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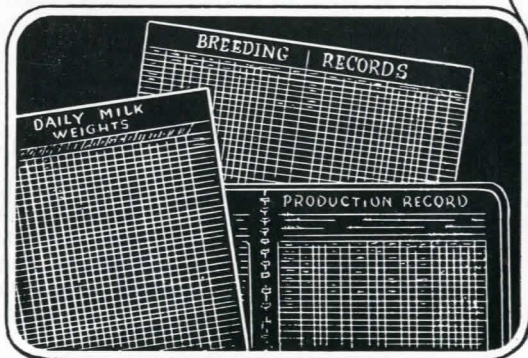
DAIRY HERD MANAGEMENT



**Proper
Milking**



**Healthy
Animals**



EXTENSION SERVICE
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Dairy Herd Management

C. W. NIBLER

INTRODUCTION

ASIDE from making an income from the dairy herd, a personal satisfaction is derived from working with well-conditioned, gentle cows in clean, convenient surroundings. This satisfaction is due the dairyman, because he spends several hours every day, perhaps much of his life, working with his cows. If the dairyman enjoys his work and likes his cows, it makes a big difference in his attitude toward the whole dairy business and determines in a great measure whether his life is to be one of drudgery or one of enjoyment.

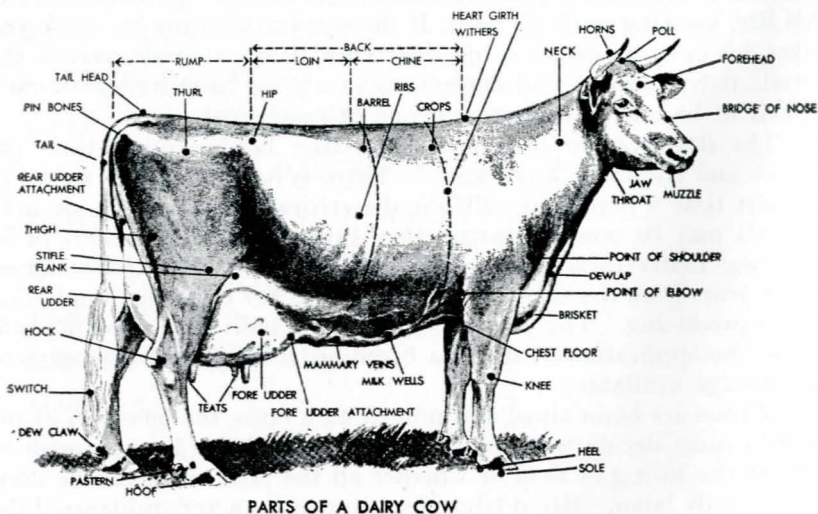
The development of a profitable dairy herd requires time, patience and livestock "know how." There is no easy way to secure in a short time a herd that will suit the critical dairyman. Some individuals may be more fortunate than others in buying heifers or in securing heifer calves from their cows; however, it requires about three years from the time a cow is bred until her offspring, if a heifer, starts producing. The producing ability of individual cows depends upon the application of the best breeding, feeding, and management knowledge available.

If cows are maintained and milked on a farm, the members of the family must decide whether the enterprise will be large enough to justify the hiring of help or whether all the farm work can be done with family labor. Hired labor needs supervision and guidance if the cattle are to receive the proper care, if maximum production is to be secured, and if the herd is to be profitable. Employed labor on the dairy farm should have regular days off and vacation periods, if they continue to give satisfactory service. When milk is bottled and retailed, approximately twice as much labor is required as when milk is picked up at the farm by the distributor.

SELECTING THE BREED

In selecting a breed, you need to consider many factors such as the cost and availability of breeding stock, the ability to produce milk and butterfat from the feed available, the value of the offspring, and the salvage value of the animals when they are through producing. The market where milk or cream is sold will influence selection. Personal prejudices should not influence you to overlook facts. The

most important factor is the profit a cow and her offspring will return. Although production is paramount, type or appealing appearance is desirable. Type, as it is related to lifetime production or years of usefulness, is an important factor to consider in evaluating cattle. Animals with straight toplines, deep bodies, well-sprung ribs, and balanced udders strongly attached to the body are more valuable than poor-type animals. Herds that are similar and uniform in type and breed character are more desirable than herds lacking uniformity. The uniform type score card assigns certain values to different parts of the animal—General Appearance, 30 points; Dairy Character, 20 points; Body Capacity, 20 points; and Mammary System, 30 points.



On Nebraska farms milk cows are maintained to market the feeds that are produced. Therefore, the average amount of feed that is produced or available annually on the farm should help determine how many milk cows can be maintained. The average cow will eat in a year $1\frac{1}{2}$ to 2 tons alfalfa or other legume hay, 3 to 4 tons silage, 1 to $1\frac{1}{4}$ tons grain, and in addition, needs five or six months' pasture. If no silage is available, then about 3 tons of hay will be needed. If sufficient feed is not available, it is better to reduce the number of cattle than to provide part of a ration for too many cattle. Feed is needed for the growing heifers and perhaps for a bull as well as for the milk cows. Two yearling heifers will eat about as much as one cow.

To maintain a herd of 25 milk cows, it is necessary to keep 6 non-producing two-year-olds, 8 yearlings, and 9 heifer calves. These figures are based on average death losses and the fact that a cow will produce for about four lactations with good management. Cows correctly fed, kept free from disease, and not injured should produce for more than four lactations. Every additional lactation a cow produces means greater lifetime production and more offspring.

PUREBREDS OR GRADES

Whether to breed purebred cattle or maintain a grade herd depends on conditions on the individual farm, and the dairyman's ability to keep records and sell breeding stock. Many good purebred herds have been developed after the owner gained experience from feeding and managing a grade herd. Purebreds have advantages over grades; though owning a purebred herd has additional responsibilities beyond just breeding, feeding, and management. Production and type vary among purebreds as well as among grades and a registration certificate is no guaranty of a superior animal.

The advantages of owning a purebred herd are as follows:

1. Purebreds are more valuable than grades.
2. Purebred breeding stock should sell for more than grade animals.
3. The owner of purebreds takes more pride in his herd, especially when they are the offspring from a few foundation animals.
4. Purebred herds are generally more uniform and better producers.

The purebred breeder has the responsibility for the following:

1. Maintain accurate and complete records. Fill out registration and transfer papers accurately and promptly.
2. Know individual breeding of animals in herd and be able to talk intelligently about each animal's production and type.
3. Know about the good producing and transmitting animals and families within the breed. Be able to analyze and evaluate information available on bulls and cow families.
4. Be able and willing to participate in activities of the community, state, and national breed organizations.
5. Answer inquiries for breeding stock completely, accurately and promptly.
6. Present animals to visitors at the farm to their very best advantage.
7. Be courteous to visitors and help them locate animals elsewhere when he does not have what they desire.
8. Advertise his cattle in the market where he wants to sell.
9. Attend shows and sales as an exhibitor or spectator.

10. Never try to sell breeding animals he would not want to buy for his herd.

11. Provide judging classes for 4-H club members, high school or college students.

12. Help boys get started with good foundation animals at a reasonable price.

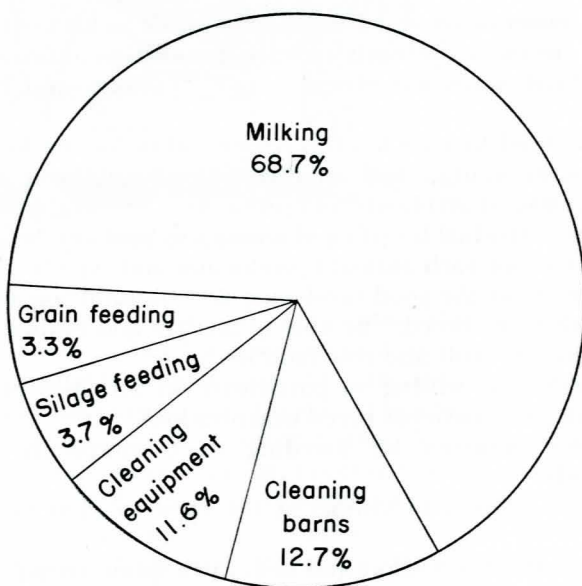
13. Be willing to test for production and classify cattle for type.

14. Maintain a neat, attractive farmstead and a clean barn.

The breeding of purebred cattle with acceptable type that produce profitably offers a real challenge to an individual. The satisfaction which comes from doing the job successfully is difficult to measure in dollars.

SAVING LABOR

On dairy farms it requires from 5 to 18 minutes per cow (an average of 10 minutes) to do chores. These include—(1) feeding hay, silage, and grain; (2) preparing for milking; (3) milking and caring for milk; (4) washing equipment; and (5) cleaning barns. On a per-day basis the figure should be doubled, provided the chore is performed twice a day.



Percentage distribution of time spent in dairy chores.

The time required to do the dairy chores can be reduced on many Nebraska farms. Not only is the saving of time important but some of the hard work could be eliminated. Cows that produce 400 pounds of butterfat annually are three to four times more profitable than cows that produce 200 pounds butterfat. Much labor is saved if one good cow is milked in place of three or four poor ones. It is better to have a small profitable enterprise than a large, unprofitable one.

Look over some of the labor-saving suggestions below and see if one or more of them can be incorporated into your methods.

1. Hay and silage fed out of doors can be moved in large quantities. A silage feed bunk on wheels pulled by the tractor from the trench silo into the cow yard saves time in feeding. Silage can be loaded onto the bunk with a loader attached to the tractor. Provide feed bunks and racks that are long enough so that all cattle can eat at the same time. Timid animals should not be molested when they want to eat.

Silage from upright silos fed in the barn should be transported with a large feed cart. Use two large silage forks, one left in the silo and the other in the feed cart, or hang them at convenient places. Eliminate carrying silage with bushel baskets or handling more than twice.

2. Store grain close to where it will be fed. Eliminate handling grain from a small storage box. Ground grain stored in an overhead bin that will feed down into a cart will save time and work. Use a regular grain scoop for feeding. Place marks on grain scoops to show the number of pounds being fed.

3. Build feed carts on large rubber-tired wheels. Be sure they fit into the alleys and around the barn where they are to be used.

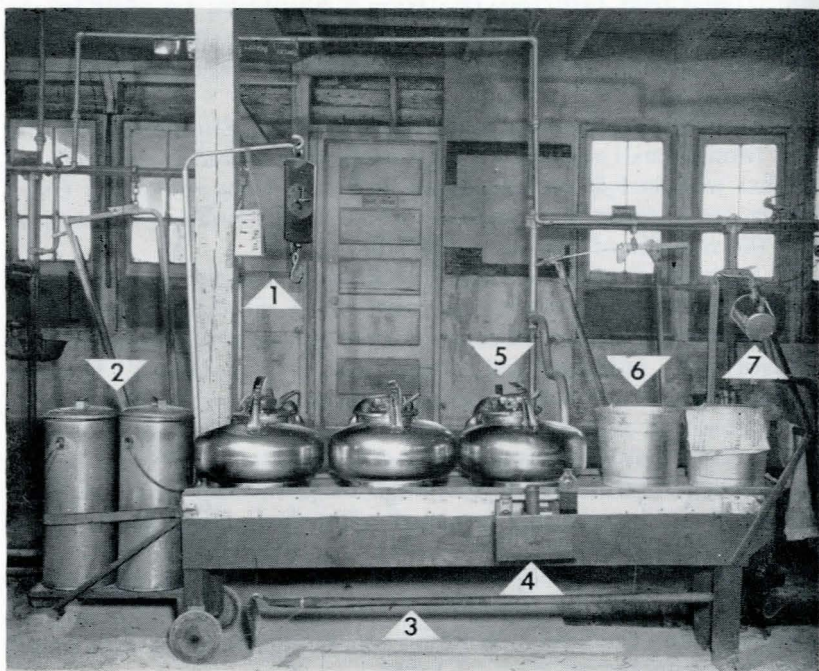
4. Machine milking will conserve time if your herd is large enough to justify the purchase and installation of a machine. Machine milking can save about 30 per cent of the time required to milk. The use of combine milkers where milk is delivered directly into milk cans or tanks may prove practical and economical. They can be real labor savers if herds are large enough to justify the cost. Machine milking should be carefully managed. This is discussed under "Managed Milking," page 13.

5. The milk house should be close to the barn, large enough (at least 12'x14'), with all equipment arranged so that steps are not wasted in doing the work. Washing vats should be large, with plenty of water available.

