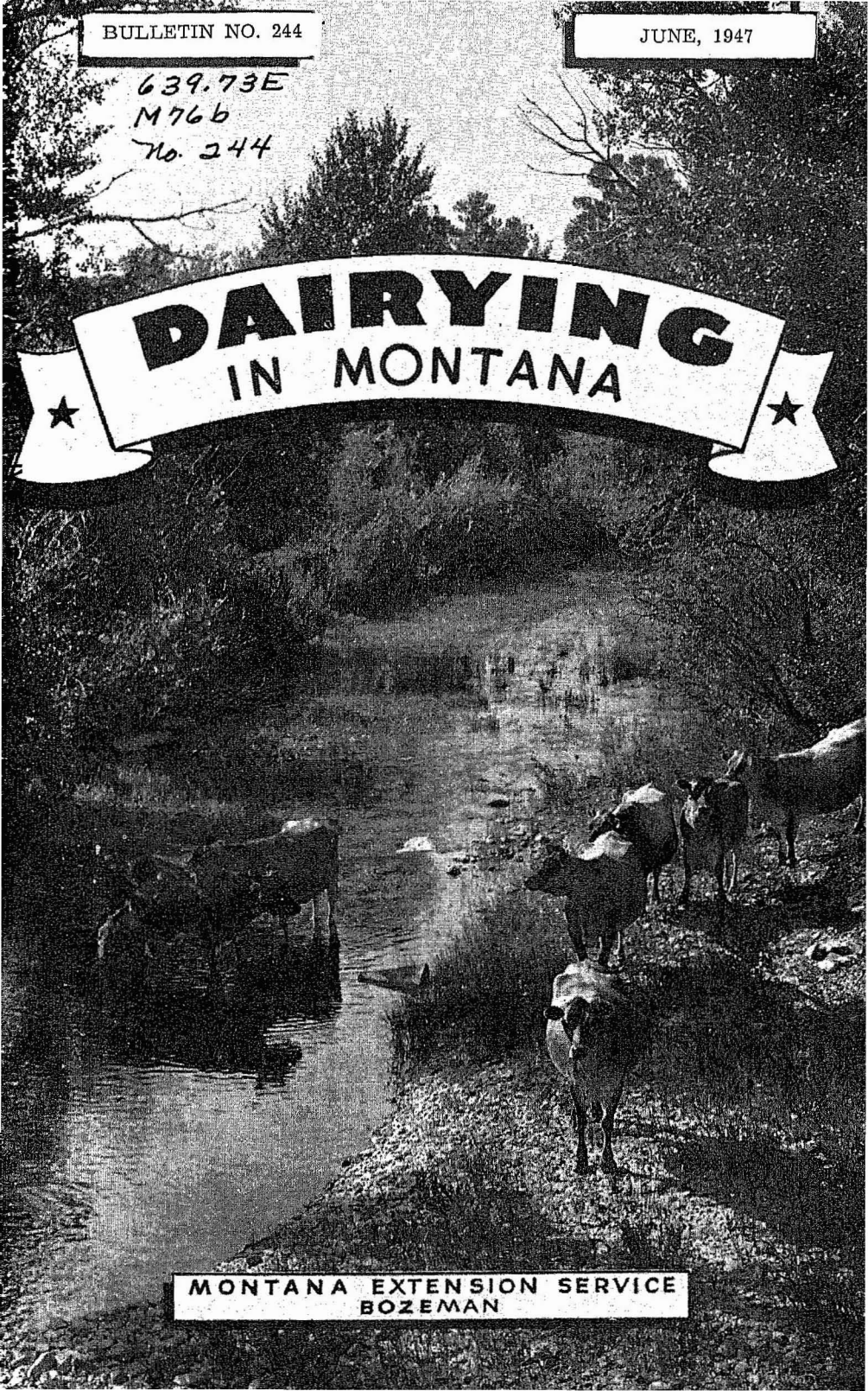
DAIRYING IN MONTANA



MONTANA EXTENSION SERVICE
BOZEMAN

Dairying Requires Ability

Dairy husbandry requires as much tact, training and experience as the successful operation of any industrial enterprise. Aside from a dependable feed supply and a good market for the products, success is dependent upon the breeding, feeding, care and management of the herd.

It is generally true that dairy farmers who read good dairy papers and farm bulletins are making the greatest progress. However, the practical application of much of the material published varies greatly with local conditions. This is particularly true in feeding for economical production. For this reason, dairy farmers will do well to observe carefully what practices are giving the best results under conditions similar to their own.

The object of this circular is to set forth the essentials of economical milk production in Montana under practical farm conditions. The information presented is based upon many years of experience as a herdsman, careful study of dairy herd improvement association data obtained within the state, and close observation of the practical management of successful Montana dairies.

The discussion on the treatment of some common ailments is limited to a few of the common diseases affecting the dairy cow. In most cases the care and treatment suggested are simple and may be applied by the dairyman without much trouble or cost. When in doubt consult a veterinarian.

J. O. TRETSVEN

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Dairying In Montana

By

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The Dairy Industry In Montana

The dairy industry has become one of Montana's major agricultural enterprises. In 1945 the cash income from the sale of dairy products was $13,711,000.00. To this should be added the

value of the dairy products not marketed but consumed on the farm, the skim milk used for feeding calves, pigs and poultry and the value of the veal and beef coming from the dairy cow.

The dairy industry in Montana may be divided into three classes: (1), the production of market milk for consumption in nearby cities and towns; (2), the production of milk and cream for the manufacturers of butter and cheese as the principal enterprise on diversified farms, particularly in the irrigated districts; (3), dairying as a side line to other agricultural enterprises on both irrigated and dry land farms.

Reasons for Dairying

There is an adage that, "Prosperity follows the dairy cow." No doubt, there are many exceptions to this statement but it is true that the dairy cow has contributed much to the prosperity and development of many communities. On a well managed dairy, one dollar's worth of feed, when marketed through good dairy cows, will return two to three dollars of dairy products.

Where dairying is carried on, a variety of crops must be produced, and this makes it possible to adopt a system of crop rotation. The legumes in the rotation and the manure from the dairy helps materially in maintaining the soil fertility. Weeds, particularly Canadian thistle, can be held in check in many places by growing alfalfa. The production of dairy products reduces the cost of living on the farm.

In addition to the sale of dairy products, the skimmilk, buttermilk or whey, may be used to good advantage in feeding pigs, poultry and calves. It is a well recognized fact that pigs and poultry grow faster and hens lay more eggs when their rations are supplemented with these dairy by-products. The sale of veal calves, surplus cows and culled-out animals also adds to the income. When these various items are added to the returns from the sale of milk or cream, the dairy becomes an important part in making the farmer successful.

The price of dairy products, generally, fluctuates with the industrial situation and, to some extent by the price of other agricultural products. In recent years, there has been a growing demand for dairy products, and this, together with the fact that many people do not like dairy work, have made dairying one of the most dependable phases of our agriculture.

With the coming of more modern dairy equipment such as electric lights, electric power, milking machines, open shed system of housing the dairy herd and the milking stable or parlor, the amount of man labor required to produce milk has been greatly reduced and much of the so called drudgery has been eliminated. Better bred cows and more modern dairy practices has added

much in making dairy farming both profitable and interesting.

Natural conditions are especially favorable for dairying in Montana's irrigated districts. In summer, irrigated or sub-irrigated pastures produce an abundance of grass for a period of four to five months. In these districts great quantities of cheap, high-grade alfalfa hay is produced. This hay with a grain ration composed largely of home-grown feeds such as barley, oats, wheat and corn, together with the by-products from the sugar factories and mills, makes a splendid winter ration. Montana Dairy Herd Improvement association records show that these common feeds, give both high and economical production where good dairy practices are followed. The climate and water supply are very favorable for dairying in the irrigated mountain valleys.

On the dry land farms the pasture and winter feed supply are not so well suited for high and economical production. However, by growing more feed crops such as corn fodder, cereal hay, brome hay and sweet clover or alfalfa and then building up feed reserves for the drouth years, dairying can be made a part of the farm business.

The need for the production of concentrated products of relatively high value to overcome the handicap of distance from larger markets and high freight rates is another important reason why dairying deserves a major place in Montana's agriculture.

Montana has a comparatively good market for her surplus dairy products in the Pacific Coast cities.

The Dairy Herd

Success in the dairy business depends largely upon the dairyman's ability to obtain high and economical production. This can be accomplished only by good, well-bred animals, properly fed and managed. The following table will show the importance of obtaining a high herd average. A compilation of data obtained in dairy herd improvement associations in 1944 shows how sharply income over feed cost rises as the production level increases.

