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FEEDING MANAGING AND HOUSING DAIRY CALVES

ABOUT ONE OUT OF EVERY FOUR DAIRY animals in a milking herd must be replaced each year with a young homegrown heifer or a purchased cow if the herd is to be kept at the same size. When a good job of calf raising is done it is usually more economical to raise the needed replacements than to purchase them. This circular contains ideas, suggestions, and recommendations obtained from research results, successful calf raisers, and other sources for the feeding, housing, and general management of dairy heifers that will be used as herd replacements.

The ability of a dairy animal to respond to good feeding and management is inherited from its sire and dam. It is obvious that your future success in the dairy business depends upon the care with which you select bulls to mate to females in your herd and the level of management practiced in caring for the young stock and the milking herd.

Feeding and Care of the Cow Before Calving

Feeding for rapid growth and development begins before the calf is born. Well-fed, healthy cows usually have strong, vigorous calves. In general if you feed a cow for good milk production during the lactation, she will receive adequate feed nutrients to produce a normal calf.

Give the dry cow all of the good-quality roughage she will eat. Dry hay, haylage, grass-legume silage, corn silage, or sorghum silage are all excellent feeds for cows just before calving, but they should also get some grain. Starting about two to three weeks before the expected calving date, increase grain allowances so the cow receives 1 to 1½ pounds of grain for each 100 pounds of body weight per day. The grain mixture fed to the milking herd is also satisfactory for dry cows.

Several days before a cow is due to calve separate her from the rest of the herd. If you use a maternity stall, give it a thorough cleaning with a good disinfectant before putting the cow into it. Use plenty of bedding. Give her time to become familiar with the area before the expected calving date.

Feeding the Calf

Thoroughly wash the cow's teats and udder before the calf nurses. First use soap and water. Then sanitize the udder by washing it with a solution of about 200 p.p.m. (parts per million) chlorine or other appropriate sanitizer. This washing helps prevent introduction of scour-producing and other organisms into the calf.

Make sure the calf does nurse soon after birth (Fig. 2). The colostrum received is high in energy, protein, vitamins, and disease-resisting antibodies, including gamma globulins. Research has shown it also contains

Be Present at Calving Time

Observe the cow closely as calving time draws near. Signs of approaching calving are a pronounced swelling and enlargement of the vulva and a dropping away or sinking on either side of the tail setting. Don't disturb the cow after these signs are noticed.

If the cow is normal and healthy, she will probably give birth to her calf without assistance. On the other hand if birth is not progressing normally, the cow or calf may need immediate assistance to prevent the death of the calf. In some cases the services of a veterinarian may be needed.

After the calf is born see that it is breathing normally. Remove any mucus from its nostrils and mouth and provide artificial respiration if necessary. In cold weather dry the calf and keep it warm. You may need to use blankets or a heat lamp in extremely cold weather.

As soon after birth as possible cover the navel with iodine (Fig. 1). Repeat again the next day. This helps prevent "navel ill" and other serious infections.



Applying iodine to the navel cord of new-born calves reduces the risk of infection. (Fig. 1)

substances capable of protecting calves against virus pneumonia and some types of scours. The calf has a low storage capacity for disease-fighting vitamin A and must obtain it from the colostrum.

Colostrum received in the first 15 to 20 minutes after birth may be more effective in helping fight disease than that received after the first hour. Also small, frequent feedings are probably more effective than two large feedings a day. Feed adequate amounts of colostrum for three to five days after birth.

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Newborn calves need colostrum. Some calves may need help to nurse the first time. (Fig. 2)

If the calf is left with the cow continuously after it is about 24 hours old it may get too much milk. Let it nurse for only about 5 minutes four or five times a day or control intake by feeding its mother's milk from a pail.

The First Month

The first four weeks is a critical period in the life of a dairy calf. Young calves are very susceptible to digestive upsets, respiratory infections, scours, and other disturbances. You must use good care, clean equipment, and adequate housing during this period for successful results.

