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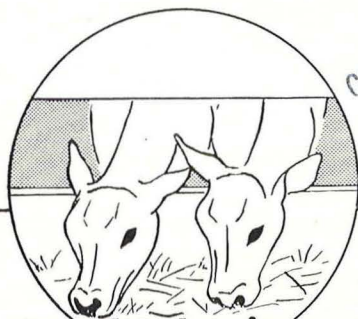
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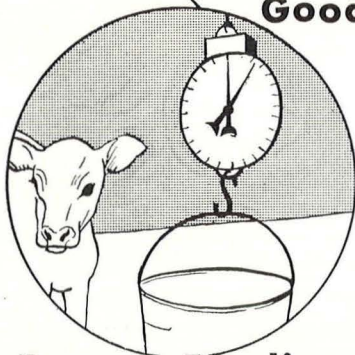
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Raising Dairy Calves

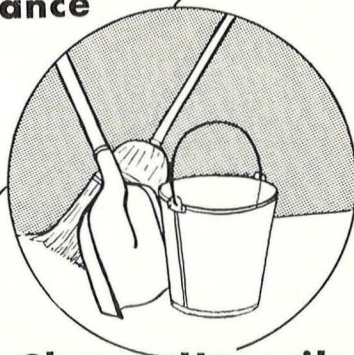
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Good Inheritance



Proper Feeding



Clean Utensils

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ACKNOWLEDGMENT

Sketches on page 15 are used through the courtesy of the University of Vermont, and the pictures on page 16 were furnished by the University of Wisconsin.

Raising Dairy Calves

C. W. NIBLER AND P. L. KELLY¹

THE MOST PRACTICAL way to improve dairy herds is to raise heifer calves from the best cows in the herd, sired by bulls that transmit high production to their offspring. Calves that inherit characteristics for low milk and butterfat production will cost as much to raise as calves that inherit factors for high yields of milk and butterfat. After the calf's birth it is necessary to apply the best feeding and management practices known, if thrifty calves are to be developed into profitable cows. Because valuable feed, time, and labor are invested in calves raised for herd replacements, every detail of proper feeding and management is important. Calf raising is one of the important jobs on the dairy farm. Normally 20 to 30 per cent of the dairy herd must be replaced each year. This means that the dairyman must attempt to raise at least three heifer calves each year for every ten cows in the herd.

Care of the dry cow. The unborn calf develops for nine months in the uterus of its mother; therefore, proper feeding of the mother is very important. The proper feeding of cows before and after calving is discussed in Extension Circular 627 (Revised), entitled "Feeding Milk Cows." This circular is available at the offices of county agricultural agents. The greatest development of the unborn calf is in the last few weeks before birth. At this time the heaviest demands are made upon the mother. Because of this, cows need six to eight weeks of rest between lactations, at which time they should be correctly fed.

In summer, good pastures, supplemented with a balanced grain ration, provide the feeds needed by the dry cow and unborn calf for best growth and health. In winter, high-quality roughages as well as a good grain ration are needed to furnish the nutrients for the dry cow. The amount of grain fed daily will depend upon the size of the cow, her condition, and the length of the period she is dry. Most cows can use 3 to 6 pounds of grain daily. Large cows that are thin in flesh when they go dry, and that have only a short rest period (three to six weeks), may need 10 to 12 pounds grain daily to properly prepare them for their next lactation.

Drying off the cow. To dry off cows, reduce the feed. Take away all grain and feed a limited amount of roughage and water for a few days. If cows are producing only a normal amount of milk, there

¹ This circular was originally written by H. P. Davis, M. N. Lawritson, and R. F. Morgan. It has been revised by C. W. Nibler and P. L. Kelly.

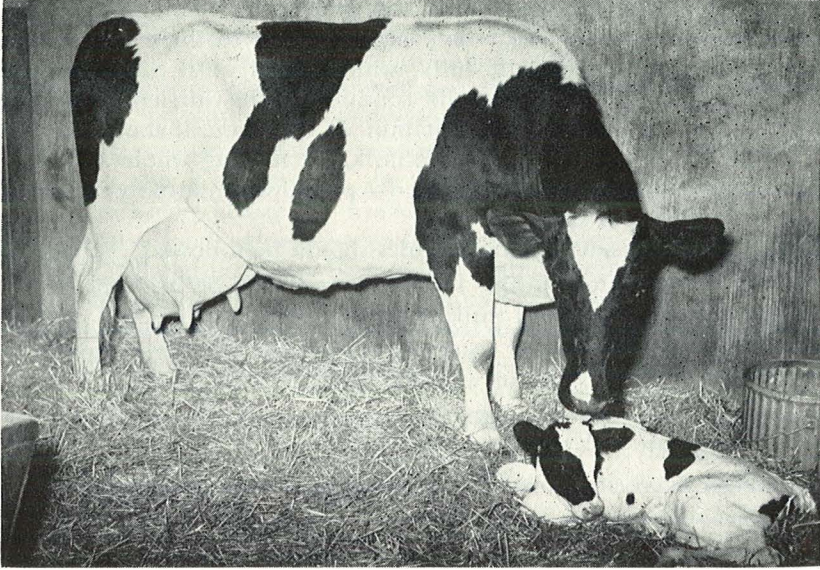
should be no trouble if milking is discontinued entirely. The udder should be checked after a few days to see that it is not inflamed or swollen. If the udder is inflamed or sensitive, it should be milked out completely. After that, it should not be necessary to milk the cow again. As soon as the cow discontinues secreting milk, grain feeding can be resumed to continue her preparation for calving.