Level of butterfat production (pounds)	Value of product (dollars)	Feed cost (dollars)	Income over feed cost (dollars)
200	176	98	78
300	258	114	144
400	338	130	208
500	411	142	269
600	493	159	334

On the basis of these figures, if a dairyman had a herd of 20 cows with an average butterfat production of approximately 200 pounds, his total income over feed cost would be (20 × 78) $1,560. If his herd had an average production of 300 pounds of butterfat per cow his total income over feed cost would be (20 × 144) $2,880. A herd with an average production of 400 pounds would yield a total income over feed cost of (20 × 208) $4,160.

Selecting Dairy Cows

Any of the leading dairy breeds of cattle will do well in Montana if given the proper feed and care. Where feed, water and shelter are not suitable for high production and where some cheap grazing land is available for growing steers, some farmers prefer a dual-purpose type of animal. Before deciding upon a breed of cattle, the farmer is advised to carefully study the merits of the various leading breeds. The following points should be considered before deciding upon a breed of cattle.

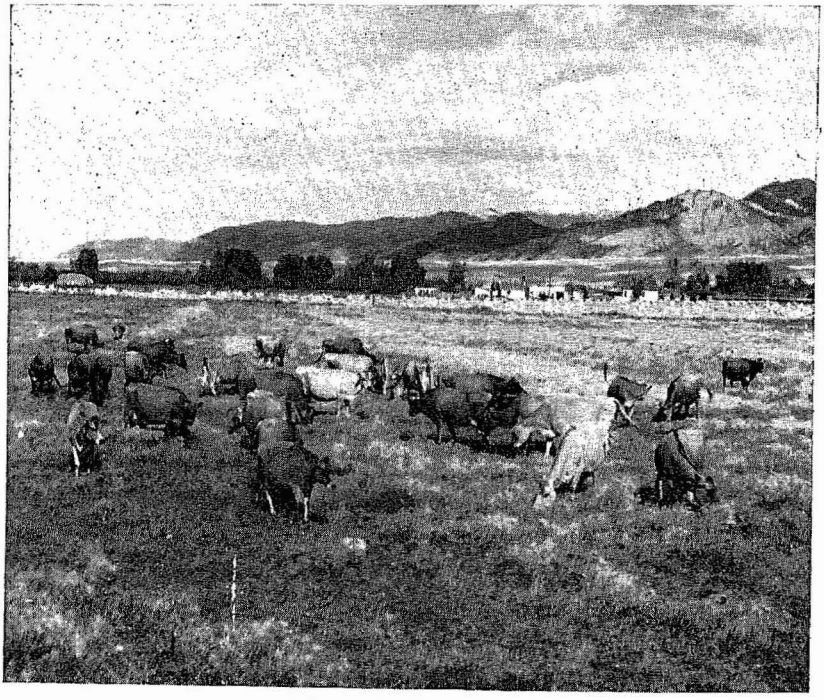

Fig. 1.—Good, irrigated grass pasture is the cheapest and best feed in summer.

1. The advantage of having the same breed of dairy cattle as one's neighbors. This makes it possible to exchange herd sires, to buy well-bred sires collectively and to attract buyers who may be interested in obtaining a large number of animals of the same breeding.

2. The market for surplus cows, culled-out animals, and veal calves.

3. The market for milk or milk products. The low testing breeds will produce milk more economically while the high testing breeds excel in the economical production of butterfat.

4. Personal preference. A person is likely to do well with the breed he likes best.

5. The need of skimmilk in feeding other classes of livestock.

6. The adaptability to the farm.

There are both good and poor individuals in every breed. For this reason, the best results cannot be obtained unless the dairyman exercises good judgment in selecting profitable animals and continuously culls out the inferior producers as revealed by the milk scales and fat test.

Many farmers make a mistake by switching from bulls of one type to those of another in hopes of developing a superior class of animal that combines all of the good qualities of the various breeds used and none of their defects. Unfortunately, the opposite results are generally obtained. This system of breeding produces off-colored, ill-shaped and inferior animals.

The cross-breeding of dairy cattle cannot be recommended until some organized system has been developed that is definitely known to result in superior animals.

Selecting Herd Sires

Because the herd sires are responsible for one-half of the inherited characteristics of all the calves, great care should be exercised in selecting the sire. The cheapest and most practical method of developing a highly productive herd is by the use of good purebred sires. Following are a few important points that should be considered in selecting a herd sire.

1. Use only purebred sires of the desired breed.

2. As far as possible, select a bull whose near ancestors are not only high producers but are also reproducers of highly productive animals. Since the bull is merely a medium for propagating the dairy qualities of his ancestors, it is well to study carefully the production, breeding qualities and type of his near ancestors. This can be accomplished best by obtaining and study-

ing a copy of the pedigree and by inspecting the living ancestors and their progeny if possible.

3. The more high-producing dams and the more sires and dams with high producing daughters appearing close up in the pedigree, the more likely his offspring will be good producers.

4. Bulls whose ancestors and their offspring have but few, if any, production records are likely to be of little value.

5. To evaluate an animal's pedigree, the buyer should acquaint himself with the classification of records as are adopted by the breed association. This information may be obtained by writing to the secretary of the breed association. If the buyer is not versed in reading pedigrees he should have someone who knows pedigrees interpret them for him.

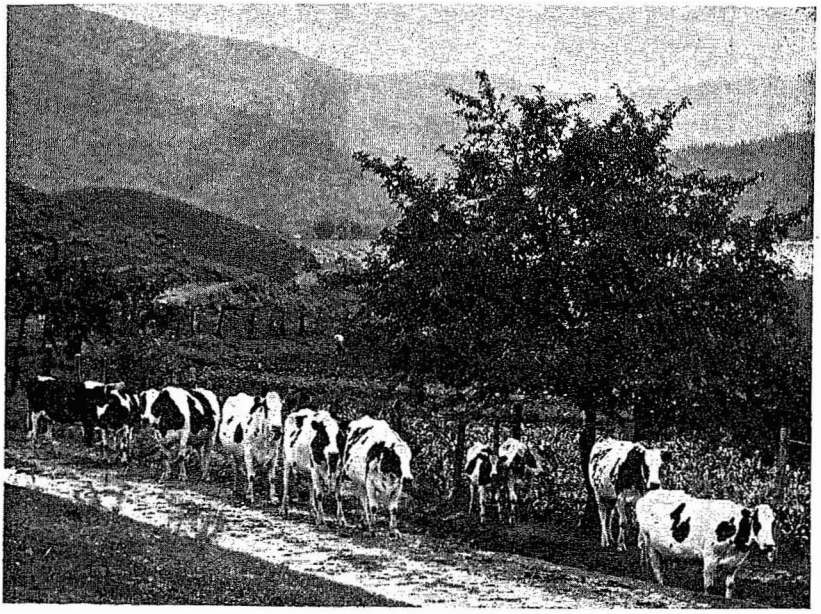

Fig. 2.—The A. P. Krueger herd, of Plains, headed for the dairy barn.

6. While high production is of greatest imporance, it is well to get an animal of good type and out of a family of cows that are easy milkers, with shapely udders well attached to the body. For this reason, it is well to see the animal and the near ancestors and the ancestor's offspring if possible.

7. If a good active proven bull can be obtained, more dependable progress can be made. A proven bill is one who has five or more unselected daughters whose records have been compared

with that of their dams. Unless the daughters' records are uniformly good or better than their dams, under similar management and feeding conditions, the bull should not be used.

Care Of The Herd Bull

The young bull should be fed a ration that will promote good growth and keep him in a thrifty, vigorous condition. The best results will be obtained if the winter ration consists of some choice pea green legume hay. The amount of grain should be governed by the quality of the roughage and the condition of the animal. As the animal matures, little grain is needed. Overfeeding may be worse than under-feeding.

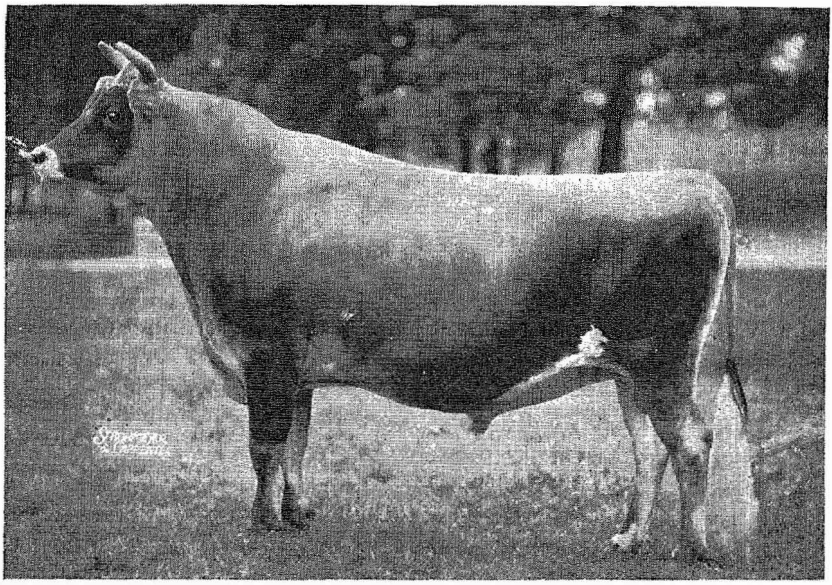

Fig. 3—An excellent type Jersey bull.