6. Save steps and time in handling milk. A cart on which rinse buckets, scales and sheets for recording milk weights are placed saves time. Use two strainers for straining milk. Filter pads should be

changed after about 10 gallons of milk has been strained. Milk can be transported to the milk house with a cart. Home-made hoists have been successfully used to place cans of milk in and out of coolers. Milk coolers can be completely or partially recessed into the floor of the milk house to save lifting cans of milk. If milk is carried in pails, two pails should be carried and doors can be opened with a foot lever.

Many people look at chores as just something that must be done; they shut their eyes and wade in. They make the same familiar rounds every day, week after week, without stopping to ask themselves if there is a better way. Why not challenge every part of every job you do? See what the answer would be to such questions as these. Do I really have to go through all these motions? Is there an easier, quicker way? There are many helpful suggestions on planning the barn to save labor in Regional Bulletin 470, *Dairy Cattle Housing*, which is available at the county agricultural agent's office.



A labor-saving cart which carries—No. 1, a scale and note pad; No. 2, milk cans; No. 3, hoe for scraping ledges; No. 4, kit of medicine; No. 5, three milker units; No. 6, buckets and rags for washing udders; and No. 7, a strip cup.

RAISING THE HEIFER

On many farms heifers are neglected from six months of age until freshening time. It is important that they receive enough feed or nutrients for normal growth. If you are not continuously watching, heifers will lack feed, and growth will be retarded and maturity delayed. When you become extremely busy during certain seasons of the year and do not see your heifers daily, their feed supply can be greatly reduced in a very short time. A close observer knows immediately when heifers lack feed and water and are not normal. Many times they get out of their pasture, bawl excessively, the hair becomes rough, and they appear gaunt.

The best feeds for growing heifers are high-quality hay and good pastures. Silage should be fed with the hay, and may be used to supplement the pasture. The more good roughage heifers eat, the less grain they will need and the better middles they will develop. The amount of grain to feed growing heifers depends upon the quantity and quality of the roughages available. Heifers need 3 to 5 pounds of a grain mixture daily until they are 12 months old. After they are 12 to 15 months old, they develop normally on high-quality roughages until about four months before freshening, when they again need about 4 pounds of grain. Heifers on good pasture continue to consume hay advantageously. A rack kept full of hay in the pasture will encourage heifers to eat more roughage.

Some good grain rations for growing heifers are listed below:

NO. 1	NO. 2	NO. 3
1 part cracked corn	2 parts cracked corn	4 parts cracked corn
1 part ground oats	1 part ground oats	3 parts ground oats
	1 part wheat bran	2 parts wheat bran
		1 part soybean oil meal

For growing heifers, oats are a good feed. They are higher in protein and lower in carbohydrates than corn. Wheat bran is a good source of protein and phosphorus. In addition to the rations shown above, other combinations of home-grown grains and by-products are very satisfactory.

If your cows are receiving one of the grain rations listed in Extension Circular 627 (Revised), *Feeding Milk Cows*, that same ration can be fed your heifers.

Develop heifers with good roughages and pasture, and with a limited amount of grain. In the grain mixture, use plenty of oats. Prevent heifers from getting fat and be more interested in developing good growthy frames.

Listed below are normal weights and height at withers for heifers of the different dairy breeds. This information can be used as a guide in determining normal growth in heifers six months to two years old.

Age	Holstein		Ayrshire		Guernsey		Jersey	
	Weight	Height withers	Weight	Height withers	Weight	Height withers	Weight	Height withers
Birth	<i>Lbs.</i> 92	<i>In.</i> 29.5	<i>Lbs.</i> 72	<i>In.</i> 27.5	<i>Lbs.</i> 67	<i>In.</i> 27.5	<i>Lbs.</i> 54	<i>In.</i> 25.5
6 months	375	40.5	325	38.5	300	37.5	275	36.5
12 months	700	47.0	600	44.0	575	44.0	525	43.0
18 months	900	50.0	750	47.0	725	46.5	675	45.5
2 years	1125	53.0	925	49.5	900	49.0	800	48.5

Age and Size to Breed

Breeding young or undersized heifers is a costly practice. They will be slow in reaching maximum size and will not produce as efficiently and profitably as heifers that were properly grown, and bred when of proper size and age. The size of the heifer is more important than her age, but perhaps a combination of age and weight, or age and heart girth measurement, can be used successfully in determining when to breed. Heifers can be bred when the minimum weight is reached, although they are younger than shown below. If they have reached the recommended age, but not the minimum weight, breeding should be delayed until that weight is reached. Heart girth measurements can be substituted for the weights.

Satisfactory Ages and Sizes for Breeding Heifers

<i>Breed</i>	<i>Age</i> (Months)	<i>Weight</i> (Pounds)	<i>Heart girth</i> (Inches)
Ayrshires	17-18	750	64
Brown Swiss	18-19	800	65
Guernseys	16-17	700	62
Holsteins	17-18	875	67
Jerseys	15-16	600	59

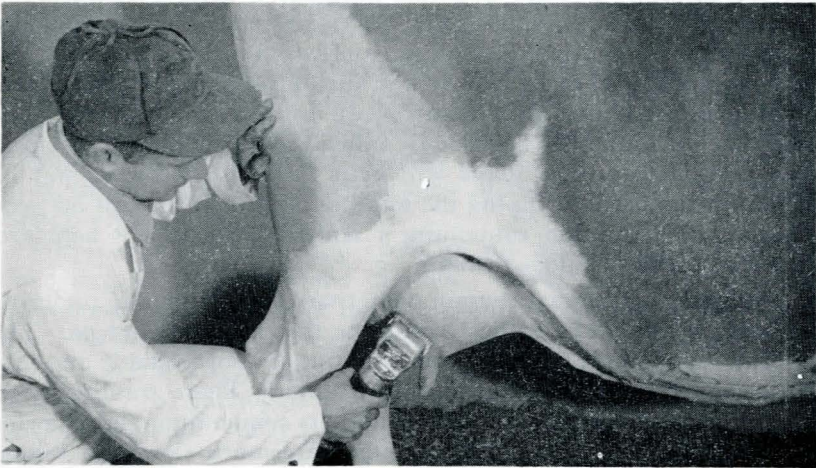
DAIRY CATTLE MANAGEMENT

It is always best to leave the herd quiet and undisturbed except at milking or feeding time. The dairy cow is an animal of leisure and comfort; she does not like to be hurried or frightened. Above all, the caretaker should be kind and patient. At times it takes a lot of patience, and this is especially true in breaking heifers to milk or

in milking cows with teat or udder injuries. The dairyman should hold his temper, and remember that a milk stool is made to sit on and not to be used as an instrument of torture. The finger nails should be trimmed so that they do not hurt the cow. Long nails may cause the cow to become an habitual kicker. Dogs or other animals such as horses or mules should not be allowed to run after the cows while they are in the barnyard or pasture.

Brushing the Cows

Cows in the milking herd should be cleaned and brushed each day—not alone for the production of clean milk, but for the health and comfort of the cows. A few minutes spent daily in brushing the cows is a good management practice. Cows are easier to keep clean if the long hair is clipped from the rear quarters, udder, and tail. This should be done in the fall or before heifers freshen the first time. A long switch many times becomes dirty when cows are confined in the barn or corrals and is a nuisance at milking time. Therefore, cutting off part or all of the switch is a good sanitary practice.



The long hair has been clipped from the udder, rear flanks and quarters. Clipping should be done in the fall, before cows are placed in winter quarters.

Exercise

The cow in milk requires only moderate exercise. The exercise she obtains in walking about in the average barnyard or lot is sufficient.

If the cows are turned out at least once a day, they will not become stiff and cramped from being confined in stanchions. When the cows are out, the stables are easier to clean and bed, and the caretaker has an opportunity to observe any cow that might be in heat. Exercise stimulates the appetite and increases slightly the efficiency of digestion. Overexercise may be detrimental to maximum production. Cows that are forced to rustle for their forage, like those turned into a cornstalk field or an overgrazed pasture, may walk several miles each day in finding enough to eat. Where this practice is followed, cows fall off in milk and flesh. The owner loses more than he gains. A cow prefers to get her fill of roughage as soon as she can, and then lie down in a comfortable spot and chew her cud. Learn to provide good quality roughage. Do not expect good production from cows that run in cornstalk fields during cold weather.

Cleanliness and Health of the Herd

Proper sanitation is of great importance in the dairy business. The prevention and spread of contagious diseases, as well as control of many minor ills, is dependent on everyday sanitary practices. For the average dairyman, no elaborate program or great expenditure of money is required. This means that the stables, sheds and yards should be well drained and free from an accumulation of fresh manure. All dairy equipment must be kept free of dirt, milkstone and dust. This program of cleanliness must be carried out as the dairy chores are done each day. It cannot be neglected. Liberal use of hydrated lime or a rock phosphate on the floors will help keep down disease and infection in the barn. Dipping the milking machine teat cups between milkings in a solution containing a sanitizing agent will help prevent the spread of udder diseases.

Sanitizing agents that contain quaternary ammonium are preferred for washing the udder rather than those that contain chlorine. The chlorine compounds are more common, but are not as stable and may cause cows' teats to chap during cold weather. There are differences in sanitizing agents that contain quaternary ammonium and chlorine or hypochlorites. The first compounds are much slower in killing bacteria than the second group. Because of this, the chlorine compounds are preferred as sanitizing agents for milking utensils and equipment.

Manure should be hauled from yards and sheds frequently. The yard should be smoothed or graded once or twice a year so that mud or manure holes around hay racks or silage bunks will be filled with soil, coarse gravel, or concrete and thus eliminate a wet, filthy yard condition.

There are advantages and disadvantages in paving the yard next to the barn. A dry, paved yard is easier to clean, keeps the cows cleaner, saves more manure and may save labor. These may be more important than the cost and labor required for the pavement. For more detailed information about paving the barnyard, obtain from the Agricultural Extension Service, Lincoln, Nebraska, Midwest Plan No. 77701, *Barnyard Pavement*. There is a small charge for this plan.

The inside floor and walls of the milking barn should be kept clean. Good dairymen make it a practice to clean the inside of the milking barn thoroughly by sweeping dust and cobwebs from ceilings and walls and coating them once a year. The use of lime or ground limestone in gutters and pens, and on the floor and alleys back of the cows is highly desirable. A good combination is to coat the lower part of the walls with a dark color and the upper part with a white or light color. This not only lightens the barn, but gives it a sanitary appearance.

Managed Milking Method

Milking takes more time than any other dairy chore. A few minutes saved every day will save many hours over a period of years. In addition, correct milking practices will aid in reducing udder irritation.

Modern milking on many Nebraska farms means machine milking; however, the basic principles that are recommended for machine milking also apply to hand milking. Both methods should be done correctly to secure the desired results.

Managed milking is the application of common sense, along with science, to the milking of cows.

Milk-secreting cells in the aveoli of the udder remove from the blood stream the ingredients of milk. These manufacturing cells continuously discharge milk into the aveoli, which fill up like a balloon. As the pressure increases, milk secretion is slowed down. The aveoli, ducts, and milk cistern store the milk between milkings. Milk-making is a continuous process. About 400 pounds of blood is circulated through the udder to supply the nutrients for each pound of milk produced.

Each aveolus and duct is surrounded by tiny muscular fibers which squeeze the milk out just as water is forced out of a rubber ball squeezed by your hand. When the cow is stimulated at milking time, a message goes by way of the brain to the pituitary gland at the base of the brain. A hormone called oxytocin is then released into the blood stream. In about one minute the hormone reaches the udder and causes the muscles surrounding the milk-producing cells to contract. This squeezes the milk out into the ducts leading to the teats.

When a cow is frightened or annoyed, her adrenal glands secrete a hormone called adrenalin. This hormone causes a constriction of the blood vessels and prevents the let-down hormone from acting.

Every cow is a different individual. Cows also become creatures of good or bad milking habits. Because cows are different, it is necessary to use good judgment when considering all the information that is available about milk secretion. Before changes are made in a milking procedure, determine how much time you now need for milking. Determine the amount of trouble you have with mastitis during the year. After applying a well-managed milking system, see whether you have saved time, or whether you have less mastitis.

Some fundamental facts need to be known to appreciate the need for correct milking.