Care of the cow at calving time. Cows at calving time should receive special care. Here are a few suggestions that will help the cow at calving time and give the calf a good start.

1. Let the cow calve in a well-lighted, properly bedded maternity stall.
2. In the late spring or summer, a small pasture, separate from other livestock, is a desirable place for calving.
3. Feed the cow less corn and more wheat bran, ground oats, or dried beet pulp during this period before and after calving.
4. Provide plenty of fresh, clean water.
5. Watch the cow closely, so aid can be given if necessary.
6. An excellent practice is to feed a warm bran or ground oat mash after calving. Feeding a warm mash plus warm drinking water seems to improve the physical condition of the cow after calving.

In the normal birth, the calf's front feet appear first, and the head lies on the front feet. Usually the calf will be born within an hour after delivery starts. If the cow seems to be having unusual difficulty or if the presentation is abnormal, an examination should be made by a veterinarian or other experienced person and assistance given if needed. If the weather is cold or if the cow becomes chilled, it may be necessary to blanket her. Before the calf nurses, wash the cow's udder with warm water to which a mild disinfectant has been added. Generally not all milk is removed from the cow's udder immediately after calving. Thus pressure is lowered gradually. Whether this practice has any benefits in preventing milk fever is questionable. After calving, remove the placenta or afterbirth from the pen or pasture and see that it is buried or destroyed. When a placenta or afterbirth is not expelled within 24 to 48 hours after the calf's birth, something should be done to aid in the removal. Consult your veterinarian for the proper procedure to follow.

Care of newborn calf. Remove the mucus from the calf's nostrils and mouth immediately after birth. If the calf does not breathe immediately, apply artificial respiration by alternately compressing and relaxing the chest walls with the hands, or slap the sides with the hands. Do not exert too much pressure too frequently. If the weather is cold, wipe the calf dry with a gunny sack, which will also increase circulation.



A clean, well lighted, warmly bedded box stall has been provided for this cow and her newly born calf.

Disinfect the navel with tincture of iodine. Be sure the iodine is fresh. A wide-mouthed bottle containing the iodine solution can be placed against the navel.

If necessary, help the calf nurse its mother soon after birth. It is essential that the calf receive the colostrum milk, which is high in vitamin A, protein and minerals. Colostrum also contains antibodies, which increase the calf's resistance to infection and scours. Calves should remain with their mothers about three days. After this period, they should be placed in separate pens where they cannot be seen by the cow. There are different methods of feeding calves, and each method will be discussed separately.

Raising calves with nurse cows. Calves can be successfully raised with nurse cows, and occasionally there may be a reason for raising calves this way. When nurse cows are used, the hard milkers or low testers should be selected for this purpose. Do not use nurse cows which produce abnormal milk because of mastitis, and do not use cows that have unhealthy udders. Many times cows produce enough milk for two or more calves. Although raising calves with nurse cows is costly, it may save labor, make sleek calves for veal, and might be the best way for a purebred breeder to raise a very valuable calf.

Raising calves with whole milk and skim milk. A common method of raising calves is to feed whole milk for two to three weeks, and then gradually shift to skim milk, which is fed until the calves are about five months old. Skim milk contains all the nutrients of whole milk, except the butterfat and vitamin A; therefore, it should be fed in no larger quantities than whole milk. In feeding whole and skim milk, a good rule to follow is to feed 1 pound of milk daily for every 10 pounds weight of calf.

For best results, a few simple rules should be followed.

1. Feed fresh, clean milk. The whole milk can be from the lower-testing cows. Do not feed milk from cows with mastitis.
2. Feed milk at regular intervals. Large, strong calves should be fed twice a day, and small or weak calves, three times a day.
3. Feed milk with a uniform temperature of about 100° F.
4. Accurately weigh or measure the amount of milk fed.
5. Feed from clean buckets. If nipple pails are used, be sure they are thoroughly cleaned.
6. Reduce the amount of milk if scouring is observed.

Below is a table which shows a good milk feeding plan.

MILK FEEDING BY WEEKS

Breed of calf	1st and 2nd weeks	3rd week	4th week	5th week	6th week	7th week and after
	Whole milk daily	Whole milk daily	Whole and skim milk daily	Skim milk daily	Skim milk daily	Skim milk daily
Guernsey	6	8	10	12	14	16
Jersey	6	8	10	12	14	16
Ayrshire	8	10	12	14	16	18
Brown Swiss	10	12	14	16	18	20
Holstein	10	12	14	16	18	20

A gallon of milk weighs 8.6 pounds.

Dried skim milk can be mixed with warm water (using 1 pound to each 9 pounds water) and substituted for liquid skim milk. Dried skim milk is difficult to mix with warm water; however, it can be fed dry as part of the grain mixture.

Raising calves with limited milk. When whole milk is marketed, the raising of calves is more complicated than when a nurse cow is used or skim milk is available. Skim milk replacements may be commercial or homemade mixtures. Commercial mixtures should be high in digestible protein and low in fiber. Some of the commercial calf feeds contain protein from animal sources like blood meal, skim milk

powder, or dried buttermilk and fish meal; others supply all the protein from plant sources like linseed oil meal, soybean oil meals, and peanut meal. The proteins from an animal source are generally more costly than the ones from plant sources. Dried skim milk is considered a necessary ingredient for good results in young calves. Commercial skim milk replacements give satisfactory results and the lower-priced feeds are about as good as the higher-priced replacements. Commercial calf feeds are sold as meals or pellets. Pelletizing a feed does not increase the food value, but will supply the ingredients more uniformly. Pelleted feed may be more palatable because of the size and shape. Generally, the meals are fed mixed with warm water.