The continuous use of dry, bleached forage over a long period of time is likely to cause sterility. For this reason some green soiling crop should be fed in summer unless the bull is out on pasture.

While the bull is young and easy to handle, he should be thoroughly broken to lead and to give his ring when the word is spoken. The bull should never be teased or abused, instead, he should be treated kindly but firmly. The object is to gain his confidence. Regardless of how well he may handle, the attendant

should never take chances with a bull. The quiet and so-called "gentle bulls" do most of the killing. When the bull is a year old, he should be rung. Older bulls should always be handled with a well-made staff.

For several reasons, the bull should **not** be allowed to run with the herd. When this practice is followed the cows are bred too soon after calving, accurate breeding records are not obtained, heifers are bred too young, and the bull is often a source of trouble with the neighbors.

The "safety bull pen" provides the best and most practical way of housing and handling a herd bull. Detailed description of this is given in Circular No. 138, "The Safety Bull Pen," Montana Extension Service, Bozeman, Montana.

CARE OF THE DAIRY COW

The Dry Period

The production of a dairy cow is largely dependent upon her physical condition before calving. For this reason the cows should stand dry from six to eight weeks before freshening. This necessitates keeping a record of the date of breeding. The gestation period is approximately 283 days.

In some cases the drying up period will take three or four weeks. Feeds that stimulate milk production, and stripping and massaging of the udder should be avoided. When the milk flow has decreased to from 2 to 2½ gallons daily, milking once daily will suffice. As the milk flow continues to decrease it is well to skip two milkings and then three milkings and so on until the cow is dry.

The dairyman should always aim to have his dry cows in good thrifty condition and carrying considerable flesh at calving time. For winter feeding, legume hay should constitute all or a large portion of the roughage. A bucket of sliced roots a day for a few weeks before calving is helpful. If the desired condition can be obtained with roughage alone the cost of feed will be reduced; if not, some grain should be fed. The amount will vary with the condition of the animal and the quality of the roughage. From two to eight pounds daily is commonly used. The regular herd mixture may be fed. Some dairymen claim a pound of grain fed before calving to be worth two pounds after calving. In summer, while pastures are good, no extra feed is required except for thin animals who made need some grain. The desired condition may also be obtained by feeding a little extra grain during the last two or three months of the lactation period.

Care At Calving Time

Four to five days before calving, it is well to discontinue heavy grain feeding and to place the cow in a large, clean, well-bedded box stall unless the weather is warm, in which case she may be out on pasture. As the time of calving approaches, the udder becomes more distended and the ligaments on either side of the tail head loosen, giving a sunken appearance. It is well to keep watch of the cow while she is in labor but not to disturb her unless assistance is required. In case she fails to pass the afterbirth within 24 hours after calving, it should be removed by a veterinarian unless the attendant is qualified to remove it himself.

After the cow has calved, she may have all the water she wants, but it should be warmed or given in small amounts at a time. Many good dairymen practice giving the fresh cow a warm bran mash for the first feed after freshening. The fresh cow may have all the legume roughage she will eat but it is best not to feed any grain until the second day. As the cow gets over the effects of calving, the grain ration should be gradually increased, taking about three weeks to get her back to a full feed. In winter a bucket of sliced roots daily for three or four weeks helps to give the fresh cow a good start. It is well to encourage the fresh cow to produce her maximum by liberal feeding and good care.

Fresh cows frequently have caked, swollen udders, a condition not necessarily harmful but troublesome. To relieve this condition the cow should be fed rather lightly on laxative grain rations, be milked frequently and the udder massaged. She should also be kept on a deep bed of dry straw away from drafts. Allowing the calf to nurse for a few days before weaning also helps to reduce the swelling. Some dairymen advise milking cows with badly caked udder before calving.

After calving there is danger of milk fever. The number of cases may be lessened by leaving enough milk in the udder to create a slight pressure for the first two or three days following calving. After that, the cow should be milked dry. The disease is most prevalent in high-producing cows after their third or fourth year and usually appears within three days after calving. Cows calving for the first time are seldom if ever affected. See page 33 for symptoms and treatment.

What To Feed

The economical production of milk depends largely upon the ability of the dairyman to select feeds that will make a good, economical ration and to govern the amount to fit the needs of the individual cow. Fortunately, it is not difficult to make up a good dairy ration from the common, Montana feed stuffs in the districts where an abundance of choice legume hay and good pasture grass is produced.

In order to provide the most practical ration the dairyman should know some of the needs of the dairy cow. Protein, carbohydrates and fats are the principal nutrients found in feeds from which the animals build and maintain their bodies and produce milk. The producing cow needs a ration that is fairly high in protein because protein is used for the production of casein (the cheesy matter in milk) and the albumen in the milk. It is also the material from which the tendons, muscles, skin, hair and internal organs are made.

The cow uses the carbohydrates and fats primarily for heat and energy, while the surplus is used in the production of butterfat and milk sugar, or is stored as body fat. If a large amount of feed rich in protein is used, the surplus protein is used to a large extent, the same as are the carbohydrates and fats.

Protein is the indispensable material in the ration. It may be likened to cement in the making of concrete. Knowing this, the dairyman will always aim to give his cows a ration that contains a sufficient amount of high quality protein along with the necessary carbohydrates and fats. The proportion of protein to carbohydrates and fats for high producing cows should not be less than one to six. If dairy cows are fed 20 pounds or more of good, leafy alfalfa hay daily, together with other common feeding stuffs, they will obtain more protein than is generally required. When milk cows are fed an unbalanced ration containing only a small amount of protein and a large amount of carbohydrates and fats they will not hold up in their milk flow. For these reasons the dairyman should know the relative amount of protein, carbohydrats and fats contained in the various common feeds. This is shown in the following table which gives the digestible nutrients in 100 pounds of feed. The feeds are also grouped according to their protein content.

VALUE OF FEEDING STUFFS

Feeds 100 lbs.	Crude Protein	Total nutrients: Protein Carbohydrates and fats.	Proportion Protein to Carbohydrates and fats.
CONCENTRATES			
Low in protein, but fattening			
Dent Corn No. 1	7.3	82.5	1:10.3
Barley	9.3	78.7	1: 7.5
Oats	9.4	71.5	1: 6.6
Rye	10.3	80.1	1: 6.8
Wheat	11.4	85.7	1: 6.5
Dried Molasses Beet Pulp	6.1	74.3	1:11.2
Molasses (beet)	2.5	58.8	1:22.5
High in Protein			
Wheat Bran	13.1	70.2	1: 4.4
Oil meal (O. P.)	30.6	78.2	1: 1.6
Cottonseed meal (choice)	37.8	80.9	1: 1.1
Soy bean meal	37.7	82.2	1: 1.2
ROUGHAGE DRIED			
Low in Protein			
Sorghum fodder	3.6	52.7	1:13.6
Fodder corn (medium)	3.5	54.6	1:14.6
Timothy hay	2.9	46.9	1:15.2
Prairie hay	2.6	49.2	1:17.9
Oat hay	4.5	46.3	1: 9.3
Millet hay	5.2	51.5	1: 8.9
High in protein			
Red clover hay	7.0	51.9	1: 6.4
Alfalfa hay	10.6	50.3	1: 3.7
Sweet clover (yellow)	10.5	49.9	1: 3.8
Oat and pea hay	8.9	52.2	1: 4.9
SILAGE AND ROOTS			
Corn silage	1.1	17.4	1:14.8
Mangels	1.0	7.3	1: 6.3
Beet pulp (wet)	.8	8.9	1:10.1
Potatoes	1.1	17.3	1:14.7
Pea vine refuse	2.6	17.8	1: 5.8

The above figures are taken from "Feeds and Feeding" by Morrison.