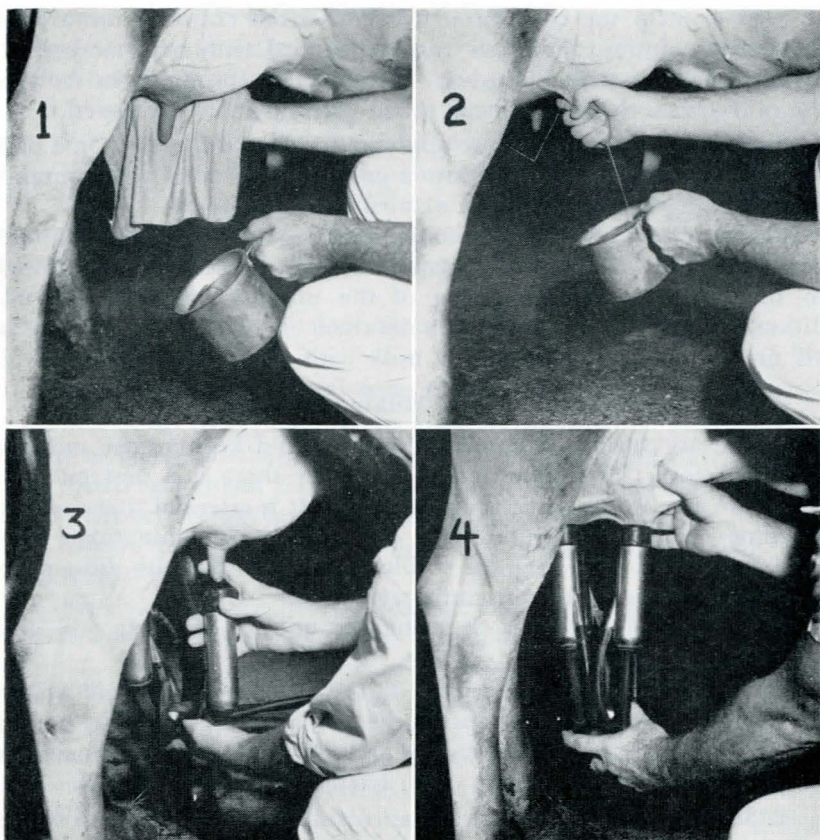
1. Milk cows completely. Milk left in the udder lowers production and quickens the drying-up process.
2. Stimulus, like washing the udder with warm water and massaging it, is necessary. Proper stimulus releases a hormone which contracts the muscles surrounding the aveoli. This stimulating effect of the hormone soon wears off, so milking should be done rapidly.
3. Avoid disturbances before and during the milking process. Rough handling or loud noises are disturbing influences.
4. Cows can be trained to respond promptly and completely to a milking stimulus. Avoid hand-stripping, or reduce stripping to the very minimum.
5. Be regular, which means to start milking at the same time each milking.
6. Have all equipment ready before starting to milk.
7. Decide on a system and follow it persistently, and develop a definite milking routine.

Below are listed necessary steps to follow with managed milking:

Step 1. Get the cow ready. Prepare the cow by massaging and wiping the teats and udder for about one minute with a wet, warm, clean rag or paper towels. The warm water, temperature about 120°, into which the rag or paper towels are dipped should contain chlorine or a nonirritating sanitizer. Wipe the udder and teats dry.

Step 2. Draw out fore milk. Milk two or three streams from each quarter into strip cup. If the milk is abnormal, milk the cow last and keep her milk separated from the other cows' milk.

Step 3. Teat cups should be dipped in a pail of warm water that contains a recommended sanitizing agent and rinsed in clean water before being placed on the teats. Milk by machine or hand as quickly as possible.



Step 1. Wash and massage the udder with a soft rag that has been rung out of a pail of warm water.

Step 2. Milk the first few streams of milk into a strip cup for observation and to further stimulate the let-down.

Step 3. Put the teat cups in place about two minutes after they have been cleaned. To clean the teat cups, rinse them in a pail of clear, cool water, dip them into a pail of warm water that contains a sanitizing agent, and then rinse them in a third pail of warm water.

Step 4. Strip by machine. Pull down on the claw of the milking machine and massage the udder with the other hand. Rinse the teat cups in cold water, place them in a sanitizing solution, and then rinse them again before placing on the next cow.

Step 4. Strip the cow. Keep teat cups from crawling upward as the udder empties. Pull teat cups downward with one hand while massaging udder with the other. Remove cups promptly as soon as the milk ceases to flow. Check to see that all milk is removed.

Step 5. Dip teat cups before applying to next cow. Rinse in a pail of clear, cool water, then dip into a pail of warm water that contains the sanitizing agent. Rinse in a third pail of water.

Cows that are suspected of having mastitis or are slow milkers should be milked last. Be sure the manufacturer's directions are followed in the operation and cleansing of the milking machine. In addition, be sure the machine is maintained in first-class condition at all times. Hand milkers should milk with clean, dry hands.

Cleaning the Milking Machine

There are various methods of washing and keeping the milking machine clean. It is questionable whether there is a best method, but there are two or three good methods. It is essential that milking machines be kept absolutely free of dirt and contamination. Not only is it necessary to keep all visible parts clean, but also those parts that are underneath or not easily seen.

The following steps in cleansing the milking machine will give very good results.

1. After use, rinse the inside of the machine with cold water. Raise and lower the teat cups in the pail of rinse water to permit some air to be drawn into teat cups and milk hose. Shake the milker pail thoroughly, then empty. Use fresh water for each unit.

2. Suck through the milker a pail of warm water (130°) to which a heaping tablespoon of a wetting agent has been added. Brush the pail, head, teat cups and rubber parts with the wetting agent solution. Use the special brushes provided by the manufacturer. Rotate the brushes and do not reverse them while in a teat cup liner. Do not use brushes that are too stiff. Drain water from all units.

3. Draw through the unit 2 or 3 gallons of hot water, at least 150 degrees or hotter. Do not raise or lower the teat cups while drawing hot water through them. Let drain.

4. Put milk tube on claw and place teat cups on the rack which holds the lye solution until the next milking or store them in a dry place free from dirt and dust.

5. For added assurance, run a pail of sanitizing solution through the machine just before milking and then rinse with clean, clear water.

Some dairymen use different kinds of combine milkers. In cleansing these, the manufacturer's directions should be closely followed.

Producing Quality Milk and Cream

People use and drink milk because they like it, and because it is a good food. Everything possible should be done to conserve and improve the flavor of milk by using the best sanitary methods in its production. Milk has no shell like an egg, nor a hide like a hog. Milk cannot be washed, peeled or hulled; it must be kept clean from the time it leaves the cow's udder until it reaches the consumer. The same principles apply to cream and the products made from milk and cream. A high quality raw product is needed to make a high quality finished product.

Here are a few essentials in the production of clean, high-quality milk and cream.

1. Milk must be obtained from healthy cows.
2. Milk and cream must be handled in utensils that have smooth, tinned surfaces and that are free of milkstone, dirt and dust.
3. Milk and cream must be kept free from extraneous matter.
4. Milk and cream must be cooled quickly and kept cold.
5. Warm milk and cream should not be mixed with cold milk and cream.

Cows should be free of tuberculosis, Bang's disease or Brucellosis, mastitis and other ailments. Cows can be tested to determine whether they are free from tuberculosis or Brucellosis. By using a strip cup before every milking, abnormal conditions can be detected when lumps, flakes, stringy or watery milk appear on the black surface or the fine mesh screen. Milk that is not normal should be discarded and measures taken to correct the condition.

After milking, rinse milk utensils first with cold water. Next, wash them with warm water containing a wetting agent. Rinse and then sterilize with steam, boiling water, water at 165° F. for five minutes, hypochlorite solution, or a quaternary solution for five minutes. Store utensils away from dusty places. Milk cans received from the milk plant should be washed, rinsed and thoroughly aired.

Be sure to wash utensils with a brush. Do not use a rag or steel wool. Where the size of the herd justifies it, the best place for handling milk and milk utensils is in the milk house adjacent to the cow barn. Before milking, rinse the utensils thoroughly with clean water to which a hypochlorite solution has been added.

Extraneous material has no place in milk under any conditions. Keep the cow's flanks and udder clean. Clip the long hair from the udder and flanks in the fall and winter. Keep the hands and clothing of the milker clean. Keep the barn clean, especially where milk is handled; it should be like a kitchen. If there is dust in the air at milking time, it will get into the milk. Straining is necessary, but

straining does not restore dirty milk to a high-grade condition. For straining, use cotton disc filters and change filters after every 10 gallons have been strained. Strain the milk into cans in the milk house. Barn odors or any undesirable odor can destroy the good flavor of fresh, clean, properly cooled milk.

Quick cooling of milk is desirable because it delays growth of bacteria. Milk should be cooled to below 50° F. as soon as possible after milking.

Keeping Records

When a calf is born or a new animal is added to the herd, it should be identified. There are several ways of numbering or marking animals. One commonly used is the tag in the ear. These metal tags, which have numbers on them, are easily inserted with a punch for that purpose. The tags are fitted into the punch and then inserted in the calf's ear by squeezing the handles together. Where the animals are purebred, the national breed association requires that all the animals either be tattooed in the ear or have color dia-



Tattooing a calf for identification. Holes are punched in the ear after it is thoroughly cleansed. Tattoo ink is rubbed into the holes by the operator with his fingers.

grams sketched or photographed on their registration papers. Brown Swiss and Jerseys require the tattoo. The Holsteins, Guernseys and Ayrshires, which have definite color markings, require a color sketch. Some owners eartag or tattoo all calves soon after birth, regardless of whether they are grade or purebred. This is a good practice, because more information is known about a calf right after birth than later.

Milk and Butterfat Records

The principal reason for keeping milk and butterfat records of individual cows is to show which ones are profitable and which are not profitable. The low-producing cows can be disposed of and the high-producing ones kept for breeding and milk production purposes. Where milk records are kept, feeding cows becomes simplified because cows can be fed according to their milk and butterfat production. This is the best and most economical method of feeding grain. Further, the practice of recording milk weights daily helps to detect sickness or abnormal conditions because many times such conditions are preceded by a decrease in milk flow.

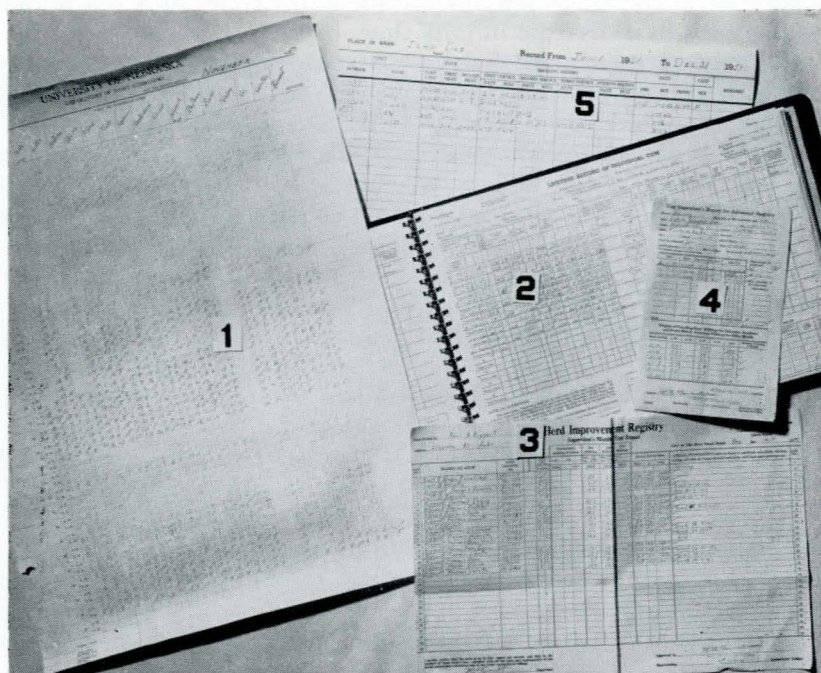
All that is needed in the way of equipment for keeping milk weights is a spring balance scale and a suitable milk record sheet conveniently placed on the stable wall. It takes very little time to place the milk pail on the scales and record the weight. A pencil can be fastened to the wall by a string near the sheet so that it is always handy. The county agricultural agent can help dairymen to obtain milk record sheets. If milk weights are kept, the dairyman should take a composite sample of each cow's milk at regular intervals and have it tested for butterfat. The composite sample is obtained by taking a sample of thoroughly mixed night and morning milk. One of the best ways to get a representative sample is to pour the milk back and forth from one pail to another. Once you have a good sample of the cow's milk, the amount of butterfat it contains can be determined by applying the Babcock test. The percentage of fat so determined is then multiplied by the weight of milk produced for the day, which gives the amount of butterfat produced for the 24-hour period. The amount of butterfat for the month can be determined by multiplying the fat obtained in one day by the number of days in the month.