Commercial calf feeds should be palatable, and it is well to have a dependable supply. Some commercial calf feeds are complete feeds, while others need to be supplemented with home-grown grains. The latter are the most economical to feed. The manufacturer's directions should be followed in feeding commercial calf feeds.

After calves have been fed whole milk for two to three weeks, they can be shifted to one of the home-prepared milk replacements listed below.

No. 1

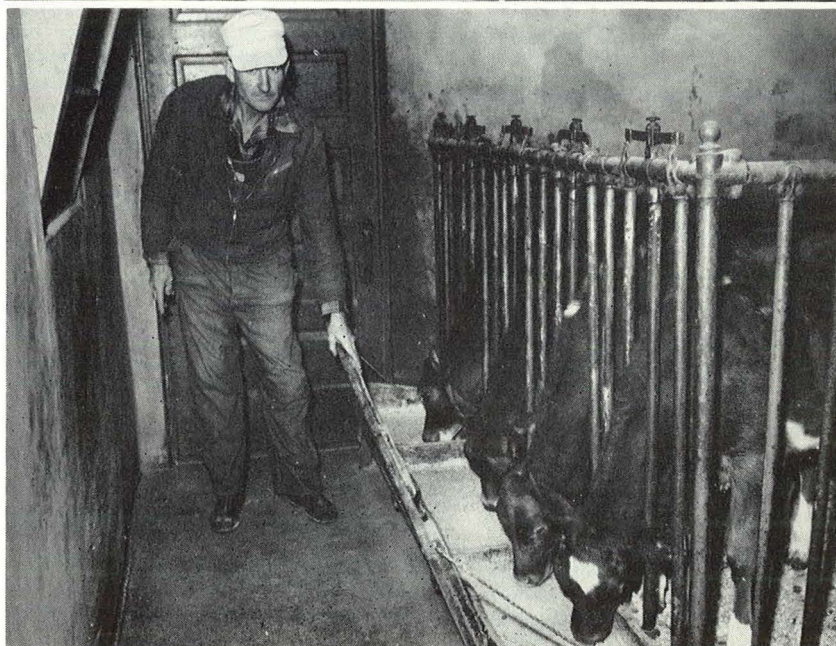
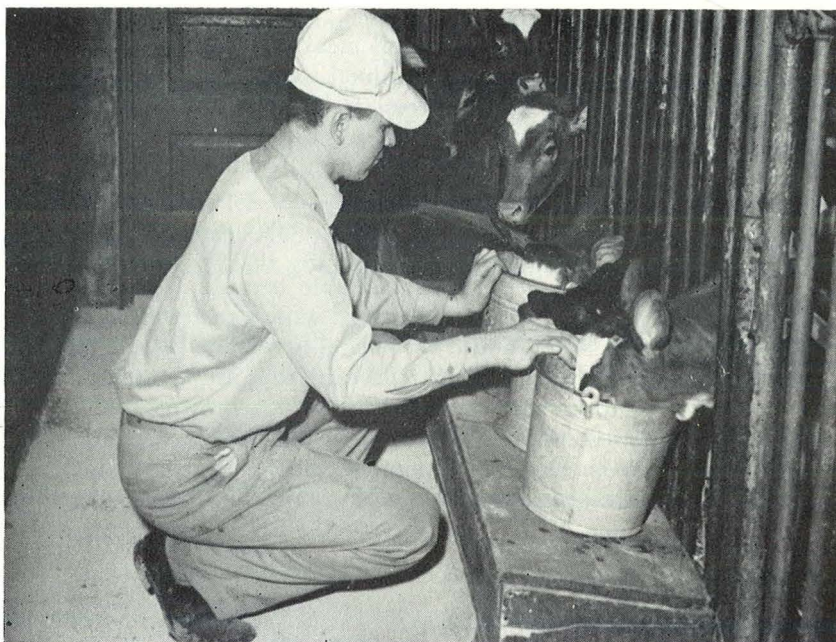
	<i>Pounds</i>
Yellow corn	30
Ground or rolled oats	30
Wheat bran	10
Linseed oil meal	10
Dried skim milk	20
Total	100

No. 2

	<i>Pounds</i>
Ground yellow corn	100
Ground oats	150
Wheat bran	50
Linseed oil meal	50
Dry skim milk	50
Steamed bone meal	4
Salt	4
Total	408

No. 3

	<i>Pounds</i>
Ground yellow corn	150
Ground oats	150
Wheat bran	100
Soybean meal	100
Dried skim milk	60
Steamed bone meal	5
Salt	5
Total	570



(Above) Calves drinking milk from clean pails. Pails are set on top of grain feeding box.

(Below) After milk is fed, hinged lid is raised and calves eat grain while locked in individual stanchions.

There are other formulas for home-mixed calf feeds, but these three are practical for Nebraska conditions. In using them, be sure they are well mixed. Feed whole milk for two weeks, then start calves on the milk replacements and discontinue milk after three weeks. Another successful plan, although more costly, is to continue feeding 3 to 4 pounds whole milk daily with the milk replacement until calves are about three months old.

After they are four months old, thrifty calves should live and grow normally on a simple grain ration, hay and water.