In making up a ration, select a variety of feeds that will have at least one part of protein to six parts of carbohydrates and fats. Use as much good legume hay, especially alfalfa, as possible. It is the best, and, as a rule, the cheapest roughage available. Select the early cut, well-cured and leafy hay. It is the richest in protein, mineral matter and the essential vitamins. The quality of the protein in choice alfalfa hay fits well with that of the common grains, making it possible to obtain high production with home-grown feeds. With choice hay, less grain is required; and the cows may be maintained in better physical condition.

Silage and roots are excellent feeds for winter and should be used freely wherever they may be produced at a low cost. In most irrigated districts the relative cost of silage and roots is generally high.

When hays rich in protein, such as good, leafy alfalfa are used in liberal amounts, select a variety of two or more grains that are relatively rich in carbohydrates and fats, such as ground barley or corn, with a little rolled oats, dried beet pulp or bran, to lighten the mixture. Select the feeds that will supply the total nutrients at the lowest cost. See table on page 13 for relative value of feeds.

When roughages low in protein, such as prairie hay or oat hay are fed, or when liberal amounts of corn silage are used in the ration, the concentrates should furnish a large portion of the necessary protein. Such feeds as bran and oil meal, depending on price, should then be used quite freely with such fattening feeds as barley or corn. See table on this page for the most economical protein feeds.

If the roughage consists of a limited amount of alfalfa, or the alfalfa is of poor quality and other roughage low in protein, such as corn fodder or cereal hay, then the grain mixture should contain some high protein feeds but less than where all the roughage is low in protein.

Value of Concentrates

If it is necessary to purchase concentrates, consult the following table which gives the relative monetary value of several feeds based on the total digestible nutrient and protein content.

To supply digestible nutrients the feeds listed have a relative value, approximately as follows:

When barley is worth $1.00—

Corn is worth	$1.05	Cottonseed meal is worth	$1.03
Rye is worth	1.02	Bran is worth	.89
Wheat is worth	1.09	Dried beet pulp is worth	.94
Oats is worth	.91	Molasses is worth	.74

The table may be used to determine the relative value of feeds at different prices as follows:

If barley is priced at $1.50 per hundred the price that may be paid for oats may be arrived at by multiplying $1.50 (the price of barley) by $.91 (the figure given for oats). Thus, $1.50 × .91= $1.36, the relative value of oats.

To supply protein only, the feeds listed have a relative value, approximately as follows:

When bran is worth $1.00, Linseed Oil meal is worth $2.33, cottonseed meal is worth $2.88.

The table also may be used to determine the relative value of feeds at different prices, thus: If bran is priced at $1.30 per hundred as a protein feed, what is Lindseed Oil meal worth? Example of how this is figured—$1.30 (price of bran) × $2.33 (figure given for Linseed Oil meal)=$3.03 or the relative value of Linseed Oil meal. Other feeds may be figured the same way.

Observe that the feeds usually purchased to supply the protein, such as bran and Linseed Oil meal, also have considerable value in furnishing the other nutrients, a point that should be considered in evaluating feeds.

Value of Dry Roughages

The time of cutting and the manner of curing dry roughages greatly influences the feeding value. In general the early cut, leafy, well-cured roughage is the best for milk cows. While the difference in the amount of total digestible nutrients in the dry roughages listed is slight, the actual value as a feed for milk cows is greatly influenced by the protein content. Good alfalfa hay heads the list, with choice sweet clover and red clover hay as fair substitutes. Poorly cured and damaged sweet clover hay has but little feeding value and is a dangerous feed. The cereal hays, grass hays and corn fodder, are all relatively low in protein, and have a much lower feeding value for dairy purposes generally.

The following table will illustrate the difference in feeding value between alfalfa leaves and alfalfa stems. The table gives the protein and total digestible nutrients in 100 pounds of the various feeds listed.

	Protein Lbs.	Total Digestible Nutrients
Alfalfa leaves	16.9	57.0
Alfalfa stems	5.1	40.8
Alfalfa hay	10.6	50.3
Wheat bran	13.1	70.2

Note: For more detailed information on milk cows see Montana Extension Circular No. 147, "Good Hay Makes More Milk."

The table shows that alfalfa leaves contain more protein than wheat bran and alfalfa stems have much less protein. This means that alfalfa hay should be cut early and put up to save as many leaves as possible. Alfalfa stems have little value for dairy cows. Hay that has been bleached from rain and sunshine has lost a large per cent of its feeding value.

Silage And Roots

Most silage and root crops are low in feeding value due to the large amount of water they contain. About three pounds of silage and five pounds of roots are required to replace one pound of hay. This means that when good hay is worth $8 per ton, silage is worth about $2.66 and roots about $1.60. Most silage and root crops are low in protein. See table, page 13.

Pasture

Native dry land pasture has very little value as a feed for milk cows, while the irrigated or sub-irrigated pastures furnish an abundance of choice feed over a long period at a very low cost. The tame, mixed, grass pastures are perhaps the best for milk cows, though sweet clover pastures give good results and usually have a high carrying capacity. With sweet clover or other legume pastures there is more danger of bloat. Crested wheat grass and brome grass make good early dry land pasture.

Minerals And Salt

Milk producing animals secrete large quantities of lime (calcium) and phosphorus in their milk. Unless their feed contains sufficient quantities of these minerals, the cows will eventually become unthrifty, and the milk flow will be greatly reduced. The symptoms of a mineral deficiency may not be observed for a few months, as the cow has the ability to draw upon the calcium and phosphorus in her skeleton for some time. Eventually, however, and especially toward spring, the cow will be unthrifty, give less milk and exhibit a crippled and stiffened condition of the joints. Cows so affected will have a desire to chew bones, lick the soil and eat rags.

Fortunately there are but few places in Montana where the dairy ration is lacking in lime (calcium) because our soils are high in lime generally, and legume hays which constitute most of our roughage for winter feeding contain an abundance of this mineral as indicated by the following table:

Calcium Content

High	Medium	Low
Alfalfa	Cottonseed meal	Grass hays
Red clover	Linseed meal	Cereal hays
Sweet clover	Corn fodder	Grains

Phosphorus Content

High	Medium	Low
Wheat bran	Alfalfa hay (?)	Straw
Shorts & middlings	Sweet clover hay (?)	Beet pulp
Cottonseed meal	Cereals	Timothy hay
Linseed meal	Some grass hays	Millet hay

The soil in large areas of the state is deficient in phosphorus. In these areas the grass and hay produced will contain a very limited amount of this mineral. Under these conditions it is wise to supplement the ration with a mineral high in available phosphorus, such as sterilized bone meal, unless a large amount of feed high in phosphorus, such as wheat bran or cottonseed meal, is used in the ration. The sterilized bone meal may be mixed with the concentrate at the rate of 5 to 15 pounds per 1,000 pounds of feed. Many dairymen also put bone meal in a box to which the cows have free access at all times. The bone meal box should be placed in a protected place away from the wind and rain.

In some phosphorus deficient areas heavy producing cows will need up to three ounces of bone meal per head daily. Bone meal is also a good source of calcium.

Bone meal contains 12 to 13 percent phosphorus. De-flourinated phosphate containing 13 to 14 percent phosphorus may be added to the grain mixture in place of the bone meal. De-flourinated phosphate, however, is not palatable and therefore must be fed in the grain mixture. Mono-sodium phosphate containing 25 to 26 percent phosphorus is very palatable and can also be used in place of the bone meal. It generally costs about twice that of bone meal but only one-half as much is required.

When fields respond readily to an application of phosphate fertilizer it indicates that the grass and hay produced is likely to be low in phosphorus. Fertilizing the fields and pastures is a good way to increase the phosphorus content of the grass and hay grown and in turn supply the animal with the phosphorus needed.

An iodine deficiency is found to exist in some localities. Where this occurs, the calves are usually born with goiters. This condition can be prevented by feeding potassium iodide in the

stock salt. The potassium iodide is mixed with the salt at the rate of one ounce to 300 pounds or, commercially iodized salt may be purchased.

Dairy cows should have all the salt they desire at all times. Some dairymen have the mistaken idea that by forcing their cows to consume large amounts of salt that they will drink more water and in turn produce more milk. An excess of salt is more likely to be detrimental than helpful. It is well to keep granulated stock salt in boxes to which the cows have access. In addition, many good dairymen add a little salt to the grain mixture, using 10 pounds of salt to 1,000 pounds of grain. Block salt is usually too hard in winter to provide dairy cows with the salt required.

While numerous other minerals are required for the normal functioning of the body, so far as is known, except in special cases, the only supplementary minerals needed by Montana dairy cows are common salt, phosphorus and iodine.