Some dairymen keep milk and butterfat records by weighing the milk from each cow one day during the month and testing it for butterfat. This method of keeping records is accurate enough for all practical purposes.

Dairymen can be members of a Dairy Herd Improvement Association, where a trained supervisor hired by the Association keeps records of feed, milk, and butterfat, and assists in ear tagging animals and keeping records of the entire herd. The member of a Dairy Herd Improvement Association obtains complete records at a low cost.

Breeding Records

The dairyman should keep both breeding and freshening records. Dates and other information on these records are very important, and he should not rely on memory for them. Breeding dates, if properly kept, help the owner in determining when to dry off his cows, as well as how to regulate his feeding and care of cows and heifers. Keeping freshening dates aids the owner in registering his purebred calves and also aids him in determining the best time to rebreed cows. Keeping all records, such as breeding, freshening, identifica-



Accurate and complete records are important for the dairyman. No. 1, daily milk weights; No. 2, the lifetime record of an individual cow in the Dairy Herd Improvement Association herd book; No. 3, the supervisor's Herd Improvement Registry monthly report; No. 4, the supervisor's report for Advanced Registry; and No. 5, breeding and calving record.

tion, and production, gives the breeder an advantage in selling surplus stock. It further gives the buyer confidence in the breeder and adds value to the individual animals and herd. All dairymen should keep complete and accurate records, but for the purebred breeders this is a must if they are not to become owners of grade cattle. Records should be kept current. Convenient breeding calendars and record forms are available, and can be tacked on the barn walls.

Pedigree

A pedigree is a diagram of the ancestry of an animal. In addition to the sire and dam, the grandparents, great-grandparents and even great-great-grandparents may be shown. The sire and his ancestors appear on the top half of the pedigree sheet, the dam and her ancestors on the bottom half. Since the sire and dam both contribute to the inheritance of the calf, weakness in either half of the pedigree should be avoided. The pedigree of dairy animals should contain more than a listing of the names and registration numbers of the animals. Production records of females should be shown. This is expressed in pounds of milk and butterfat produced at a certain age. If "2x" is beside the figure, it means the cow was milked two times daily; if "3x" appears, it means she was milked three times daily. Some records are made in 10 months, some in 12 months.

There are different kinds of production records because different testing plans are followed by dairy cattle breeders. For example, "A.R." means Advanced Registry. When milk and butterfat production is determined by this plan, you know that the cow's milk was weighed daily and a butterfat test was determined once a month for a period of 305 or 365 days. The letters "H.I.R." mean Herd Improvement Registry, and this testing plan is for purebred herds. Daily milk weights are not kept, as production is determined by a noninterested supervisor who weighs and tests milk one day each month. These two types of production testing are sponsored by the respective breed associations and are supervised by the College of Agriculture.

The letters "D.H.I.A." mean Dairy Herd Improvement Association, and records are maintained by noninterested supervisors for the farmer's benefit on grade or purebred cattle. It is important to know how many days a cow milks during her lactation period. Evidence of regular reproduction is important, and this can be determined by observing the intervals between the start of successive records.

The show ring winnings of the animals are also listed on the pedigrees. For males, production records of their daughters or sisters may be listed. The milk and butterfat production of a bull's daughters is very important in determining how good he is in transmitting production.

A GOOD PEDIGREE

NAME OF BULL.....
Major of Lilly Swiss
 REG. NO. 94593
 DATE OF BIRTH.....10-30-48
 BREEDBrown Swiss
 BRED BY.....Lilly-Smith
 OWNED BY.....
 University of Nebraska
 ADDRESSLincoln, Nebraska

Royal James Ambassador of Vernon			
NO. 40112			
8 yrs. E. E VG GP VG E			
19 dau. Classification Average			
84.6 84.9 83.9 83.4 84.6 85.3			
83.6 84.6 83.0			
10 dau. 11312 4.1 468			
10 dams 9618 3.7 360			
+1694 +4 +108			
Alice M. B.			
NO. 95783			
5 yrs. GP GP GP VG VG GP			
GP GP GP			
2-2 305 2X 7666 4.99 382.6			
3-2 269 2X 8262 4.59 379.3			
4-2 272 2X 8593 4.62 397.3			
5-0 293 2X 10121 4.53 458.6			
7 305 2X 11468 4.32 496.0			
8-0 305 2X 12083 4.39 530.9			
2 dau. Pearl of Lilly Swiss			
139576 VG. VG GP GP VG			
VG VG VG GP			
3-10 350 2X 13127 4.37 573.5			
Alice Pansy of Lilly Swiss			
158022			
2-11 305 10721 4.01 430.2			

Bubbling Over of Walhalla			
NO. 33458			
11 dau. Classification Average			
85.7 85.2 85.0 85.9 85.0 86.1			
83.4 82.9 81.1			
7 dau. 10631 4.0 425			
7 dams 12522 4.0 503			
-1891 .0 -78			

Royal Jane of Vernon			
NO. 55497			
9 yrs. E E E VG VG E VG VG			
VG			
2-4 3X 365 14427 3.94 568.8			

Maiden's Betty Boy J. B.			
NO. 42937			
17 dau. Classification Average			
83.1 83.5 85.3 81.8 85.0 84.1			
83.1 83.9 81.8			
12 dau. 11556 4.2 480			
12 dams 11269 4.0 454			
+287 +2 +26			

Clepe's Best M. B. 95788			
Classified E E E E E			
7-2 365 3X 25436 4.75 1207.5			
World's record when made			
Alice of Lilly Swiss			
NO. 74159			
3-5 305 2X 11170 3.95 441.2			

Beauty Boy Blackstone of Walhalla			
NO. 28150			
5 dau. Classification Average			
86.5 86.5 85.0 86.5 88.5 86.5			
83.5 80.5 85.0			
14 dau. with 17 records all im-			
mature 324 dys. 11,067 lb.M.			
4.0% 442 lb.B.F.			
Beauty Boy Bubbles of Walhalla			
NO. 46858			
2-5 4X 365 12004 4.08 490			

Royal Pathfinder of Vernon			
NO. 30474			
2-4 3X 14427 3.94 569			
Jane of Vernon 2nd			
NO. 43893			
10 yrs. 365 2X 21306 4.53 966			
Ed E E E E E E E			

Swiss Betty Boy			
NO. 27137			
21 dau. Classification Average			
84.6 85.4 81.9 83.6 86.7 86.8			
83.8 82.3 84.4			
36 dau. 10352 4.2 436			
36 dams 11724 1.2 489			
-1372 0 -53			
Royal's Maiden of Vernon			
NO. 62286			
5 yrs. 365 3X 18753 4.54 852			

Valley Boy of Lee-Land			
NO. 32209			
7 dau. Classification Average			
79.2 83.6 84.3 78.6 82.9 83.9			
76.8 76.8 78.6			
8 dau. 10774 4.0 432			
5 dau. 10171 4.0 406			
5 dams 11149 3.9 433			
-978 +.1 -27			
Orfila P. K.			
NO. 32026			

Classification VG			
7-3 2X 357 11154 3.83 426			
8-3 2X 211 8046 4.17 335			
9-3 2X 327 10506 3.89 409			
11 2X 365 12869 3.77 483			
2 dau. Verna B. B. 82884 3			
yrs. VG VG GP GP VG VG			
VG VG VG			
3-8 305 da. 3X 19285 4.21 808			

Within the last few years, letters such as "VG" or "G" have been printed on pedigrees. These pertain to an official classification of type. The highest rating is *Excellent* (E), then in order, *Very Good* (VG), *Good Plus* (GP), *Good* (G), *Fair* (F), and *Poor* (P). The Guernsey breed association uses the term *Desirable* instead of *Good Plus* and *Acceptable* instead of *Good*; otherwise, all breed associations use the same system of grouping.

The numerical score for each of the different classification groupings based on the unified score card is shown below:*

- Excellent (E)—Score of 90 points or more.
- Very Good (VG)—Score of 85 points and less than 90.
- Good Plus (GP)—Score of 80 points and less than 85.
- Good (G)—Score of 70 points and less than 80.
- Fair (F)—Score of 60 points and less than 70.
- Poor (P)—Score of less than 60 points.

*There are slight variations for designating scores on different parts of animals between the breed associations.

The most important animals in the pedigree are those nearest related to the animal in question. A famous animal remotely related can contribute little to the inheritance of the animal.

A good pedigree is shown on the opposite page.

Registration Certificate

The pedigree of an animal shows the ancestors. Information on the pedigree assists you in selecting breeding animals. Although an animal may have a purebred sire and dam, she is not recognized as a purebred unless a certificate of registration is recorded on the breed books of the proper breed organization. The registration certificate shows the proper name, number and date of birth of an animal, and a method of identification. Ayrshires, Guernseys and Holsteins are identified by their color markings, which are shown on the registration certificates. Brown Swiss and Jerseys are identified by tattooed letters and numbers in their ears, which are shown on the certificate.

When an animal is sold, a certificate of transfer must be recorded with the breed association in order that the animal can be properly transferred on the books of the association to the new owner. It is very important that applications for registry and transfers be correctly and completely filled out before they are mailed to the proper breed association. The cost of registering cattle advances as they become older, so calves should be registered before they are six months old.

A special herd book or filing cabinet should be provided for valuable papers about animals.

Registered cattle are properly called "purebreds." It is incorrect to call them "thoroughbreds" or "full-blooded" or use any term except "purebred." "Thoroughbred" is the name of a breed of race horses. Below are the names and addresses of the different breed associations:

Ayrshire Breeders' Association—Brandon, Vermont.

Brown Swiss Cattle Breeders' Association—Beloit, Wisconsin.

American Guernsey Cattle Club—Peterborough, New Hampshire.

Holstein-Friesian Association of America—Brattleboro, Vermont.

American Jersey Cattle Club—107 No. Sixth St., Columbus 15, Ohio.

American Milking Shorthorn Society—313 So. Glenstone Ave., Springfield 4, Missouri.

In addition to handling all registration and transfer papers, the breed associations can furnish information about the different breeds. A breed magazine or journal is published by each of the breed associations. These publications contain helpful information. You can subscribe to them by writing directly to the respective associations.

REPRODUCTION

All life starts from a single cell which has been formed by the union of the egg cell or ovum from the dam or mother and the sperm cell from the sire or father. When sperm and egg cells unite, fertilization has taken place, and thus pregnancy begins. This one cell formed by both parents is extremely small and is not visible to the naked eye, yet it divides and redivides, growing as it does, and eventually becomes the mature animal. Characteristics such as color, size, body shape and ability to produce milk are all determined at the time of fertilization. Therefore, individual calves are a chance combination of a sample of the characteristics possessed by the parents. The chances that the calf will possess desirable characteristics can be improved through intelligent selection of the parents. These characteristics are collectively termed the inheritance or heredity of the calf. Aside from choosing which animals are to be parents, you can do little about the inheritance. The feed and care that animals receive are called environment. The owner determines to a large extent what this environment will be, and he should make it as good as possible in order that the expected animal will have an excellent opportunity to produce milk and butterfat. Growth and later production of the animal are influenced by both heredity and environment; if either one is poor, the performance of the animal will be hampered accordingly.

Probably more animals do not grow and produce at their maximum due to a lack of feed or because they are improperly managed than because of poor inheritance.

Estrous Cycle and Heat Period

The estrous cycle is the interval from the beginning of one heat period to the next. The average length of the estrous cycle is about 21 days but it varies with individual cows. Studies indicate that about 85 per cent of the cows have estrous cycles of 17 to 26 days, while for others the cycle is shorter or longer.

The heat period for the dairy cow is associated with the liberation of the egg from the ovary and increased activity of the genital organs.

The interval of time a cow is in heat varies with the individual. Heat lasts from 6 to 36 hours, with an average duration of about 18 hours. Most dairymen can easily detect when the cow is in heat. This is especially true if the cows are in the barnyard.