Raising calves with skim milk and grain. Calves have been successfully grown without any whole milk. In this method of feeding, calves receive the colostrum milk for the first three days and then skim milk until they are 30 to 60 days old. To the skim milk should be added daily 2 to 4 teaspoons of cod-liver oil to replace the vitamins removed with butterfat. One pound of skim milk is fed for every 10 pounds liveweight of the calf. In addition to the skim milk, one of the grain mixtures below should be used.

<i>Mixture 1</i>		<i>Mixture 2</i>	
Ground yellow corn	2 parts	Ground yellow corn	3 parts
Wheat bran	2 parts	Wheat bran	2 parts
Linseed oil meal	1 part	Linseed oil meal	2½ parts
		Soybean oil meal	2½ parts

To the mixture should be added 1 per cent salt and 1 per cent steamed bone meal. Calves should be encouraged to eat the maximum of one of these grain mixtures and continued on the grain ration until they are four months old. After that, a regular grain ration can be fed.

Sometimes calves about two weeks old can be encouraged to eat more grain by mixing the grain in the milk. All utensils and feed boxes should be kept absolutely clean.

Feeding grain. Different methods of feeding calves have been discussed. Your supply of whole milk, skim milk or milk replacements will help determine the method followed. In addition to the milk or replacements for milk, other feeds need to be supplied. The following discussion on feeding grain and hay pertains to the use of these feeds as they supplement the basic milk or milk replacement feeding program.

Encourage calves to eat grain just as soon as possible. If small quantities are rubbed on the calves' noses right after they drink milk, they will soon eat grain regularly. Coarsely ground grains are better than unground grains or grains ground too finely. A mixture of home-grown grains like corn and oats or barley and oats is palatable and nutritious. Some suggested grain rations follow.

No. 1

1 part cracked corn
1 part whole oats

No. 2

2 parts cracked corn
1 part ground oats
1 part wheat bran

No. 3

4 parts cracked corn
2 parts ground oats
2 parts wheat bran
1 part soybean oil meal

Grain ration No. 3 is the best one of the above group, but is also the most costly. It is better to feed enough of a simple grain ration like No. 1 than be limited in the feeding of grain because it is too costly.

Calves two or three weeks old will eat only small quantities but by the time they are six months old they should have 3 to 4 pounds daily. As they grow and develop, calves will eat more than 4 pounds of grain daily if it is provided; however, it is questionable whether calves or heifers should ever receive more than 5 to 6 pounds grain daily. The grain ration should be kept palatable. Unfavorable flavors caused by musty or moldy grain must not be allowed to develop. Feed boxes need to be kept clean, and moist grain should not be allowed to accumulate, as it is likely to turn sour.

Calves should be fed grain individually in stanchions, or they should be tied while eating. If calves are not fed grain individually, they do not receive their proportionate share.

Feeding roughages. Feed the calf hay as early as possible. The hay should be of excellent quality, fine, clean, leafy and bright green. Alfalfa and clover hay are excellent, but they are more laxative than prairie or brome grass hay. Calves prefer the alfalfa hay because it is palatable, and generally they will select it from other hay with which it might be mixed. Sometimes calves will eat good hay in preference to grain, so at times there may be a need for limiting the amount of hay fed. Feed fresh hay in racks rather than on the floor or ground.

Silage can be fed to calves after they are four months old. Feed 2 to 3 pounds daily, and increase to 4 to 6 pounds when the calf is about six months old. The silage should be of high quality, and not moldy. Corn and cane fodders are poor roughages for calves.

Pasture is an excellent feed, but is bulky. Because of their limited digestive capacity, calves need more concentrated feeds until they are about four months old. If calves are turned on pastures, it should be for limited periods and their greatest benefit will come from exercise and sunshine. They can receive these same benefits in the dry lot. Calves born in the spring or summer should not be pastured until the following year. When calves are on pasture, they should have fresh, clean water, shade, and shelter.

To increase the consumption of roughages, which help calves develop better middles, cuds can be transferred from cows to calves. Cuds need to be transferred to calves weekly for the first six weeks of their lives. Transferring cuds is an art accomplished by experience. In feeding calves it is essential that good judgment be used in all feeding practices. There is danger in overfeeding as well as underfeeding. Because the digestive system undergoes change during the early months of a calf's life, it is important that the calf be encouraged to eat roughages, but at the same time he should not be underfed concentrates. The feed capacity of a calf is limited, so one feed should not be overfed to the detriment of another feed.

Use of antibiotics. Within the last few years antibiotics have become very important in human medicine. It was natural therefore that the antibiotics be considered from the standpoint of animal health. Of all the antibiotics, aureomycin and terramycin have received the most attention in calf raising. These antibiotics stimulate faster growth in calves until the animals are about three months old; and they reduce the incidence of scours. Many commercial feeds contain antibiotics. When calves are raised without commercial feeds, aureomycin or terramycin can probably best be used in the treatment of scours. Antibiotic preparations are on the market which can be used for this purpose.

Minerals. Mineral supplements, other than salt, are seldom necessary if the calf is fed a ration containing proper amounts of milk or milk replacements, concentrates and roughages.

Salt should be provided in a box in the calf stall. Flaked or granulated salt is preferable to block salt. Bulk salt containing trace minerals may furnish some insurance against lack of trace minerals. Steamed bone meal is an excellent source of calcium and phosphorus and 1 per cent should be placed in the grain ration. In addition, steamed bone meal and salt should be placed in separate compartments in a divided salt box in the feed yard where it is protected from wind and rain. An arrangement such as this should provide ample amounts of salt, calcium and phosphorus.