The Vitamins

The vitamins play an important part in promoting growth and the normal functions of the cow's body. Fortunately most well balanced rations for dairy cows contain a liberal supply of the essential vitamins. Vitamin D, necessary in the formation of the bones, is known as the "sunshine vitamin" because direct sunshine results in the production of this vitamin within the body. Thus, animals exposed to direct sunshine need little if any vitamin D in the feed. Well cured alfalfa hay contains a fair amount of this vitamin while the low grade roughages—cereals—and most all concentrates are nearly void of this factor.

When animals are fed exclusively for long periods on bleached forage or stack-burned hay they may suffer from a lack of vitamin A, necessary for normal growth and good health. Well cured, pea green, leafy hays; green grass; all green growing crops and yellow corn are good sources of this vitamin.

In summer when the cattle are out on good pasture and in winter under proper management when the ration is composed of well cured, pea green, leafy hay, particularly alfalfa, and some ground whole grains, the cows will be fairly well supplied with the essential vitamins.

How Much To Feed

The amount of feed a cow should have depends upon her production, physical condition, and capacity for food. Thus, each cow must be carefully studied and fed according to her needs. Many high-producing cows get very thin after calving because

their rations do not contain enough nutrients or the nutrients are not in the right proportion to produce the milk and maintain the body. It should be the aim of the dairyman to feed his cows at all times in such a way as to maintain them in good physical condition. The cows will not only produce more milk but the lactation period will also be prolonged.

It is well to give the cows all the good roughage they will consume, the amount of grain to be adjusted to the production and condition of the individual animals. When the production is high it is evident that more feed is required. The rations given on pages 21 and 22 show how the amount of feed needed varies with the yield of milk. It is generally conceded that liberal feeding of good dairy cows is the most economical method to follow. This has been verified by the record of experiment stations and Dairy Herd Improvement associations. See table on page 5.

Figure 4 illustrates the importance of feeding cows accord-

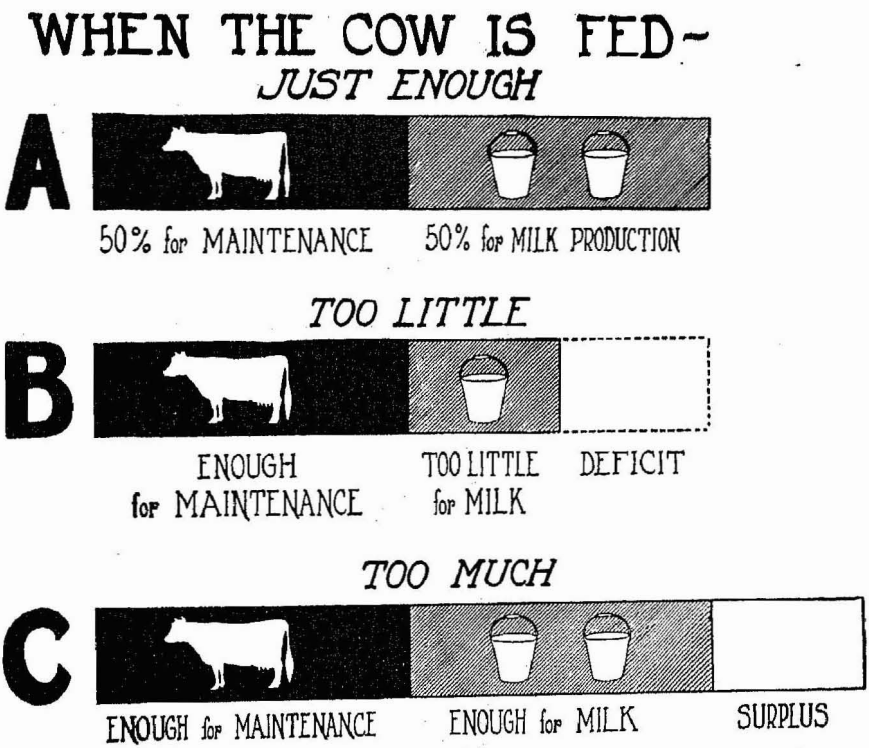

Fig. 4—Too little feed means reduced milk production; too much, means waste.

ing to their needs. This chart shows that when a good producing cow is fed a full ration as indicated by (A), 50 per cent of her feed is used to maintain her body and 50 per cent is available for milk production. If fed a lesser amount as in (B), the same amount is used for maintenance and too little is available for production. Thus, the ration fails to meet the needs of a high-producing animal. In this case the animal loses weight and the milk flow is reduced. The cost of production is also high. If too much feed is given as in (C) the surplus feed is used for increase in body weight. Here again the cost is high.

Some dairymen practice giving all their cows the same amount of feed. Where this system is followed the high producers are apt to be underfed and the low producers overfed. By this method the heavy producers become very thin and decrease in milk flow very rapidly, while the lower producers may maintain their condition or increase in flesh.

When heavy feeding is carelessly practiced the cows are likely to go "off feed" and suffer from indigestion. To avoid this the grain mixture should contain some loose, light feed, such as wheat bran, rolled oats or dried beet pulp, and the amount of grain should be increased very gradually. At no time should the cow be fed more grain than she will clean up. If the cow acts as though she is not hungry and does not lick her manger clean, the grain ration should be reduced.

After the cow gets over the effects of calving, she should be fed liberally to encourage high production. As the lactation advances the grain ration should be gradually reduced as the milk flow and her physical condition warrants. Many successful dairymen feed their cows according to some rule. The following rules are common for winter feeding:

Rule I. Feed all the good roughage the cow will consume and 1 pound of grain for every three to four pounds of milk she produces daily.

Rule II. Feed all the good roughage the cow will consume and only enough grain to keep her in the desired physical condition. Cows will consume about 2½ pounds of dry roughage or its equivalent daily per 100 lbs. live weight, in addition to the concentrate.

While these rules are fair guides in determining the amount of grain to use, they should not be followed too closely in all cases. The richness of the milk produced and the kind of grain and roughage fed will influence the amount used. Cows producing small quantities of milk do not require as much grain as is called for by Rule I. Rule II is perhaps the more practical when feeding

is done by one man and the condition of the cows is closely observed for gain or loss in flesh.

Where an abundance of cheap, high-grade alfalfa hay is produced and grains are relatively high-priced, dairymen use less grain than in Rule I. In some cases no grain is fed at all.

Suggested Rations

Following are a few suggested rations that illustrate how common feeds may be combined to make well-balanced rations:

Ration I. For a cow weighing 1,000 pounds and producing 22 pounds of 5 percent milk.

Feeds	Pounds Protein	Pounds total nutrients: Protein, Carbohydrates and fats	Proportion of Protein to Carbohydrates and fats
Sweet clover hay			
10 lbs.	1.050	4.99	
Oat hay 15 lbs.	.675	6.94	
Grain mixture:			
Barley 3 lbs.	.279	2.36	
Oats 2 lbs.	.188	1.43	
Bran 2 lbs.	.262	1.40	
	2.454	17.12	1:5.9

This grain mixture contains 13 percent protein chemical analysis.

Ration II. For a cow weighing 1,200 pounds and producing 40 pounds of 4 percent milk.

Feeds	Pounds Protein	Pounds total nutrients: Protein, Carbohydrates and fats	Proportion of Protein to Carbohydrates and fats
Alfalfa 30 lbs.	3.180	15.09	
Grain mixture:			
Wheat 5 lbs.	.570	4.28	
Dried Mol. Beet Pulp 2 lbs.	.122	1.49	
Barley 4 lbs.	.372	3.15	
	4.244	24.01	1:4.65

This grain mixture contains 12 percent protein chemical analysis.

Ration III. For a cow weighing 1,400 pounds and producing 60 pounds of 3.5 percent milk.

Feeds	Pounds Protein	Pounds total nutrients: Protein, Carbohydrates and fats	Proportion of Protein to Carbohydrates and fats
Alfalfa hay			
18 lbs.	1.908	9.05	
Corn silage 40 lbs.	.440	6.96	
Grain mixture:			
Barley 8 lbs.	.744	6.80	
Oats 4 lbs.	.376	2.86	
Bran 3 lbs.	.399	2.11	
C. S. Meal 1 lb.	.378	.81	
	4.245	28.09	1:5.61

This grain mixture contains 14 percent protein chemical analysis.

The above rations illustrate how the feeds are combined to meet the needs of the cow. The roughage given is about what the animal will eat while the grain varies with the amount of milk and the richness. (Refer to rules on feeding).

Notes on Feeding

In practical feeding give the cows all the hay they will clean up reasonably well and then feed the refused hay (stems) to the idle horses or other cattle. When silage is available, it should replace about one-third to two-thirds of the hay. Dusty or strong-flavored feeds should always be fed after milking. Where two kinds of roughage are available it is better to give one in the morning and the other at night rather than to feed one kind exclusively until the supply is exhausted. Dairy cows will do better if they have a variety of feed, but they should be fed in the same order and at the same time each day as far as possible.