The most common signs of heat are: (1) The cow in heat will stand still while other cows mount her, and she in turn will try to mount other cows in the herd; (2) the cow is very active, does a lot of moving around, and (3) often the vulva may be reddened and swollen. It is often hard to detect a cow in heat while she is in a stanchion. As mentioned before, it is a good dairy practice to allow the cows to be turned out for a time each day. It takes only a few minutes to detect the cow that is in heat, because she is hardly out of the barn before she starts mounting other cows. The heat period for the dairy cow can be pronounced, moderate, feeble, or silent. Where the heat period is silent, it is difficult to know when to breed a cow.

Time of Service

There seems to be little foundation for the belief that cows bred on the first heat period after calving conceive better than those bred later. In studies made with animals bred at various intervals from 1 to 12 months after calving, the conception rate was no higher for cows bred soon after calving than for those bred later. The time of service during the cow's heat period is important. Dairy cows bred during the middle or toward the end of the heat period after a normal estrous cycle conceive better than those serviced at the beginning of heat or after their heat period is past. This is because the egg is generally released 10 to 12 hours after a cow is out of heat, with variation for individual cows. The practice of breeding cows two times during the heat period 6 to 8 hours apart seems to have some merit where cows are difficult to settle.

Factors Influencing Reproduction

To be profitable producers, cows must be persistent producers. Dry cows can eat a great deal of feed, but they do not justify their

keep unless they milk for 10 or 11 months after they freshen. Cows dry too long will soon lower the average production of a herd.

Many factors influence reproduction in dairy cattle, regardless of whether they are bred naturally or artificially. Sometimes cows conceive, but abortions occur within 90 days. An early abortion causes one to question whether the cow conceived when bred. Other times a cow may conceive and continue to show signs of heat. These are abnormal conditions, and both influence reproduction. Abnormal conditions in the ovaries, such as the formation of cysts or a retained corpus luteum, will interfere with normal reproduction. Dairymen have thought cows pregnant because they passed heat periods, but later discovered that a retained corpus luteum was keeping the cow from coming into heat. It is very difficult or sometimes impossible to know just what is interfering with normal reproduction. Many times the local veterinarian can give help with reproduction problems.

Some dairy animals do not have the ability to reproduce. Other cows reproduce regularly for many years and then suddenly stop reproducing.

Management practices that are helpful in obtaining good reproduction are listed below:

1. Keep accurate calving and breeding records.
2. Keep records of heat periods to see that they are normal.
3. Watch cows closely during the time of heat.
4. Breed cows toward the end of the heat period.
5. Feed good-quality roughage (green alfalfa hay and silage and nutritious pasture) and a balanced grain ration.
6. Supply salt in a granulated form.
7. Don't handle cows roughly.
8. Permit the cow to become normal after calving and before she is rebred.
9. Be sure the animals are free from Brucellosis and venereal diseases.

CARE OF DRY COWS

Cows need a six to eight weeks' rest period between lactations. The best way to dry a cow is to decrease her feed and discontinue milking. When one discontinues milking, the udder will become distended and the pressure stops milk secretion. After pressure stops the secretion, the milk in the udder is removed and then any excess milk will be reabsorbed and the udder will become loose and flabby.

Cows at calving time need special care. Even when cows are on pasture it is wise to put a cow that is soon to calve in a clean disinfected box stall or in a small pasture lot where she can be given any needed attention.

As calving time approaches, the udder will become swollen with milk. If the udder becomes unduly congested, it is well to rub it twice a day with a mixture of one half cod liver oil and one half ethyl alcohol, or some other suitable mixture. See Extension Circular 627, (Revised) "Feeding Milk Cows" for proper feeding methods for dry cows.

Milking heifers or cows before calving has no detrimental effect upon milk production after the animal calves, but there is no evidence that it is necessary or beneficial. Milking before calving removes the colostrum milk and deprives the calf of this essential food.

BREEDING THE COWS

Proper time to breed the cows may be governed by several factors. If fluid milk is sold and you need to maintain maximum production from month to month, then it is necessary to have cows freshen throughout the year. If you sell cream for buttermaking, it might be more advantageous to have cows freshen in the fall and winter months. If a cow is to milk 305 days and then have a 60-day rest or dry period, she should be bred two to three months after calving. Cows have an average gestation of 282 days, although a variation of 7 to 10 days either way is considered normal.

For the different breeds the gestation table below is considered the most accurate:

<i>Breeds</i>	<i>Days</i>
Ayrshire, Holstein and Jersey	279
Brown Swiss	290
Guernsey	283

Gestation periods of first-calf heifers average one day less.

Practical dairymen permit their cows to pass two heat periods after calving before breeding them. This practice is a good one. It not only gives the cow an opportunity to milk 305 days but gives her genital organs a chance to become normal and healthy after calving. The practice of breeding cows on their first heat period after calving is not advised, unless for some unknown reason the cows have delayed several months coming in heat. Very heavy producers are often delayed as much as four months before coming in heat.

MANAGING THE DAIRY BULL

Keeping the dairy bull in active service for a number of years requires careful feeding and management. The young bull should be well fed until he reaches maturity, after which time he should be kept in moderate flesh. Never allow him to become too fat. There is no definite rule for feeding mature sires. The caretaker must be

the judge, as some bulls require much less feed than others. Information about feeding dairy bulls is presented in Extension Circular 627 (Revised), *Feeding Milk Cows*.

Breeding Age

If well grown, the young sire is ready for light service by the time he reaches the age of one year. However, one service a week is all that should be allowed for bulls 12 to 18 months old. As the bull becomes older and more mature, the number of services can be increased. If the owner uses good judgment and conserves the bull's breeding powers, the bull will remain serviceable for a long time. On the other hand, if the bull is used too often he may become a slow and uncertain breeder early in life.

The bull should never be permitted to run with the herd. Such a practice results in the bull's exhausting himself unnecessarily and it also results in breeding heifers too young, causing them to freshen when small. When the bull runs with the herd, it is impossible to keep accurate breeding records. Furthermore, there is always danger to persons and property when the bull is running loose.

Sterility

It is difficult to detect sterility in a bull. There are many causes of sterility, and little is known as to definite methods of correction. Some reasons why a bull fails to breed are: overuse, disease, and inheritance. The examination of semen under a microscope by an experienced person is the best method to use in determining the viability of semen.

If a group of females fail to conceive, then the bull or the semen should be suspected of sterility; however, if individual females fail to conceive, probably the females themselves are sterile. If females fail to conceive, the advice of a competent veterinarian should be obtained.

Ringling

When the bull is 10 or 12 months old, a ring should be put into his nose even if he is regarded as gentle and easy to handle. The ring is a great help in handling any bull and may serve as a protection to a herdsman in case the bull becomes vicious. A copper ring 2 to 2½ inches in diameter is satisfactory at this time, but should be replaced by a larger and stronger ring when the bull reaches the age of two years.

Ringling the bull is not a difficult task, provided the operators are prepared for the work. The bull's head should be securely fastened so that he cannot jerk. After his head is secured, grasp his



Placing a ring in the bull's nose. The cartilage between the nostrils has been punctured with the trocar and cannula and the cannula left in the nose. One end of the ring is placed in the cannula which is withdrawn, leaving the ring in the nose.

nose with the fingers, then push a trocar with cannula through the cartilage which separates the nostrils. Then pull out the trocar, leaving the hollow cannula in place. Put one end of the open ring in the cannula; then withdraw the cannula, leaving the ring in the bull's nose. Close the ring and fasten the screw.

If this operation is to be performed properly the bull's head must be securely fastened and a trocar and cannula must be available. As soon as the bull's nose heals, he should be taught to handle with a staff. This is the safest and easiest way to handle a dairy bull.

Care of the Feet

It is important to keep the feet of the breeding bull in good, sound condition. Exercise in a bull paddock tends to keep his hoofs worn off to a normal length. In case the bull is sluggish and does not take enough exercise, it may be necessary to trim his feet occasionally. If the hind feet do not wear off and keep growing longer, it will not be long until the bull will be unable to serve. Trimming the feet

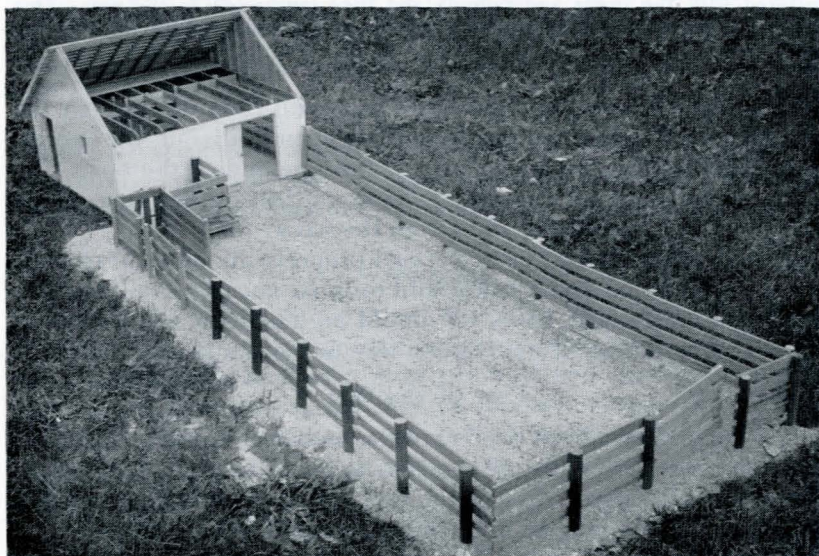
is best done with the animal thrown and securely tied, or in a chute. The tools needed for this work are a pair of sharp hoof snippers or parers, a sharp knife, and a rasp. This work should be done under the direction of someone with experience. The inexperienced may take off too much of the hoofs, making the animals lame.

Shelter and Exercise

The dairy bull should have a shed of his own; if this is not possible, a box stall in the dairy barn opening into an exercise lot is satisfactory.

This shed for the bull should be well drained so that it will stay dry. No elaborate pen is necessary. It should be tight enough to furnish protection from the cold and provide shade in hot weather. Exercise is very important in prolonging the usefulness of dairy bulls. The safest and easiest way to provide exercise is to have a yard adjoining the bull shed. If local conditions permit, it is advisable to have the exercise lot near or adjacent to a small pasture. Pasture is an excellent feed for bulls. Further, it is desirable to have the bull's pen located where the cows pass frequently. A bull will take more exercise if the cows come near his pen than if he is placed away from them.

The exercise yard need not be wide, but should be long enough so that the bull will have a tendency to move from one end to the other. A square pen is not desirable unless it is large. With a well



Model of a bull shed, pen, and breeding chute.

planned shed, exercise yard, and safety breeding chute, the most dangerous bull can be managed with safety. With the safety breeding chute attached to the pen, cows can be bred without the necessity of handling the bull. For a good plan on the construction of a safety bull pen and shed, you can obtain from the Agricultural Extension Service, Lincoln, Nebraska, Midwest Plan No. 77901. There is a small charge for this plan.

Proven Bulls

The best measure of a bull's transmitting ability is the production of his daughters. The milk and butterfat produced during the animal's lifetime is more important than the amount produced in a single year. A bull is proven when five of his daughters have Dairy Herd Improvement Association records that can be compared with records from their five dams. Herd improvement registry records may also be used.

All records are compared on the basis of 305 days at maturity. For example, a six-year-old Holstein cow, in 305 days, produced 10,371 pounds milk and 357 pounds butterfat with a 3.4 test and her daughter at two years, three months produced, in 305 days, 8,642 pounds milk and 288 pounds butterfat with a 3.3 test. The daughter's record is multiplied by 1.326 for the purpose of comparing these records on a mature basis. The daughter's record on a 305-day mature basis is 11,459 pounds milk and 382 pounds butterfat. The difference in these two animals is 1,088 pounds milk and 25 pounds butterfat in favor of the daughter; however, the butterfat was 0.1 per cent less.

The actual proving of a Holstein bull is shown below:

	Records (Average)	Milk (Lbs.)	Test (%)	Fat (%QT)
Hawthorne Dictator Premier 813295- —56 daughters	132	12,736	3.8	482
Born 10-15-40; proved, 6-6-51; Nebr.—23 daughters	48	12,727	3.9	492
Sire 759581; dam 2030659 —23 dams	67	13,995	3.4	481
Used in University of Nebr. (A.B.A.) —Difference		- 1,268	+ .5	+ 11

A study of the above figures shows the average of the daughters' records was higher in per cent and pounds butterfat than the average of the dams' records. The dams' records averaged higher in milk production. This bull was bred to a good producing group of cows and had many daughters with records.