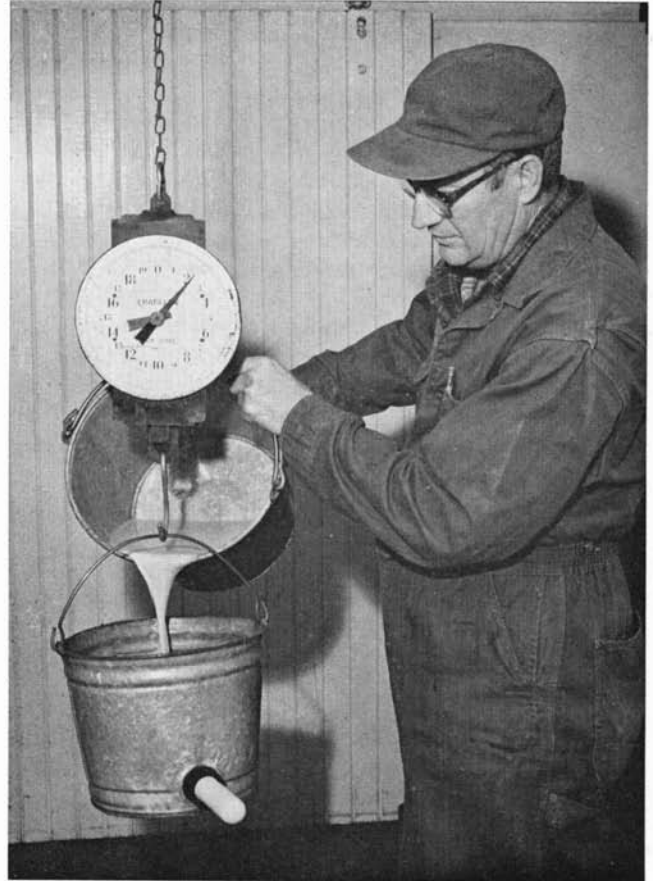
The digestive system of the calf changes rapidly during the first few months. The rumen is small at first and essentially non-functional. During this period milk or liquid milk replacer must be the primary source of nutrients. Not enough dry feeds are consumed during the first three weeks to supply much of the nutrient needs. But within a few weeks the rumen starts to function and it soon serves a major role in the digestive process. You can then include more roughage and other dry feeds in the diet.

Follow a carefully planned feeding schedule in the daily feeding operations. Drastic changes from the established schedule in the quantity of milk fed or marked changes in the composition of the feed may result in digestive disturbances. You can feed calves large amounts of milk or milk replacer for veal production by following the proper schedule. Similar amounts of milk offered to calves that have been on a limited milk schedule may cause digestive upsets.

It is a good plan therefore to weigh carefully or measure the amount of liquid feed offered at every feeding and to feed the calf at regular hours each day (Fig. 3). Maintaining the temperature of the milk as removed from the cow is not necessary. However, cold milk at 35 to 40° F. may cause calves to shiver and chill.

Table 1 shows the recommended whole milk feeding schedule for calves one to five weeks of age. This schedule has been used successfully in the University of Illinois dairy herd and by other good calf raisers. It allots milk to calves on the basis of birth weights and provides enough milk to equal about 8, 9, 10, 8, and 5 percent of the birth weight for the first, second, third, fourth, and fifth weeks respectively. The daily milk allowances are generally fed in two equal feedings.

This feeding schedule is based on calf birth weights. You can estimate calf weights with heart-girth tapes if scales are not available (Table 5). It is also possible to estimate calf size as small, average, or large and to use the schedule for feeding categories 2, 4, and 6 respectively. Producers who want more bloom or hair coat finish may use one feeding category heavier than recommended in Table 1. Calves should eat at least 1 to 1½ pounds of starter per day when milk is no longer fed.