Many practical dairymen feed grain just before milking, while others find it more advantageous to feed after milking. The simplest way to feed concentrates is to make a mixture (several hundred pounds) of the different grains and concentrates that will make a balanced ration with the roughage. To get the proper proportions, a trial ration should be worked out for a producing cow. Then by means of a truck the grain mixture may be easily carried to the animals, where it is weighed or measured out according to their needs.

A few minutes of study and figuring to get the most practical and economical ration may greatly increase the milk flow and save many dollars on the year's feed bill.

Summer Feeding and Management

There is no feed that improves the physical condition of the cows and stimulates the milk flow more than good pasture grass. While the dairy herd has good pasture the cost of producing milk is at the minimum. It is well therefore, to provide the animals with good pasture as long as possible. However, too early grazing in the spring should be avoided as it not only retards the growth of the grass but lowers the production as well.

It is best to let the grass get a little start before turning out the cows. As the pastures become dry and short, late in the season, dairymen find it profitable to supplement them with hay or other feeds in order to maintain the milk flow. Poor native dry land pasture has little value for milk producing animals. The best pasture is the most economical for milk producing animals. For detailed information about irrigated pastures get a copy of Bulletin No. 174, Montana Extension Service, Bozeman.

Danger From Bloat

Cows are subject to bloat when first turned on good pasture and especially so if it contains much clover or alfalfa. This trouble is also more prevalent when the grass is wet or during the period when the grass is making very fast growth. As a means of preventing bloat it is well to give the cows a good fill of dry roughage before they are turned out on pasture. Pasturing short intervals of from 30 minutes to an hour until the cows become filled up and accustomed to the grass, is often practiced. Regardless of these precautions it is well to keep close watch of the animals at first so the cases that develop can be treated at once. See pages 31 and 32 for treatment.

Feeding Grain on Pasture

While the herd is on good pasture little, if any, grain is required for cows of low to medium production. The heavy producers will need some concentrates if their milk flow and physical condition is maintained. The amount to feed will vary with the conditions of the pasture.

Protection Against Flies

Flies are not only an annoyance to cows but contaminate the milk supply as well. The first and most important thing to do in eradicating flies is to destroy their breeding places by hauling out and spreading all manure and litter that accumulates about the barn. By placing screens over the milk room windows

and then spraying the barn and milk room with DDT three times, during the season, the flies will be practically eliminated from the dairy. Keep the spray away from the milk utensils and the milk.

In summer the cows should be given a light spray of DDT over their backs about every ten days. This will destroy a high percent of the flies that irritate the cattle.

An effective spray for cattle is made by thoroughly mixing six tablespoons of 50 percent wettable DDT powder in one gallon of water. For spraying the barn, mix three cups of the powder in one gallon of water. Apply with pressure sprayer to walls, ceiling, stanchions and other places where flies rest.

If possible, cows should have shade in their pasture.

Watering

While cows are on pasture they should have free access to good water. In winter, frequent and regular watering is very important in the economical production of milk. The highest and most economical production cannot be obtained where cows are watered but once daily. This is especially true where the cows are turned out of a warm barn into an open yard to drink ice water. Under these conditions the cows will not drink enough water, and furthermore, they receive a severe chill that greatly lowers their production.

The best results are obtained where the cows have access to water at all times as with the automatic watering device or where they run loose in an open shed so they can go to water at will. If neither of these plans is possible, then the cows should be watered morning and evening. Some good dairymen water in the barn by running the water through concrete mangers, while others turn their cows out for water. Where the cows are watered once or twice daily, better results will be obtained if the water is warmed a little by means of a tank heater.

Housing

To do her best, the dairy cow must be well housed in winter. When cows are exposed to cold, stormy, wet weather, their milk flow will be reduced. Drafty barns or barns that are excessively warm and poorly ventilated should be avoided. Cows that are well-fed and have free access to water and have a good bed of dry straw away from drafts will withstand considerable cold weather without affecting the milk flow. It is for this reason that the "open shed milking stable" plan of housing is meeting with good results. See Montana Extension Circular No. 210.

The barn should be well lighted for the comfort of the animals

and convenience in doing chores. Modern barns are built with approximately 4 square feet of window light and 500 cubic feet of space per cow. The essential features of a good barn are comfort and cleanliness for the animal and convenience for doing the chores.

The aim of the dairyman should be to make the cow as comfortable as possible, and to this end, suitable stalls with a deep bed of clean straw are important. All manure and soiled bedding should be removed at least once daily, and the platforms and

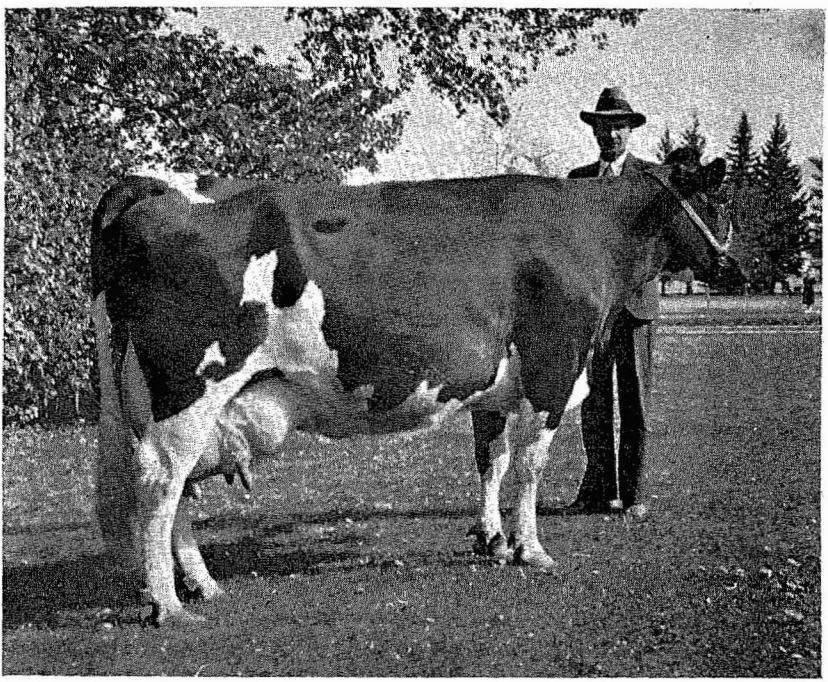

Fig. 5—A cow in excellent working condition.

passages kept clean. Sweeping down the cobwebs and then whitewashing or painting helps greatly in lighting and cleaning up old barns. A large shed adjacent to the barn into which the cows may go for protection during bad weather when turned out for exercise and watering is very advantageous. A bed of straw in the shed gives the cows a clean, dry place to lie down.

Fall vs. Spring Freshening

Many successful dairymen arrange to have their cows freshen in the fall or winter. This provides more time for care and management of the cows, and means fewer chores during harvest season. These dairymen also receive greater returns for their dairy products since cows that freshen in the fall are at maximum production in winter when prices are high. Calves dropped in the fall will generally do better than those dropped in the spring. By spring the calves can dispense with the skim milk ration, making this feed available for the young pigs—another decided advantage to the farmer. Cows that freshen in the fall and winter nearly always give a markedly increased flow of milk when turned to fresh pasture in the spring. This generally means a larger flow of milk for the year and thus, larger returns per cow.

When the cows freshen in the spring and summer they produce very economically for a few months, and the labor involved in caring for them is not so great. For these reasons a large number of farmers practice summer dairying. The principal disadvantages of summer dairying are that the value of the products is generally lower, and the farmer is frequently too busy with his crops to devote much time to the cows.

The following table gives the average record of cows freshening in the winter, spring, summer and fall. These records are taken from Montana Dairy Herd Improvement associations.

Time of Freshening	Number of Cows	Avg. Prod. of Fat, lbs.	Average Value of Product	Avg. Total Cost of Feed	Avg. Return Above cost of Feed
Winter	231	287	$122.60	$54.99	$67.61
Spring	235	282	120.60	53.86	66.30
Summer	152	268	116.94	51.50	65.44
Fall	283	298	129.43	54.52	74.91

The above table shows that the cows freshening in the fall, winter and spring had the highest average production and the greatest return above cost of feed in the order named. Pre-war data.

Exercise in Winter

It is generally agreed that cows will do better if they have some exercise every day except in very stormy weather. The cows should not be left in the yard so long that they will lie down, unless there is clean, dry straw for them. Lying on snow or frozen ground is one of the common causes of Mastitis (garget).