Vitamins. The young calf rarely requires supplemental vitamins except vitamins A and D. Deficiencies of these vitamins are more likely to occur during winter and spring than during summer and fall.

The best natural source of vitamin A, or carotene, for young calves is colostrum. Colostrum and milk are higher in vitamin A and carotene when cows have access to good pasture or high-quality hay. As the calves grow older, green, leafy roughages are an excellent source of carotene.

The symptoms of vitamin A deficiency include nasal discharge, watery eyes, scours, poor growth and general unthriftiness.

If the natural source of vitamin A is poor, additional amounts must be added to the rations. The most common form in which vitamin A can be purchased commercially is fish-liver oil concentrate. This can be fed either in capsules or with a teaspoon. The amount to feed will depend upon the concentration of vitamin A in the oil. Calves should receive about 15,000 International Units (or USP units) of vitamin A daily for the first month. After this, they usually are eating enough roughage to supply sufficient vitamin A.

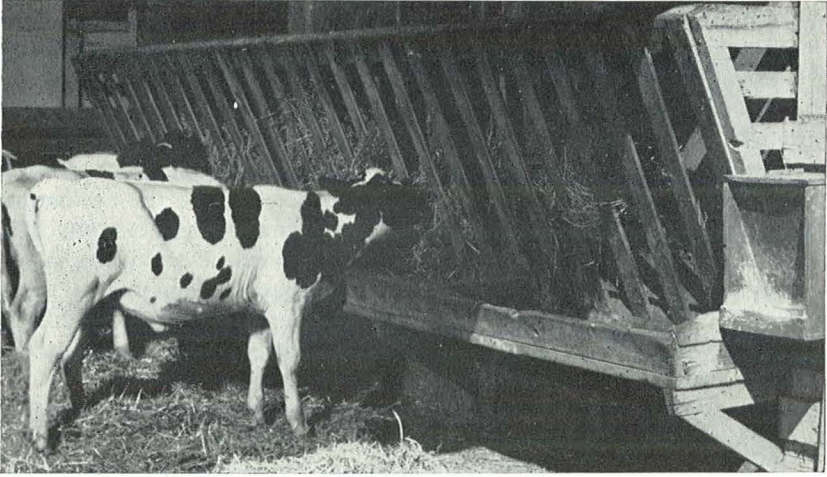
Symptoms of vitamin D deficiency include swelling and stiffness of the joints, bending of the forelegs, and humped back. Vitamin D requirements usually can be met by exposing the calves to sunlight for a short period each day. Good quality sun-cured hay contains vitamin D. During adverse winter weather it may be necessary to feed additional vitamin D. Commercial sources of vitamin D are fish-liver oils and irradiated products. Supplement rations during winter with about 300 International Units (or USP units) of vitamin D per 100 pounds body weight daily.

Water. Water can be given to calves of any age. However, when liberal quantities of whole or separated milk are fed, there seems to be little advantage in watering before the calves reach six weeks of age except during extremely warm weather.

Sanitation. Many calves die before they have an opportunity to get a satisfactory start. During the first months of a calf's life, pens and feeding utensils should be kept clean. Pens need to be cleaned regularly and fresh bedding should be added. They should be kept dry. Pails in which milk is fed should be thoroughly washed after each feeding. Grain boxes or containers should be cleansed at regular intervals, and grain should not be permitted to become wet, sour, or moldy.

Feeding space. Sometimes calves do not receive enough to eat because too little feeding space is provided. Calves should be locked into individual stanchions for feeding milk and grain. Individual stanchions make it possible for each calf to receive its fair share of the milk and grain. Wooden stanchions which can be knocked down and moved and used inside or outside are very handy and practical. Hay is generally fed in racks and ample space is needed so the most timid calf can eat at all times without being molested.

Housing for calves. On most Nebraska farms the place where calves are housed will need to be part of the other dairy buildings. There should be provided one or two calving stalls, or maternity pens, a small pen where calves can be kept individually or in small groups (three or four calves), and a larger pen where calves can be kept together until they are about seven months old. The calf pen, like



Heifers in open shed with hay rack, silage and grain manger, and mineral box.

the maternity stall, should be thoroughly scrubbed and disinfected before the calf is admitted. All of the loose straw or bedding should be removed before the scrubbing begins. A good cleaning solution can be made by dissolving 1 pound of lye in 5 gallons of boiling water. A thorough scrubbing with this solution will usually destroy most of the disease-producing bacteria. Afterward calves can be run outdoors provided they are protected from severe weather by means of an open shed. Bull calves should be kept separate from heifers after they are three to four months old. It is important not to overcrowd calves. A number of calves varying a great deal in size should not be placed together in a small pen. Calves should be kept in pens free of drafts and with dry bedding.

As soon as a calf is weaned, it should be placed in an individual pen (4 x 6 feet) or in a pen with two or three other small calves. The sides of the pen should be 30 to 36 inches high and solid to prevent drafts. In the pen should be a rack for hay. Water should also be provided.

Floors of calf pens should be constructed so they are easily cleaned. False floors can be used to raise the calf off the permanent floor and make it possible to keep the bedding dry. This type of floor can be made with wooden slats or heavy expanded metal lath.

After calves are two months old, they may be placed in a pen with other calves. Along one side of this pen should be calf stanchions so calves can be confined when milk and grain are being fed. A wooden feed trough with a hinged cover may be placed in front of the stanchions. Buckets of milk or milk replacements can be placed on the

lid of the trough and then at the completion of this feeding operation the lid raised so the calves can eat their grain.