Information on records of proven bulls should be carefully studied because it is a good indication of how a bull will transmit production

to his offspring. Some of the factors to consider in appraising a proven bull are:

1. The level of production of the cows to which the bull was bred. Production can be increased more on low-producing cows than on high-producing cows.
2. The number of daughters upon which records are available and whether or not some daughters were culled before records were completed.
3. The feeding and management of both the dams and daughters. This may be difficult to determine, but feeding and management can greatly influence production.
4. The type of the daughters, particularly as it may influence lifetime production.

Artificial Breeding

Cows are being successfully bred artificially on many farms. Practically all the artificial breeding is done by technicians or inseminators who are employed by artificial breeding cooperatives. Bulls that are carefully selected for production and type are maintained at a central bull stud. Semen is then shipped to the technicians.

Service fees are used to pay technicians' wages, the bull stud for semen, and for miscellaneous expenses of the associations. The success of the associations depends upon first, the density of the cow population; second, the ability of the technician; third, the quality of the semen; fourth, the interest and cooperation of the members and board of directors; fifth, local telephone facilities and road conditions; and sixth, a good financial plan that is sound and ample.

Artificial breeding has the following advantages:

1. Provides the services of more desirable bulls than can generally be owned by individuals, particularly if the herd is small.
2. Eliminates the danger, cost and inconvenience of keeping a bull. A producing cow kept in place of the bull is a definite advantage and a financial asset.
3. Increases the value of offspring when from selected sires.
4. May reduce the spread of disease transmitted by the bull.
5. May lower production costs by increasing production of offspring.
6. Controls the age and size when heifers can be bred.
7. May improve the type of offspring.
8. Permits owners with more than one dairy breed to breed their cows and heifers to the breed desired.
9. May control more uniformly the dates of calving for cows.
10. Generally increases interest in dairying and assists with culling, feeding and management practices.

The limitations are as follows:

1. May increase breeding costs in some herds.
2. Requires excellent telephone service.
3. Requires close observation of the herd to detect animals in the different stages of heat.
4. Severe storms and blocked roads may temporarily interrupt service.
5. Organization and supervision require some time and effort.
6. Difficult to follow a definite breeding program with cow families.
7. May or may not make it possible to have cows bred to a certain sire within a breed.

More detailed information about the local artificial breeding services can be secured from county agricultural agents.

DEHORNING DAIRY ANIMALS

Dairy cattle have no use for horns; therefore, they should be removed. If horns are not removed, cows hook and injure one another. It is easier to prevent horns by removing them from calves when the horn-producing tissue is soft. If horns are not prevented from developing on baby calves, they should be removed when the calves are not over five or six months old.

Chemical dehorner or commercial pastes are effective horn preventers, if used properly and before the calf is two weeks old. The commercial preparations have the advantages of caustic sticks and not the disadvantages, because they are easier to use.

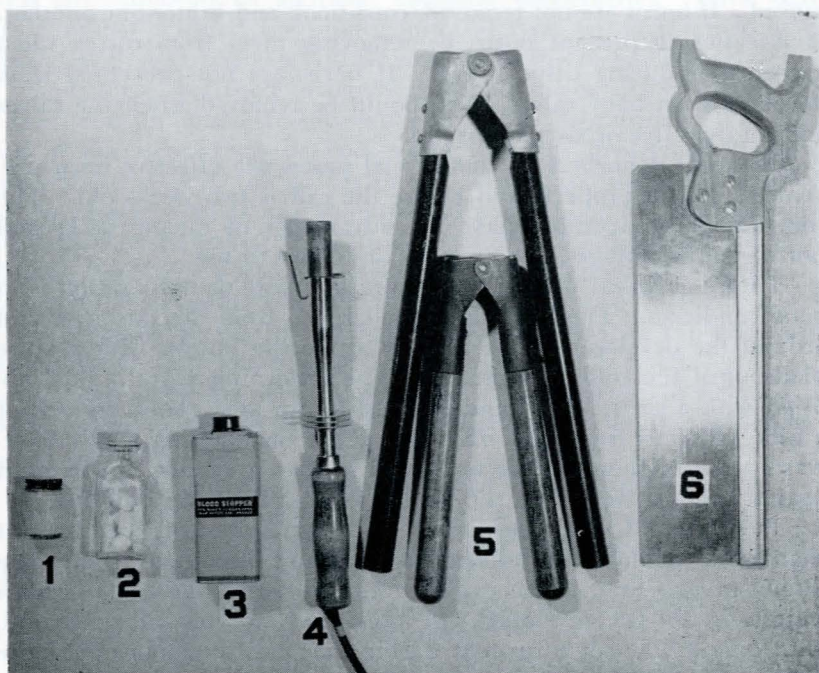
To use chemical dehorner, be sure the paste or preparation is in good condition. The hair should be clipped from the skin over and around the developing horn. Then scrape the button with a knife blade until the color is light red. The dehorning paste is then applied with a small wood-handled brush to an area about the size of a nickel directly over the horn bud and the surrounding skin. Afterward, the calf should be securely tied so that it cannot rub its head against other calves or on the mangers or walls of the building.

This method of dehorning is easily performed, is less painful than other methods, and causes less shock and bleeding. It has some disadvantages—first, if the calf is over two weeks old and the horn button is too far developed, the horn may not be killed; second, with only a few calves to treat during the year, sometimes the paste becomes dry and not usable; and third, regardless of how carefully the job is done, scurs or stubby horns sometimes appear.

For calves two to ten months old, a mechanical calf dehorner can be used satisfactorily. The small dehorner does an excellent job on calves four to five months old, while the larger all-metal dehorner

is best adapted for calves nine to ten months old. These dehorners scoop the horns from the head and an excellent poll results after the wound heals. The animal's head needs to be securely held and then the dehorner can be placed over the horn and quickly operated. After the horns are removed, a commercial blood stopper should be sprinkled over the wound. By leaving the wound uncovered, good drainage is made possible in the healing process. The advantages of this dehorning method are—first, all calves can be dehorned at definite times; second, calves can be dehorned when they are young and when the shock is not severe nor the bleeding excessive; and third, the dehorning, if done properly, leaves animals with a neat-appearing poll.

For mature or older animals with large horns, removing them with a saw is probably the best procedure. When saws are used, the shock and bleeding is more severe. The wounds are larger and a longer time for healing is required. If a mechanical dehorner is used, be



Horns can be prevented or removed by using one or more prescribed procedures. No. 1, commercial paste; No. 2, caustic sticks; No. 3, commercial blood stopper, which helps form a coating over a wound; No. 4, electrical dehorner; No. 5, mechanical dehorners (use the small one for dehorning calves about 5 months old and the large one for calves about 12 months old); and No. 6, dehorning saw.

sure a ring of hair is removed with the horn. Many poor jobs of dehorning occur because not enough horn is removed.

When a saw or mechanical dehorner is used, animals should not be eating sweetclover hay or pasture. Excessive bleeding may occur because sweetclover contains an ingredient which hinders the clotting of blood.

In addition, cattle that are dehorned should not be unduly excited. Cattle should not be dehorned during fly time.

The hot iron or electric iron dehorner can be used for calves when they are about 10 days old. The iron is heated and placed over the small horn. The tissue, located at the base of the horn, is destroyed by burning. The horn buttons will drop off in three to six weeks, leaving a clean head which soon heals. This method is bloodless, and produces a clean poll. It is essential that the iron be hot enough to do a good job.

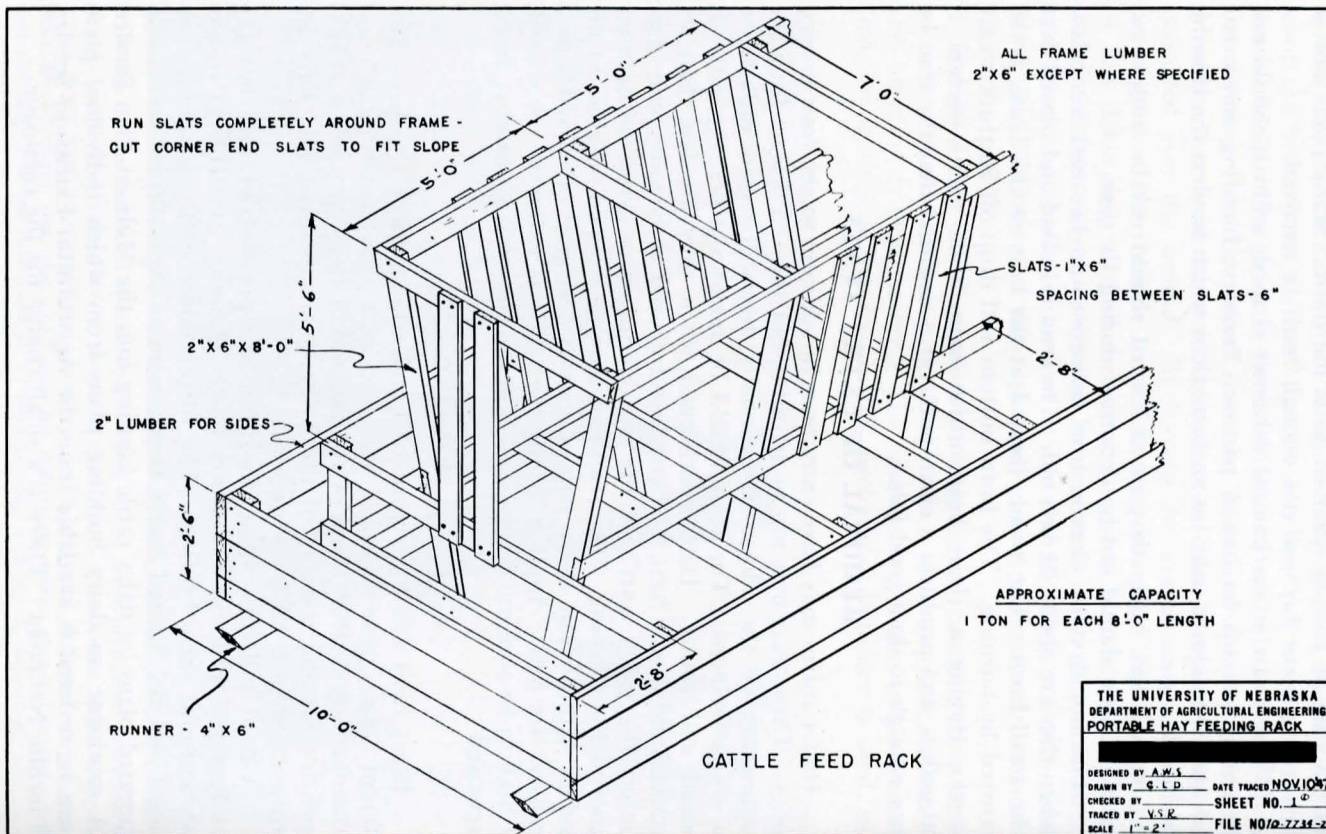
REMOVAL OF EXTRA TEATS

Heifer calves may have extra teats in addition to the four normal ones. These teats may not be harmful, but they do detract from the appearance of the udder. Occasionally they will secrete milk when a heifer freshens. The teats should be removed when the heifer is small and young. Heifers dehorned when they are less than six months old should have the extra teats removed at the same time. Disinfect the extra teats and the surrounding area with iodine after thoroughly cleaning. The teats can then be snipped off close to the udder with a clean, sharp pair of scissors. Surgical or curved-bladed scissors are best. Apply a disinfectant such as iodine to the wound. Check to be sure only extra teats and not the normal teats are being removed.

HOUSING

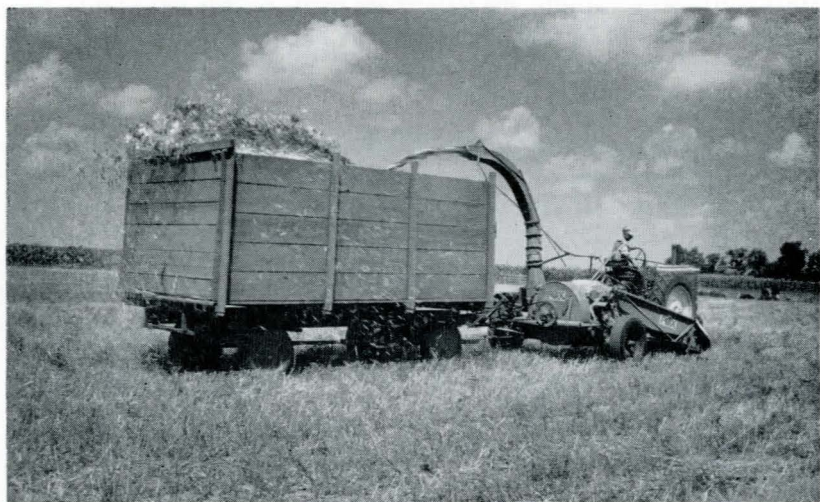
Dairy cows should be protected from disagreeable weather. Different housing systems can be used and each plan has advantages and disadvantages. Regardless of the method of housing used, it should provide for the comfort of the cows, be inexpensive, and have incorporated in it labor-saving ideas.