Trimming Hoofs

Cows that take but little exercise in winter frequently develop long hoofs. These should be trimmed off before they break or disfigure the feet. Broken, or very long hoofs, often cause severe lameness and lower the production. Hoofs may be trimmed with a long-handled carpenter's chisel and a heavy hammer while the cow is standing on a plank floor. By placing the cow between two poles about 24 inches above the floor she is prevented from turning around or kicking. Very practical hoof nippers designed to trim hoofs while the animal is standing are now available. Sometimes it may be necessary to throw the animal to trim the feet.

Treatment for Lice

Cattle that are infected with lice rarely do well. The treatment for this pest depends upon the kind of louse and the time of year when treatment is applied. Powdered sabadilla seed dusted lightly over the animal by means of a pepper shaker is very effective for the small gray louse.

A mixture of one part kerosene and three parts mineral oil rubbed into the hair with a cloth or brush gives good results.

DDT is also effective in destroying lice.

Milking

Milking is one of the most particular jobs in dairying. Poor milking reduces the milk flow, shortens the lactation period and frequently injures the teats resulting in Mastitis.

To produce wholesome milk, the cows must be kept clean and the long hair clipped from the udder and flanks.

The advantage of good, fast milking has been recognized for many years. Recently, science has revealed some biological principles that have made it possible to milk faster and better than ever before. There are four distinct advantages to good, fast milking: (1) It saves time. Now, under favorable conditions, one man, with two single unit machines can milk 20 to 25 cows per hour. (2) It maintains higher milk production. It is a well recognized fact that slow, incomplete milking causes cows to dry up prematurely. (3) It reduces the incidence of Mastitis. Poor machine milking is now known to be a common cause of Mastitis, and (4) It results in higher quality milk.

Rules For Fast Machine Milking

(1) Always handle the cows gently, quietly and regularly. Avoid making them nervous or excited, especially at milking

time. "It costs little and pays big" in time saved and increased production.

(2) Do not wash the cow's udder and teats or in other ways stimulate the milk let down far in advance of milking. Cows that are stimulated to let their milk down, by coming into the barn, or by sounds associated with milking, should be put at the front end of the string, if possible, and be milked first.

(3) Stimulate the milk let down by gently washing and massaging the udder and teats with warm water (120 degrees F.) and then with the full hand, gently squeeze out a stream or two of milk from each teat.

(4) Attach machines approximately one minute after washing, but do not increase the vacuum or the rate of pulsation over that recommended by the manufacturer. Apply a slight pull to the teat cups as guided by experience and the individual make-up of the cow.

(5) When the lower part of the udder becomes soft and the teat cups begin to "crawl" upward, begin stripping with the machines. With one hand increase the pull on the teat cups and with the other hand gently massage the udder toward the teats and in time with the pulsation. With experience, the operator soon learns by feel when the milk is extracted. Remove the machines as soon as the milk ceases to flow. Most trained cows will milk out in two to three minutes.

(6) Only a few cows need to be stripped by hand. The stripping should be done gently and quickly with a full hand squeeze if possible. For most cows the double hand method of stripping is fast and efficient.

Special Notes On Milking

Most cows respond readily to the fast milking routine. However, there may be a few cows in the herd, well along in lactation, that do not respond to the shift. Such cows may be readily trained to fast milking at the beginning of their next lacation period. First calf heifers milk out quickly and will generally continue to do so if good, fast milking is continued.

In most every herd there may be one or more problem cows that milk out slowly because of teat injury or odd shaped teats. All such cows should be placed at the end of the string, if possible, and be milked last. Cows with Mastitis should be milked last.

An electric hot plate, conveniently located, is very effective in making available a constant supply of hot water.

Where no electricity is available, a supply of hot water may be brought from the milk house or kitchen. For this purpose a large covered wooden bucket or keg is most efficient in maintaining the temperature. The hot water is then added to the wash water to obtain the desired temperature.

Milking machines must be kept clean and in good repair at all times.

Better Hand Milking

Milk rapidly but gently and with a full hand squeeze if possible to avoid injury to the delicate membranes on the inside of the teat.

The double hand method of stripping is both fast and efficient. With one hand, gently massage the udder toward the teat, forcing the milk down into the teat, and then with the other hand, milk it out with a full hand squeeze. Do not continue stripping too long.

For more detailed information on fast milking, get a copy of Montana Extension Circular No. 159.

Frequency Of Milking

Good cows will produce more milk and butterfat if they are milked three or four times a day. Breeders of purebred cattle who strive for the maximum production take advantage of this fact. However, under ordinary conditions it is not practical to milk oftener than twice a day except that fresh cows, when giving a large flow, may be milked three times daily to reduce the pressure.

Milk and Fat Records

A record of the production of each cow is an important point in improving the herd. When a healthy, normal cow is properly fed and managed, her real value may be determined by her milk and butterfat records. Thus inferior animals may be disposed of and the good ones retained for production and breeding purposes.

Weighing, recording and testing the milk for one day in the middle of each month will give records sufficiently accurate for determining the yearly production. However, many dairymen weigh and record the milk from each cow daily because such production records serve as a guide to the feeder. A sudden decrease in the milk flow is a warning that there is something wrong

with the cow.

For weighing, a regular spring balance milk scale should be used. Milk sheets can be made at home or they may be purchased at small cost from leading dairy papers.

Milk samples for making butterfat tests should be taken at regular intervals. Fairly accurate records may be obtained when fat tests are made every month. However, some dairymen make it a practice to test every other month. Less than six fat tests a year are likely to be too inaccurate to be of much value because of the wide variation in the fat content of milk.

For the milk samples it is best to get a two or four ounce, screw-top sample bottle for each cow. To get a fair sample the cow should be milked dry and the milk poured from one bucket to another or stirred before the sample is taken. A small milk sampler full of milk should then be put into the sample bottle. This process should be repeated each milking for one day. Unless the samples can be kept very cool and tested immediately, a tablet of corrosive sublimate should be placed in each bottle to keep it from souring. As a rule dairymen can make satisfactory arrangements with their cream station operator or creameryman for having the testing done.

A herd record book should be kept where the record of each cow may be entered monthly and finally totalled for the year.

A cow should not be condemned on one year's record until the owner has considered the opportunities she had for making a creditable record. Difficulties at calving time, too short a dry period, sickness, unbalanced rations, poor pasture, insufficient feed, and garget are some of the common causes of reduced production. Young cows will produce less than mature animals. The record of an immature cow is a fairly accurate index of her production when mature, provided conditions remain the same. The following table will give the basis for making such estimates:

2-year-olds produce 70 per cent of their mature record.
3-year-olds produce 80 per cent of their mature record.
4-year-olds produce 90 per cent of their mature record.
5-year-olds produce 100 per cent of their mature records.

This means that if a cow, calving at 2 years, makes 294 pounds of fat she will likely make 420 pounds when mature. ($294 \div 70 \times 100 = 420$).

If there is a dairy improvement association in the community the dairyman should consider becoming a member. Such an organization is of great help to the member in the improvement of his herd. In general, farmers who are obtaining records of their cows either through an organization or privately are making the greatest progress in developing high producing herds.

Breeding Records

Records should be kept of the time of service and the date the cows are to freshen. Without this record the cows may be dried up too soon or they may be milked too long; either lowers production. The best production is obtained when cows are bred to freshen once every 12 months. The average gestation period for cows is 283 days or about 9 months and 10 days. This means that the cow should be bred about two months after calving.

THE TREATMENT OF SOME COMMON AILMENTS

Constipation

Constipation is a very common ailment of cattle, especially of dairy cattle and may occur without apparent cause. The affected cow first shows a great decrease in milk flow, the next day is visibly sick, refusing feed, lying down most of the time, and often grunting and groaning. Very little fecal material is passed, and the absence of feces is practically sufficient for a diagnosis.

A good physic is obviously the logical treatment. Epsom salts in one to two-pound doses, or a quart of raw linseed oil, is the standard treatment. Most people prefer epsom salts for cattle, but many stockmen make the mistake of giving too small a dose. For Holstein and other large cows, not less than a pound and a half of salts should be given. No purgative action may be expected for 18 to 24 hours after the dose is given but if no relief is noted by that time, another dose of salts or oil should be administered. For younger or smaller cattle, the dose of purgative can be adjusted accordingly. There is not much danger of doing serious damage from an overdose of either of these standard purgatives.

Acute Bloat

This is more or less of a seasonal disease, occuring mainly in late May and throughout June, and, in most cases, is due to hungry cattle gorging themselves on lush pastures containing a high percent of legume forage, such as alfalfa, sweet clover, red clover, etc. Losses seldom occur on blue grass, timothy, or wild pastures. Bloat also may occur when least expected. There seems to be no medical treatment that will prevent bloat.