If stanchions are not available so calves can be confined while they are eating their milk and grain, the calves should be tied. Short ropes with buckles on the ends which can be snapped into rings fastened around the calf's neck are very satisfactory. The ropes can be fastened to large rings placed on the sidewalls with staples. Calves should be prevented from sucking one another because the accumulation of hair balls in one of the four compartments of the stomach is detrimental and sucking is very harmful to udders. Restraining calves for 30 minutes after they are fed will help to prevent calves from sucking one another. Calves should not be permitted to eat bedding. If they develop this habit, they should be muzzled.

Pens with a southern exposure and yards which slope to the south are good places for calves to exercise and to receive sunlight. In the summer, calves will appreciate some shade in the yards.

Heifers six months old or older need protection from severe storms, but do not need to be confined in the barn. The open shed is a good place for heifers. While an open shed may be of any size or construction, an inside height of about 8 feet and a depth of not less than 24 feet is advised. Six-month-old heifers need 40 square feet of floor space, yearlings need 50 square feet, and two-year-olds need about 60 square feet. If possible, the floors of the sheds should be concreted. Feed racks and watering tanks placed in the yard will make it possible to keep the shed cleaner.

Identification. Some system or plan should be used for marking calves so they can be correctly identified. This is an absolute necessity for the purebred breeder and an advisable practice for the individual with a grade herd. Many herds cannot secure production proof on bulls or cow families because of lack of identification of the animals.

By properly marking calves and then recording the information in a good record book, the following information is made permanently available: (1) Date of birth, (2) Name and number of sire and dam, (3) Date of vaccination against diseases, (4) Date and method of disposal.

The calf should be marked for identification when small, as that is when the most information is known and calves are easier to handle. This is a job easily delayed, and as a result information is forgotten or lost. It is best to plan a definite system so that the information about a calf has a meaning. For example, all calves born in 1953 can be given a name starting with A, all calves born in 1954 a name starting with B. The most common method of numbering is to start with number one for the oldest cow and then number the herd consecutively from the oldest to the youngest. Then as each heifer calf

is born, it is given the next number. Numbers should not be repeated when cows with earlier numbers are removed from the herd.

Standard Dairy Herd Improvement Associations offers a system of ear-tagging all cattle in the herds of members.

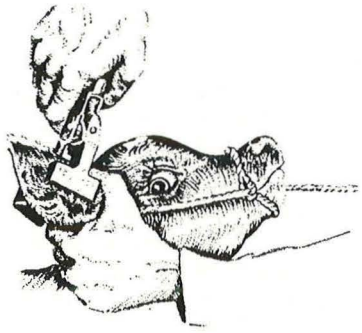
In registering calves, breed associations will furnish registration blanks or birth reporting certificates upon request.

Tattooing the ear of the calf of the solid-colored breeds such as Brown Swiss and Jersey will permanently identify the calf.

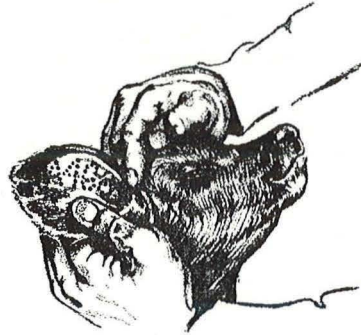
Photographing or sketching the color markings of the calf of the broken-colored breeds such as Holstein, Ayrshire, and Guernsey will furnish information that will permanently identify the calf.

Eartagging calves when they are young will provide identification. Record the ear tag number together with the names of the sire and dam and date of birth in a permanent record book.

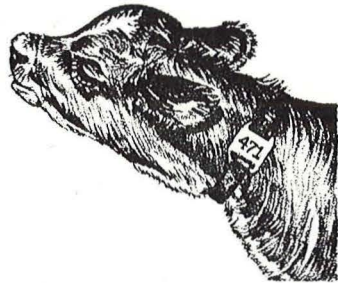
A leather neck strap, or a chain neck strap with a number can be used until tattoo marks, ear tags, photos, or sketches are made for permanent identification.



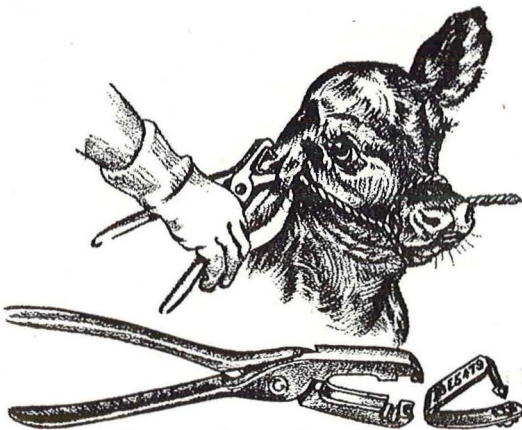
Tattooing inside the ear.



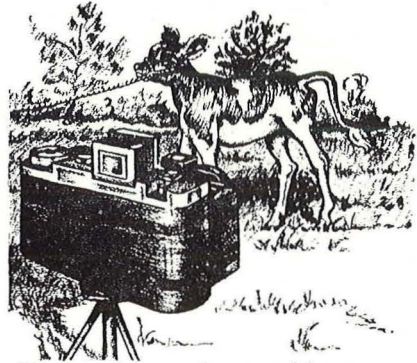
Results of tattooing.



Neck strap with herd number.



Ear-tagging and equipment.