A good bulletin on plans for different types of dairy cattle housing is Regional Bulletin 470, *Dairy Cattle Housing*, available at county agricultural agents' offices. The fifteen midwestern agricultural colleges and the United States Department of Agriculture have incorporated plans on dairy cattle housing into the Midwest Plan Service. A catalogue on dairy building plans from which individual plans can be ordered is available from the Agricultural Extension Service, Lincoln, Nebraska. There is a small charge for the catalogue.



Hay and Feed Bunks

In Nebraska much of the roughage is fed outside the barn in racks and bunks. Where this method of feeding roughage is practiced, the owner should make sure that there is sufficient feeding room at the hay racks and silage bunks to accommodate his herd without crowding. If there is insufficient room, the more timid animals will not get their share of the feed and may even go hungry. Every herd has a cow that is "boss," and she will invariably take over more than her share of bunk room and drive the more timid cows away.



Conserving straw, after the combine, for winter bedding. Straw may be baled, chopped, or stored loose to be returned to the land next year as manure.

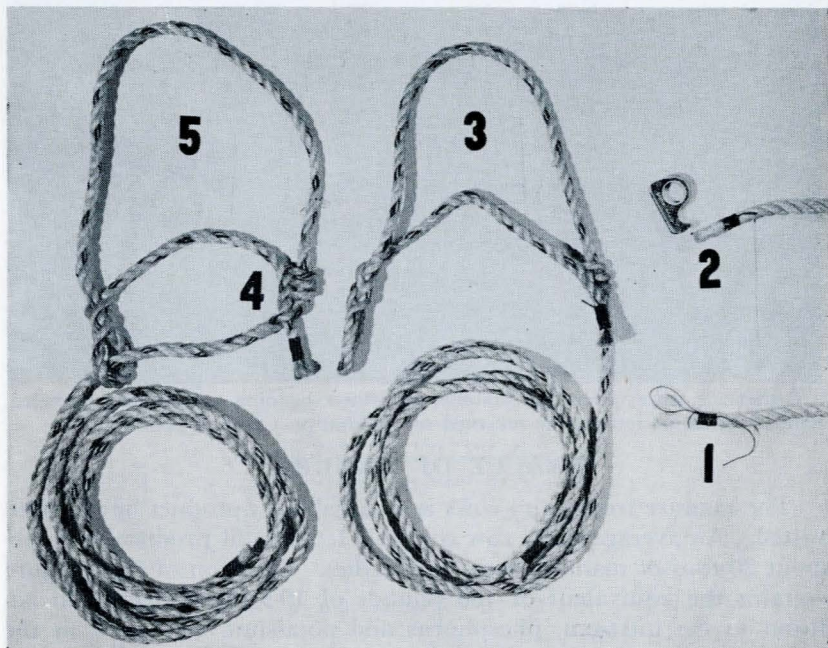
VALUE OF MANURE

The manure from dairy cows is a valuable by-product but is often wasted. An average dairy cow correctly fed should produce annually about 20 tons of manure (feces and urine). Each ton of this manure contains the equivalent of 100 pounds of 10-5-10 fertilizer. In addition to the nitrogen, phosphorus and potassium contained in the manure, it improves the physical structure and increases the water-holding capacity of the soil. To stop losses in the fertilizing value of manures, one must stop the leaching, save the liquid manure, and prevent excessive fermentation. This can be accomplished by the use of more bedding to absorb the liquid. A manure pit with a concrete floor and a roof to prevent washing by rains will help conserve manure. Building up the litter or bedding in an open shed will help conserve the manure, because tramping by the cattle reduces chances for leaching.

On some farms manure can be hauled directly to the land and disked into the soil and thus conserved. Some kinds of bedding are better than others. Straws from the cereal grains make good bedding. Shavings and sawdust have low water-absorbing properties. Shredded corn stover or ground corn cobs can be successfully used as bedding.

HALTERS

Rope halters are commonly used in tying cattle. Making a rope halter is a simple process and can be done easily after a little practice. Since cattle grow rapidly, the halters are made readily adjustable. Rope of manila hemp of various diameters may be used for cattle of different ages, but a halter made of 15 feet of rope $\frac{3}{8}$ or $\frac{1}{2}$ inch in diameter is most common for dairy animals.



Steps in Making an Adjustable Rope Halter

1. Strong cord is used for whipping the ends of a rope. Strong, colored fish line is excellent cord to use.
2. After the ends are whipped, scotch tape placed around the ends will make the rope easier to work between the strands.
3. The head stall is formed.
5. The completed halter. Notice how the short end is tucked between the strands of the rope at 4 to prevent slipping. The halter is placed on the animal so that the loop is at the left side of the jaw.

End splices may be used to finish the rope end; however, whipping is better because it leaves the end of the lead small enough to be passed easily through tie rings. Take a piece of strong cord about 40 inches long in the left hand and grasp the rope in the right hand, leaving about 2 inches extending to the left from under the first finger. Make a loop with the cord with 6 or 8 inches left on the short end. Place the loop at the end of the rope with the ends caught under the first finger of the right hand. Take the long end of the cord and wrap it tightly and smoothly around the rope end, wrapping with the twist of the strands of the rope, until within $\frac{1}{2}$ inch of the rope end. Then tuck the unused cord through the exposed loop. Pull on the short end of the cord until the loop draws the long end tight well under the whipping. Cut off the loose ends of cord. Soaking the whipped end in waterproof cement makes the end very secure.

With the rope made ready, use a marlinespike to make separation of strands easier. A marlinespike is a round piece of iron or wood pointed at one end, the other end serving as a handle. The pointed end may be slightly flattened. After pushing it between two strands of rope, the strands are easily spread by one-fourth roll of the marlinespike.

Take the rope in the left hand, palm up. Allow 22 or 23 inches to extend to the right for the short end. Grasp the rope between the thumb and forefinger at this point, and, with the marlinespike, open the rope by lifting two strands. Bring the short end around, clockwise (to the right) and put it through the opening in the rope. This forms a loop. Close this loop until the inside diameter is at least twice the thickness of the rope. A loop that is too small closes too tightly when the halter shrinks after getting wet.

Next grasp the loop with the right hand. With the marlinespike, open the short end of the rope outside but next to the loop, lifting one strand. Then take the long end of the rope, bring it from the left and push it through the opening made in the short end. This completes the loop with an equal number of strands on each side of the splice. This procedure leaves the inside of the splice very smooth where it bears against the jaw of the animal.

The short end of the rope becomes the nose piece of the halter. Measure off 11 inches of it from the eye splice or loop. With the hands 2 or 3 inches apart, one at each side of this point, grasp the rope firmly and untwist the rope between the hands. Then close the distance between the hands slightly, keeping the rope untwisted. This allows each strand to form a separate loop. These loops may be opened further and brought into line by working the marlinespike through all three at once. Take the long end of the rope and place it through

all three loops, starting with the inside loop. Draw it through until the loop formed becomes the right size for the head piece of the halter. By putting the long end through the loop at the other end of the nose piece, the halter is completed. This halter is readily and safely adjusted.

COMMON DISEASES OF DAIRY COWS

It is very important for the dairyman to maintain healthy animals. Diseases cause financial loss and some diseases may be transmitted to humans. A few of the common diseases are discussed here, not with the intention of giving specific methods of treatment but more to impress individuals with the need of prevention and control. Veterinarians are available in most Nebraska communities. They can be employed for the treatment of diseases, and livestock owners should not wait until diseases are seriously advanced before their services are used.

The most important factor in the elimination of diseases is prevention. Many times diseases can be prevented—first, by applying good sanitary methods, because germs multiply in dirty, dark, moist places; second, by feeding animals correctly; third, by vaccinating against some diseases at the proper time; and fourth, by eliminating exposure to disease from outside sources. When animals are brought onto the farm they should be kept separate from other animals. They should be tested by a veterinarian for various contagious diseases and kept isolated from the herd until all tests and possible retests have proved negative and there is no sign of sickness. Barns should be well lighted and kept clean, yards should be well drained, and stagnant pools of water should not be allowed to accumulate.

After a disease has entered the herd, everything possible should be done to prevent its spread. When it is first noticed that an animal is sick, that animal should be isolated from the rest of the herd. The liberal use of a good disinfectant is essential. It is a good plan to have a well equipped medicine chest containing the following items:

Clinical thermometer	Tincture of iodine
Drenching bottle	Medicated vaseline
Syringe	Lysol
Trocar	Spirits of ammonia
Cannula	Hose for stomach tube

Many times valuable animals can be saved if there are available in the medicine cabinet supplies and equipment that can be used in an emergency or before the veterinarian arrives. In addition, there should be sufficient room in the cabinet for medicines the veterinarian may prescribe.

Breeding problems. Many factors influence the ability of heifers and cows to breed and reproduce. A limited number of dairy heifers are sterile, that is, they do not have the ability to have young. Other females may produce one or two calves and then fail to reproduce again. Some of the reasons why heifers and cows fail to breed and produce calves are impossible to explain.

Diseases, improper feeding or the lack of minerals may influence reproduction. Injury or deformity may have an effect on the reproducing ability of a female. Some females inherit the ability to reproduce better than others. Sometimes veterinarians can correct breeding troubles with heifers or cows, but at other times there is nothing to do but sell for beef the nonbreeding female.

Brucellosis. This disease is also called Bang's disease or contagious abortion. It is a germ disease, with infection usually entering the body through the mouth from contaminated feed and water. Germs are carried by the blood to the pregnant uterus where the unborn calf is developing.

Not all infected females abort. Heifers in their first pregnancy are most likely to abort when infection is present. Some cows will abort the second pregnancy; and a few, the third. Some females that carry Brucellosis germs produce normal calves regularly.

At calving time there is the greatest danger of spreading this disease to other cattle. There is no known satisfactory treatment for Brucellosis. Every possible treatment has been tried without success. Much can be done to prevent females from becoming infected. New cattle that are brought onto a farm should be quarantined for 30 to 60 days and blood-tested before they are allowed to run with the other cattle. For 30 to 60 days after a cow becomes infected with the Brucellosis germs her blood test may be negative. Therefore, a retest is recommended. Guard against having strange cattle come onto the farm, as they may be infected with Brucellosis. The vaccination of heifer calves with Strain 19 has met with wide approval. It may not be perfect in every respect, but it is the best vaccine produced so far for the prevention of this disease.

Brucellosis in humans is called undulant fever. This disease is transmitted to humans from swine, goats and cattle. Undulant fever is primarily a disease of men. There is a possibility of contracting undulant fever by drinking raw milk from cows with Brucellosis, but most cases are caused by contacts with infected material. Many years ago undulant fever was known as an occupational disease because it was prevalent among farmers, veterinarians and packing house workers that handled diseased organs from cows, goats and swine.

Blackleg is a disease that usually attacks young cattle. Calves under four months or cattle over three years old seldom have the disease. The germ that causes blackleg is very resistant to heat, cold, drying or disinfectants. It may lie for several years in a pasture or barn lot and then threaten cattle. The germ enters the blood stream through a break, puncture or abrasion in the skin and causes gas-filled swellings in large muscles like the shoulder, neck, chest and flank. Other symptoms are high fever, lameness, loss of appetite and rapid breathing. Death results in 18 to 36 hours after symptoms are noted. In the swollen muscles a sound like the crackling of parchment paper is heard when the muscle is massaged. There is no cure for blackleg but it can be prevented by vaccination. The immunity from vaccination varies in duration but will generally last 12 to 18 months. Calves vaccinated when over six months old do not generally require a second vaccination, but calves vaccinated younger than six months should be vaccinated again for complete protection. Carcasses of dead animals should be burned.