In a bloat case, gas forms so rapidly in the paunch, or first stomach, that great distension of the body occurs, and death may

follow from sheer pressure on the heart and lungs.

The treatment consists of drenching the cow with a tea cup full of kerosene oil mixed with a pint of milk or raw linseed oil. In severe cases and as a last resort immediate relief may be obtained by tapping the paunch with a trocar or the blade of a sharp knife and allowing the gas to escape through the opening. Such an opening should be made well up on the left side, half way between the hip bone and the last rib.

Chronic Bloat

Chronic bloat is the result of indigestion which may arise from one of many causes. A thorough purgation should be first attended to with possibly a complete change of diet. Many of these cases are hard to handle. In chronic bloat the cow seldom bloats dangerously, but is off feed and down in milk production, bloating a little every day.

Lump Jaw

Actinomycosis, or lump jaw, is an infectious disease of cattle, sometimes affecting man, characterized by a slowly developing lump on lower or upper jaw, throat, or below the ear. Usually the swelling is part of, or attached to, the bone, but there are many of the movable, hard swellings that are due to this same infection. Actinomycosis of the tongue, characterized by salivation, and finally causing the tip of the tongue to protrude from the mouth, is quite common, and is known as "wooden tongue."

In cases where the bone is not affected, treatment with one level teaspoonful of potassium iodide daily in the feed for a month will generally effect a cure. This treatment is very effective in cases of "wooden tongue." If the jaw is much enlarged and considerable bony swelling has occurred, it is doubtful if treatment should be attempted. Such a cow is dangerous to other cows, she cannot be used as a dairy cow on account of the risk to human health, and even with treatment, recovery is slow and very uncertain.

Sterility

When a promising heifer, or a cow that has been a good producer, will not breed, it is always a question whether to sell her for beef at once or carry her along for months hoping that nature will restore her normal breeding ability. There is nothing the average stockman can do to remedy the trouble. Some veterinarians who have specialized in this line of work can generally tell whether the cow will breed again and whether treatment

is advisable. No one can advise the owner as to treatment unless the cow has been thoroughly examined by an expert, for sterility may be due to several causes. Some types of sterility cases cannot be successfully treated.

Retained Placenta

The membranes that surround and protect the calf during its growth in the uterus of the cow, sometimes do not loosen and pass out naturally, as they should. When these membranes are retained for longer than 24 hours, they should be removed. The task of removal is not difficult but will prove confusing to the inexperienced.

The hand and arm, first well lubricated with soap suds, is introduced into the uterus, and the membranes gently loosened from their attachment to the button-like cotyledens. The uterus must not be scratched nor the cotyledens pulled off. The membranes should be removed in one piece, if possible. Various "uterine capsules" are on the market and these help to reduce the chance of infection of the uterus, but they cannot be depended upon to remove the placental membranes. Though anyone can learn to remove a retained placenta, it is not everyone that can do so in a manner that will insure against infection of the uterus, and resultant sterility of the cow. If a veterinarian is available, all retained placenta cases should be handled by him.

Milk Fever

Milk fever or calving paralysis, is of common occurrence in good dairies where high producing cows are kept. A definite chain of circumstances generally precedes an attack of this disease. The cow, usually in the prime of life, a heavy producer, calves normally and is completely milked out shortly after calving. Within 12 to 18 hours she develops a weakness of the hind quarters, staggers and reels and finally goes down, becomes entirely helpless, stupid, sleepy, and finally becomes unconscious. Most of these cases will die if not treated, but will not die for 24 hours or longer, so that there is no great hurry about treatment.

Treatment consists of tightly inflating the udder with air, using either the regular milk-fever pump outfit, or an apparatus rigged out of an automobile or bicycle pump, some rubber tubing, and a milk or teat tube. Care must be taken to prevent udder infection during the process of inflating the udder. A clean towel or cloth should be spread under the udder, each teat washed with a mild disinfectant, and the teat tube sterilized before using. Each quarter of the udder should be tightly inflated, and the teat tied with tape to prevent the escape of air. Complete recovery

usually takes place in five or six hours after treatment, and no further treatment is necessary. No case of milk fever is hopeless. As long as the cow breathes, there is a good chance to save her by the above treatment.

Wherever a vetinarian is available, all milk fever cases should be treated with the intravenous injection of a calcium gluconate or calcium dextrose solution. This method entirely eliminates the ever-present danger of udder infection, which may occur in using the air-pump method. As a rule, the calcium solutions bring about a more prompt recovery than does the air treatment, though with either method relapses may occur, necessitating repeating the treatment.

Garget or Mastitis

(Inflammation of the Udder)

Fortunately the losses from this disease can be largely eliminated by good herd management. While this disease may be transmitted from one cow to another it is generally brought on by injuries to the udder and teats and by the lowered resistance of the cow.

Some of the most common udder and teat injuries result from cows running, stepping on one another's udder and teats, falling on slippery floors, bruising their udder on rough short stall platforms and cows standing in drafty places or lying on snow or frozen ground.

Improper machine milking is now known to be a very common cause of Mastitis and careless hand milking is also a factor. Instruments should never be inserted into the teats unless absolutely necessary and then only after the end of the teats are cleaned and disinfected and the instrument sterilized.

Dairymen, who feed carefully and adopt a good, fast milking system, provide their cows with a deep bed of straw to lie on, treat injured teats promptly and properly and otherwise handle their cows gently and carefully, to avoid injury to the udder and teats, will have very little Mastitis trouble.

When an acute case of Mastitis occurs, immediate treatment is essential. The cow should be isolated in a warm place, free from drafts, and given a deep bed of straw to lie on. She should be milked out several times a day and her udder gently massaged each time. If she is on heavy feed her grain ration should be reduced.

This simple treatment is very beneficial if applied at the very beginning of the attack. Sulfanilamide sometimes gives relief. Very little can be done for advanced cases where one or more quarters are badly swollen, highly inflammed, painful and the

cow is giving blood stained milk.

When the cow is returned to the herd, it is well to milk her last until the trouble has completely disappeared. Persistent cases may be successfully treated with udder injection of penicillin when the cow is dry or nearly dry. These treatments should be applied by a veterinarian.

Chronic Mastitis, that form of the disease that cuts down the milk yield but causes no manifest symptoms, can often be detected by the "strip-cut", passing a jet of milk through a black cloth to detect the fine granular flakes of milk that accompany this form of Mastitis. These chronic carriers of infection are often responsible for the occurrence of the acute cases, and should be isolated and treated.

Sore or Injured Teats

If the end of the teat has been cut, bruised or frosted, it is very troublesome and difficult to heal because the sore has to be reopened at each milking. Besides applying some salve or ointment to the end of the teat, a medicated teat dilator or plug should be inserted into the milk duct and left in the duct between milkings, using a new plug at every milking period until the end of the teat is healed. These medicated teat plugs can be obtained at most drug stores. They are also advertised in the leading dairy magazines. These plugs are also helpful for "hard milkers."

Small cuts or sores on the teats should be treated after each milking with a salve or vaseline.

Teat tumors, lumps that form inside the teat and block the milk flow, can be removed by special instruments, but very often recur.

Small warts on the teats can be removed by rubbing them with castor oil after each milking.

Cowpox

Cowpox is a disease of the udder of cattle, characterized by the appearance of crater-like ulcers on the teats and lower parts of the udder. These may be very small or up to the size of a pea. At first a small, hard lump appears, which soon ruptures, and a slow-healing, ragged sore, or ulcer, appears, which may require 10 days or more to heal. It is not considered to be an important disease, but causes "sore teats" and consequent trouble at milking time.

Medical treatment, except for vaseline or zinc oxide ointment to keep the skin soft, is useless. Affected cows should be kept in a separate corral and milked last, to avoid spreading the disease to healthy cows. The milk of cows affected with cow-

pox must not be used for human food until after the ulcers have healed.

Brucellosis (Bang's Disease)

Because of the risk to human health and for economic reasons, Brucellosis cannot be permitted to exist in a dairy herd. If the presence of the disease is suspected, the matter should be reported to the nearest veterinarian, or to the State Veterinarian, and a blood test will be made of the entire herd. The extent of the disease in the herd will thus be determined and a plan of control decided upon. Brucellosis vaccine, used on heifer calves at about 6 months of age, is a very valuable aid in the control of this disease.

Vaccine should be administered by a veterinarian, so that an official record of the vaccination may be available.

There is no effective treatment for a diseased cow, no reliable means of diagnosis except the blood-test, and no means of prevention except herd isolation or by building up an immune herd through heifer vaccination.