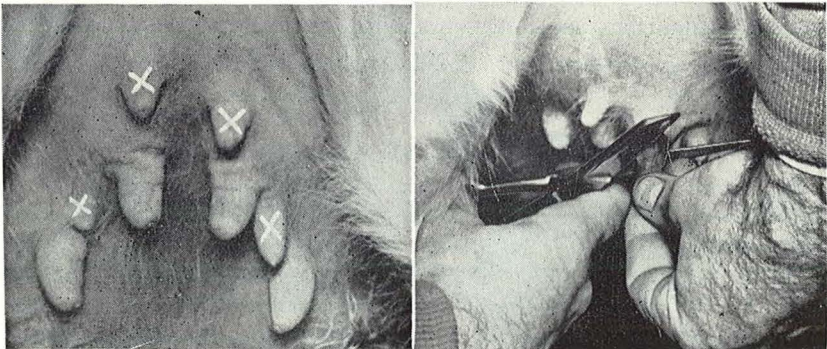


Photos show color markings.

Preventing horns. Horns should be prevented from developing on calves. However, if horns are allowed to develop and grow, they should be removed from the older heifers or cows. It is best to apply caustic, a dehorning paste or fluid, when calves are ten days to two weeks old. Many times the dehorning of calves is unsatisfactory because the chemicals are not applied early enough. To apply the pastes, clip the hair from the skin over and around the developing horn. The 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 surrounding skin. A dehorning liquid is applied in the same way as pastes except that the liquid is daubed on the developing horn by means of a rubber stopper.

Different kinds of metal dehorners can be used on older calves. These are used to scoop the horn from the poll and are slightly more severe than other dehorning methods. Bell-shaped irons heated by electricity, over a fire, or by blow torch and placed over the developing horn are also satisfactory for dehorning. The hot iron should be used when calves are about two weeks old. A careful job should be done in burning a uniform copper-colored ring around the base of the horn.

Removing extra teats. Heifer calves may have extra teats in addition to the four normal ones. Sometimes the extra teats are on the rear of the udder and at other times between two of the other four. The majority of extra teats will not be harmful, but occasionally they will fill with fluid as the animal matures. In other cases, they will interfere with milking when they grow large and are between the normal teats. They do detract from the animal's appearance. Extra teats should be removed when heifers are very young and small. You should inspect for extra teats before calves are three or four months old. Disinfect the extra teats and the surrounding area with iodine



"X" marks the extra teats on one calf's udder.

Do it early when the calf is four to six weeks old.

after thoroughly cleaning. They can then be snipped off close to the udder with a clean, sharp pair of scissors. Apply a disinfectant, like iodine, to the wound. Be sure extra teats and not normal ones are removed.

Veal calves. The profit from raising a calf for veal depends upon the price of veal, the value of milk and the birth weight of the calf. Each pound of gain in weight requires about 10 pounds of milk. Highest prices are obtained for veal at 150 to 200 pounds live weight. A 70-pound calf would need to gain 80 pounds to reach the minimum weight which ordinarily brings the best price. This gain would require about 800 pounds of milk. Thus the economy of veal production in any particular situation can be determined by considering the above factors.

Heifers six months to two years. The feeding and management of heifers after they are six months old and until they freshen is discussed in E. C. 631, "Management of the Dairy Herd." This bulletin is available at the offices of county agricultural agents. Stated briefly, heifers should receive, in addition to all the high-quality roughage they will eat, 3 to 5 pounds of a grain mixture daily until they are twelve months old. After that, heifers will grow normally if they are supplied with high-quality roughage. About four months before freshening they should again receive about 4 pounds of grain daily. A rack kept full of hay in the pasture will encourage heifers to eat more roughage. A simple grain ration which contains about 10 per cent digestible protein can be used for heifers. Prevent heifers from getting fat and be more interested in developing good growthy frames. A few weeks before freshening, place the heifers in the barn so they become accustomed to the milking routine.

Feeding and raising the young bull. The same methods of feeding, care and management outlined for dairy heifers apply to dairy bulls under six months of age. After six months bulls should be separated from open heifers to prevent unwanted matings. From six months on, bulls tend to grow more rapidly than heifers and need slightly more feed. If at all possible, young bulls should be kept in separate pens. See E. C. 631, "Management of the Dairy Herd," for more detailed information on the management of the dairy bull.

Common ailments of dairy calves. In the successful raising of calves, there is no substitute for good feeding practices and careful management. Every precaution possible should be taken to protect calves against disease. Healthy calves should not be exposed to sickly calves, and approved vaccination practices should be followed to immunize calves against certain diseases. To be of maximum help, veterinary services should be employed before disease conditions are

too far advanced. In the discussion which follows, some general information is given about common calf ailments. The discovery and development of new drugs will aid in the treatment of disease, but the use of good feeding and management practices will continue to be important in preventing diseases.

Just before and after a calf's birth some very distinct changes take place. Before birth the calf receives nutrients from the mother's blood supply. Then immediately after birth, the calf's digestive system needs to function and supply the required nutrients.

Fundamentally there is a great difference between the digestive system of a calf and that of a mature animal. The rumen or paunch of the animal develops slowly, so at first the calf needs concentrated feeds. The rumen is fully developed when the animal is about one year old. As the calf has no power for regurgitation, too much of certain feeds in the rumen may decompose, causing digestive disturbances. This is why small calves are more easily overfed than older animals.

The general information that follows may be of some help in preventing certain common calf ailments.