Bloat is a condition where the rumen or paunch becomes distended by an accumulation of gases. The formation of gas in the paunch is a normal occurrence, but when it forms very fast or is not properly eliminated by belching, bloat occurs. Most dairymen recognize bloat as a distention of the upper left side of the abdomen. The animal becomes uneasy and breathing becomes difficult. If relief is not given the animal will stagger, fall and finally die from suffocation or because the gases are poisonous when absorbed by the blood.

The animal can be treated with a number of remedies before the pressure becomes too great. In some cases gas pressure can be relieved by placing a wooden bit in the cow's mouth upon which is placed some turpentine or pine tar.

A drench of about 1 ounce of aromatic spirits of ammonia and turpentine mixed in a small quantity of water is helpful. If the animal lies down and other treatments have failed it may be necessary to puncture the rumen. For this the trocar and cannula are best, although in an emergency a knife may be used. The trocar inside the cannula should be directed toward the abdomen with a sharp thrust. Leave the cannula in the wound until no more gas escapes.

A few precautions to prevent bloat are: provide plenty of salt and water and have animals full of dry roughage before turning them onto succulent legume pastures. Keep animals on pasture after they have started to graze.

Cattle lice are of different kinds. Some suck blood, and others bite. They generally cause cattle to scratch, and in turn lower their milk production. Sucking lice sometimes cause an anemic condition. Numbers increase from fall to winter and decline during late spring and summer. They can be controlled by dusting or spraying with rotenone. Chlordane can be used as a spray. Treatment should be given in the fall before lice become numerous, and repeated in two or three weeks. Clipping hair from heifers helps to control lice.

Cowpox affects the skin of the udder, teats and sometimes the inside of the thighs and belly. The disease is spread by contact only and will produce immunity to smallpox in man. The first symptoms are a reddening of the skin, increased warmth to the touch and soreness, accompanied by a slight fever. In a few days reddish pea-like nodules appear, which grow in size until they are about an inch in diameter. This disease seems to run its course in about three weeks. The sores make milking difficult; however, some relief can be obtained by applying 5 per cent sulfanilamide in lard to the sores. The sulfanilamide protects against secondary infection and the lard softens the sores.

Foot rot is an infection of the foot caused by pus-producing germs. The infection causes great pain to the animal. Generally the germ enters the foot between the toes after the skin is injured. Most cases occur after animals have been in muddy yards. Sometimes the condition is more pronounced when yards or pens are alternately muddy and dry.

A swelling occurs above the hoof, the animal becomes lame, it may lose its appetite, and milk flow is reduced. An animal with foot rot should be moved to dry ground and the foot cleaned and then treated with antiseptics like copper sulfate or formaldehyde. Veterinarians are successfully treating foot rot with the sulfa drugs blended with carriers injected into the blood stream.

Foreign objects. Every year many valuable dairy cattle die because of nails, staples or wire that they pick up with their feed. After being taken into the animal's mouth, foreign objects are passed through the gullet into the second compartment of the stomach or reticulum. The objects may remain in this part of the cow's stomach or, if they have sharp ends as in the case of nails and wire, they may eventually work through the walls and puncture the heart or other vital organs and cause death. Scientists have developed a method of removing these pieces from the reticulum by an operation. The best thing, however, is to prevent pieces of wire, staples, nails and similar material from getting into the animal's feed. A magnet properly placed in the

feed grinder will help eliminate some of the foreign objects from the ground feed.

Johne's disease is highly infectious. The germs of the disease are eliminated in the manure of infected animals. Young animals are most susceptible, but the disease may not be noticed until the animals are three or four years old. Johne's disease causes a general loss of flesh or condition, diarrhea occurs, and animals show a rough coat and dry skin. There is no fever, and in many respects the symptoms are similar to tuberculosis. The disease is best detected by veterinarians using the Johnin test. There is no satisfactory treatment or cure.

Ketosis or **acetonemia** generally appears in milk cows six to eight weeks after calving and is not infectious. Ketosis shows up more often in heavy producing cows in late winter and early spring. The cause is a build-up of substances called ketones in the blood and urine. These substances are also called acetone bodies; hence, the term acetonemia which means an excess of acetone bodies in the blood. It is, in brief, faulty metabolism of the carbohydrates and fats.

Symptoms are a lack of appetite, loss of weight and a drop in milk production. An affected animal may stagger or weave and walk with its head in an abnormal position. Some cows exhibit a crazed appearance, foam at the mouth, and walk through barbed wire fences. Another symptom is a disagreeable odor of the breath.

To prevent ketosis, feed an extra two to five pounds of corn sugar or molasses daily during the first few weeks of lactation. Veterinarians usually inject a sugar solution into the jugular vein for treatment. Other methods of treatment show promise at this time.

Lumpy jaw may be due to two different kinds of germs. One affects the bones of the jaws and head and the other affects the soft tissues of the neck, jaws and head. The germ (actinomycosis) which enters the jaws through abrasions in the skin or inside the mouth, is found on barley awns, oat stubble and various grasses. The bones become large and spongy and are filled with a sticky pus. Growth may continue until it breaks through the skin. The pus gives off a disagreeable odor. The growth also may go inward, affecting the palate or gums.

The other germ (actinobacillosis) is confined to the soft tissues around the head and neck. Swellings are the size of a walnut to the size of a baseball or larger and are movable. They occasionally become enlarged until they break and a creamy colored pus is discharged. The tongue sometimes is swollen and protrudes from the

mouth and the animal slobbers. In severe cases the animal is unable to chew.

The first type of lumpy jaw is difficult to treat because the germs are imbedded and are difficult to reach. The type which affects the soft tissue can often be cured with an iodine compound. Treatment should be under the supervision of a veterinarian. Keep animals with running sores away from other animals.

Mastitis is an inflammation of the udder. Different kinds of germs enter the udder through the teat canal and are responsible for the inflammation. Mastitis reduces milk production, affects the butterfat content of the milk, makes milk unusable from the infected quarter, and sometimes causes the cow to be very sick. Acute mastitis is usually a flare-up of the chronic type. The infected portion of the udder is swollen, reddened, hot and painful. Milk from the infected part varies in appearance. It may be watery, contain flakes, or be stringy or yellow and ropy. In some cases the milk is nearly normal in appearance but is different in composition. For example, milk from an infected quarter generally is more alkaline than normal milk. The cow may lose her appetite and have a depressed appearance, with sunken eyes and rough coat of hair.

As mastitis progresses, the infection causes the udder to lose its soft, pliable quality. Scar tissue develops which feels meaty and hard when massaged with the hand. One or more quarters may become blind and fail to secrete milk.

Many poor management practices are responsible for mastitis. The correction of these practices will help control or prevent the disease. Mastitis may be brought on by cold, damp weather or sudden weather changes, by cows lying on cold, poorly bedded floors or cold, damp ground, by cold drafts in the barn, or by high door sills, particularly when it is muddy. Udders might be injured by barbed wire, logs, old stumps or debris in the pastures, lanes and yards, and in many other ways. Improper machine or hand milking, and irregular or incomplete milking may cause mastitis. Some dairymen believe too much corn in the ration just before and after calving is a predisposing cause of mastitis.

The germs that cause mastitis are present continuously, so they have a chance to cause damage whenever the resistance of the udder tissues is lowered. Prevention means reducing the chance of udder injury.

In the control of mastitis, early detection is very important. Many tests can be used, but probably the most practical one is the use of a strip cup. If the first two or three squirts of milk through the fine screen or over the black surface of a strip cup show flakes, lumps or

stringy milk, an abnormal condition is apparent. The strip cup should be used at every milking.

Cows with mastitis should be milked last and the milk discarded where it cannot spread the disease. The managed milking plan as outlined in this bulletin will help prevent mastitis.

Some of the newer antibiotics can be used for treatment of the disease. These should be administered under absolutely sterile conditions by a veterinarian, or under his supervision.

Milk fever is a disease of milk cows which generally occurs after calving. It is not contagious and affected animals do not have a fever. The cause of the disease is not definitely known except that there is an abnormal calcium balance in the blood stream. Early symptoms usually begin a few hours to three or four days after calving. A cow with milk fever shows dull eyes, has cold ears, the muzzle is dry and the temperature drops below normal. Later the animal trembles, switches her tail, weakens, and then staggers. Finally the cow goes down, lying with her head to one side. If she does not receive treatment, she loses consciousness and dies.

Treatments are intended to restore calcium balance in the blood stream. They should be given by a veterinarian.

If a cow is sick with milk fever after one calving, the owner should be on guard at subsequent calvings. This means the udder should not be completely milked out for the first three or four days after the calf is born. Sometimes a calcium solution is injected into the blood stream 12 hours after calving.

Pink eye is a very contagious disease affecting animals of all ages. It may be spread by contact between infected animals and healthy ones or by flies. It is an inflammation of the membranes of the eye. Occasionally animals are left permanently blind. Animals with pink eye prefer dark places. Vaccines are of questionable value.

The best treatment is to keep affected animals in a dark place and away from healthy animals and wash the eyes with a weak boric acid solution about three times a week. Another treatment is to place a few drops of a 10-per cent argyrol solution in the eyes daily with a medicine dropper. Protect the animals from flies.

Ringworm is a fungus growth on the skin and is contagious. It appears as a circular patch where the hair has fallen out and a white or gray, scaly crust has formed. It is most common in the winter or early spring when calves are housed. Ringworm causes the calf to scratch because of the irritation. Remove the crust by scraping or soaking with soap and water. Then paint the affected area with tincture of iodine, or 1 part tincture of iodine and 2 parts glycerine or crude oil, or sulphur ointment. Do this once a day for several days

to keep the disease from spreading. Keep the animals with ringworm separated from the others, and thoroughly disinfect the stalls, pens, halters, and other objects with which they have contact.

Screw worms are the larvae of a kind of blowfly. They are found mostly in the southern states, but are present some years in Nebraska from June until a killing frost occurs in the fall. This larva or maggot does its damage in wounds caused by dehorning or castrating, in barbed wire cuts, or in wounds caused in other ways. Avoid causing wounds by dehorning or castrating calves during the period when the adult flies are laying eggs. Smears are on the market which are helpful in treating calves affected with screw worms, if used in time and used properly.

Trichomoniasis is a venereal disease of cattle and generally causes abortions early in pregnancy. It is transmitted during service, usually after a new bull or an infected cow has entered the herd.

As a result of infection, one of several things may happen: (1) the animal may fail to conceive; (2) conception may take place and be followed by an early abortion—in 8 to 16 weeks; (3) the fetus may die within the uterus, which then becomes filled with a thin, grayish-white, almost odorless fluid; or (4) a normal birth may occur in spite of infection.

There are no signs of heat during the interval the dead fetus is retained, although a few days after abortion the cow generally comes into heat.

Cows with this disease should be given a rest period and not be rebred too soon. Sometimes veterinarians can help clear up the disease in cows with a douche. There is no known cure for bulls.

Tuberculosis is caused by the tubercle germ. There are three kinds, known as human, bovine, and avian. The germs are spread in food and water or through the air from the lungs or manure of infected animals. In dairy cattle, tuberculosis of the lungs is most common but the udder may also become infected.

Dairy animals with tuberculosis lose weight and cough when the lungs are infected. However, some severely infected animals do not lose weight, but stay in good condition. The best way to diagnose tuberculosis is with the tuberculin test applied by a veterinarian.

Cattle are the principal victims of the bovine type of tuberculosis. Swine are also susceptible to the bovine type, but most swine infection comes from the avian type to which chickens are susceptible.

Humans are quite resistant to the bovine type, but if continuously or frequently exposed can acquire the disease. Children are more susceptible than adults.

Good progress has been made in the elimination of tuberculosis in Nebraska's dairy cattle. The problem now is to completely eliminate tuberculosis and maintain cattle free from the disease. Strict sanitation should be followed to prevent the spread of tuberculosis.

Warts are very common on young cattle. Sometimes they will disappear without treatment, but early treatment is a good practice to prevent growth. Large warts may be treated by applying tincture of iodine or glacial acetic acid daily for three or four days. However, it should be applied with care so that it does not run down on healthy skin. Iodine should not be used on warts near the eyes. Small warts usually disappear in two or three weeks if they are soaked daily with sweet oil or castor oil. A small oil can may be used in applying the tincture of iodine or oil. Do not handle the warts with your hands. A wart with a small base may be clipped off with sterile scissors. Tying a stout thread tightly around the base of the wart will remove it.