To avoid overfeeding carefully weigh or measure the amount of milk or milk replacer fed. (Fig. 3)

Table 1. — Suggested Whole Milk Feeding Schedule

Feeding category	Birth weight (lb.)	Pounds of whole milk per day					Total milk (lb.)
		First week	Second week	Third week	Fourth week	Fifth week	
1.....	50-63	5	5½	6	5	4	178
2.....	64-73	5½	6	7	6	4	199
3.....	74-83	6	7	8	7	4	224
4.....	84-93	7	8	9	8	5	259
5.....	94-103	8	9	10	8	5	280
6.....	104-113	9	10	11	9	5	308
7.....	Above 113	10	11	12	10	5	336

Put Calves on Dry Feed as Soon as Possible

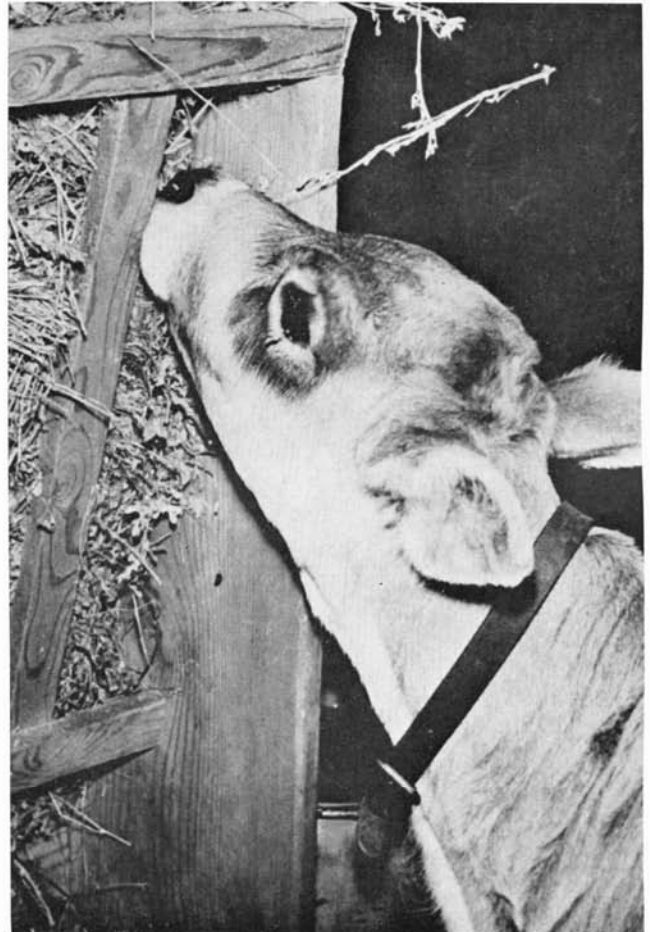
Since fewer digestive upsets, cases of diarrhea, and other problems are usually encountered when calves are on dry feed than when they are on a liquid diet, one of the important objectives of a successful calf-raising program should be to get the calves on dry feed at an early age. University of Illinois research shows that early weaning can reduce both labor and feed costs without sacrificing weight gains. However the dry feed must be highly nutritious and palatable, and should meet the requirements of the calf.

The best weaning age depends primarily on the age of the animal at the start of effective rumen fermentation. It has been shown experimentally that the feeding of a dry feed enhances early development of rumen fermentation by the establishment of protozoa and bacteria. Therefore the most important factor in a successful early weaning program is getting the calves to consume adequate amounts of dry starter and hay when milk feeding is stopped.

Young calves will eat a considerable amount of hay while on milk or milk replacer if you give them free access to fresh hay of good quality (Fig. 4). In addition to the hay give them up to 6 pounds per day of a palatable calf starter. A starter with about 75 percent total digestible nutrients (TDN) and 16 to 18 percent protein is recommended. The calf-starter mix listed in Table 2 has been used successfully when the calves were first offered the feed at 4 to 6 days of age.

Young calves can be fed up to 6 pounds of this mixture per day. Feed high-quality legume hay free choice from the first day they will nibble at it. Feeding more than 6 pounds of starter usually reduces the hay intake at a time when you should encourage the calf to consume roughage.

The molasses is recommended in the mixture in Table 2 to improve palatability and encourage early acceptance. Illinois studies show that the addition of molasses, dextrose, or sucrose at the rate of 8 percent boosted starter intake and increased weight gains. Table 3 shows that calves on the sweetened starters consumed 211 pounds while the controls (who were fed unsweetened starter) ate 182 pounds during a 12-week trial. The former group gained 1.46 pounds per day as compared with 1.33 pounds for the other group. The increased starter consumption and resulting increased daily weight gain were caused by the addition of the sweetener.