Blackleg generally does not affect calves under four months old. To safeguard against the disease, calves should be vaccinated. Calves vaccinated when they are about six months old should not need a second vaccination; however, if they are vaccinated younger, a second vaccination at about 12 months of age is advisable.

Coccidiosis affects calves of different ages. It is caused by coccidia, which are parasites that get into the animal's body in food and water. Symptoms of the infection are bloody diarrhea, loss of weight, drooping ears, dullness and loss of appetite. Coccidiosis is easily confused with other diseases; therefore, to be cured without harmful effects, it should be diagnosed and treated at a very early stage. Calves with the disease should be kept by themselves, and manure and contaminated bedding removed daily from their pens.

Hair balls. Calves that lick themselves or suck each other swallow quantities of hair. This mats together, and as the stomach works normally this mat of hair is worked into a ball along with plant fibers. Hair balls are more common in calves that have been kept on milk too long and not given enough grain and hay. The hair and fiber balls get larger until they completely block the outlet of the stomach. This causes colic and eventually death.

Lice. Calves are annoyed by lice. If many lice are present they will prevent proper growth. Generally they are present in large numbers before being noticed. Lice cause the hair to look dull and lifeless. Because lousy calves rub against the fence and mangers, their

hair is soon removed. Lice are generally found over the shoulders, on the neck, around the ears, along the back, and around the tailhead. Lice will do most damage when the calf's hair is long in the winter. Rotenone and DDT can be used to control lice. Apply rotenone (1 per cent) as a powder to every part of the animal where the lice may gather. Repeat this treatment in 16 to 20 days.

Use DDT as a spray or dip. As a dip, mix 4 pounds of 50 per cent wettable DDT powder with each 100 gallons of water. The calf should be wet thoroughly. It is best to use the dip or spray when the day is warm and the sun is shining. If the weather is cold or damp, see that the calf is exercised afterward. October is the best month for treatment.

Pneumonia is an inflammation of the lungs. It generally strikes calves that are between three and eight weeks old. A calf that is exposed to wet, cold weather or lives in a damp, poorly ventilated pen or stall with wet bedding may become sick with pneumonia. A calf that is weakened with scours will more easily contract the disease. Symptoms are dullness, lack of appetite, high fever, rapid breathing, roughened coat, and coughing. The animal distends its nostrils and may stand with forefeet apart, or rest on its brisket when lying down. It does these things to ease difficult breathing. Sick calves should be placed in dry, well-bedded pens away from other animals. The pens should be free from drafts and should be warm. Sick calves should be blanketed to keep them warm. Palatable foods in small amounts should be given often. Early diagnosis and treatment by a veterinarian is important.

Poisoning. Prevent calves from licking newly painted fences or buildings. Do not permit calves to drink or eat from paint buckets after the paint has been removed. There is danger that they will be poisoned from lead in the paint. Keep calves away from poisons put out for rats, gophers, or other pests. Do not scatter nails, staples, or short pieces of wire where calves will pick them up with their feed.

Ringworm is a fungous 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 sulphur ointment. Do this once a day for several days. To prevent the disease from spreading, keep the animal with ringworm separated from the others and thoroughly disinfect the stalls or pens.

Screw worms are the larvae of a certain kind of blowfly. They are found mostly in the southern states, but some years they are present

in Nebraska from late in the spring until a killing frost in the fall. The larva or maggot does its damage in wounds, but for calves born during the summer months there is great danger of infecting calves through the navel. Smears are available for treating screw worms.

Scours from indigestion are a common ailment of young calves. A calf with scours becomes dull and listless and loses its appetite. The droppings are thin and foul smelling. Before scouring starts, the calf may be constipated. This condition of indigestion may be due to feeding too much milk, feeding at irregular temperatures, milk too rich in butterfat, sour or dirty milk, sudden changes in amounts or kinds of feed, dirty feeding utensils, or cold, damp, unhealthful quarters.

With the first sign of scours, try to find the cause and correct the condition. Isolate infected calves. Reduce the milk being fed by one-half and correct any faults in regularity, in temperature of milk and in sanitation.

Many homemade remedies have been used with varying degrees of success. Giving calves 1 or 2 ounces of castor oil in $\frac{1}{2}$ pint of warm milk is a good remedy. In recent years, the most effective treatment for scours has been to use sulfa drugs or antibiotics.

White scours are indicated by diarrhea with light-colored watery feces. Calves appear dull and exhausted, and their eyes are sunken. If white scours last more than a week, pneumonia usually develops. Calves over two or three weeks of age usually do not contract this disease. White scours are difficult to cure, and prevention is the best remedy. Affected calves should be isolated and a veterinarian consulted. A thorough job of cleaning and disinfecting is necessary after white scours have been on a farm.

Warts on calves are common, and respond rather slowly to treatment. Although they sometimes disappear without treatment, early treatment will be found advantageous. For small warts which are closely attached to the body, soak daily with castor or olive oil. For longer ones attached by a small base, wrap a small, narrow rubber band or strong cord tightly around the base close to the skin. The use of a vaccine in treating warts has proved helpful in some cases.

Vaccination for brucellosis. An important factor to consider in deciding whether to vaccinate heifer calves for brucellosis is whether or not there is danger of infecting calves on the farm. If brucellosis has never been present on the farm and heifers are going to be maintained with little possibility of outside infection, then it may not be advisable to immunize. If there is danger of infection from the home farm or from adjoining farms, then vaccination with Strain 19, when heifers are four to eight months old, is advisable.