Encourage calves to start eating hay at a young age by keeping clean, fresh, high-quality hay before them at all times. (Fig. 4)

Table 2. — Calf-Starter Mixture

Corn.....	40.00 lb.
Oats.....	25.00 lb.
Soybean meal.....	23.00 lb.
Molasses ^a	8.00 lb.
Dicalcium phosphate.....	1.85 lb.
Trace-mineralized salt.....	1.00 lb.
Aurofac or similar antibiotic feed supplement ^b	1.00 lb.
Vitamins A and D supplement ^c15 lb.

^a If scouring occurs, reduce molasses to about 5 percent.
^b 1.8 grams of aureomycin per pound. (Not needed after calf reaches 12 weeks of age.)
^c 10,000 international units (I.U.) of Vitamin A and 1,250 I.U. of vitamin D per gram.

Table 3. — Sweetened vs. Unsweetened Calf Starters^a

	Control	Molasses	Dextrose	Sucrose
Number of calves.....	12	12	12	12
Birth weight of calves (lb.)..	85.6	86.8	87.8	86.7
Average daily weight gain to 12 weeks of age (lb.).....	1.33	1.47	1.43	1.47
Feed consumption:				
Whole milk (lb.).....	252	248	252	248
Calf starter (lb.).....	182	210	212	211
Hay (lb.).....	74	75	50	63

^a The control ration contained alfalfa leaf meal instead of a sweetener. In other respects the mixtures were essentially the same.

Milk Replacers

When prices of dry milk replacers are low enough, they can be used as a substitute for whole milk. High-quality milk replacers usually contain a large proportion of milk products such as dried skim milk, sweet dried whey, and dried buttermilk. The fat content should be about 10 percent.

If you decide to use a milk replacer, select one of high quality and follow the feeding directions of the manufacturer carefully. Be sure to mix the dry powder thoroughly with warm water before feeding and to give the calf about the same quantity at each feeding. Protect the replacer from spoilage in the bag.

Antibiotics

Most of the carefully controlled research work has shown that an antibiotic such as aureomycin included in the diet of young calves stimulates appetites and increases growth rates. Also, antibiotics may reduce the severity of scours. There is no advantage in routinely feeding aureomycin or any other antibiotic to calves after they reach about three months old.

Vitamin A

A calf is born with almost no vitamin A in its system. Colostrum furnishes the first supply of this important vitamin which is so necessary to the calf for growth, health, and resistance to infections. It is essential, therefore, that the calf get colostrum or milk from its mother for the first 3 or 4 days of life.

The amount of vitamin A in colostrum will usually meet the needs of the calf. However if the cow is receiving poor-quality roughage, the vitamin A content of her milk may be low. Also, when you put the calf on dry feed, providing enough vitamin A is essential.

Although high-quality green roughages are excellent sources of carotene that can be converted to vitamin A in the calf's body, young calves may not eat much roughage. For these reasons, a good vitamin A supplement is recommended for all calf starters. As the calves get older and start eating more roughage, adding a vitamin A supplement to the diet is of less importance.

Vitamin D

Vitamin D helps the calf use the calcium and phosphorus in its ration. If the calves do not receive enough

vitamin D in their diet, it may result in slow growth, unthriftiness, and rickets.

Sun-cured hay or haylage, silage, and direct sunlight are natural sources of this vitamin. When the calf eats as much as 1½ to 2 pounds of good sun-cured hay or an equivalent amount of dry matter from haylage or silage, the requirements for vitamin D are usually met. But younger calves must receive supplemental vitamin D in their diets. Most milk replacers and calf-starter mixtures contain a vitamin D supplement.

Other Vitamins

There is very little evidence that well-fed calves on an early weaning program need supplements to provide the other vitamins. Calves receive vitamin E from grains, protein supplements, and green feeds. The B vitamins are synthesized in the rumen. The feeding of multiple vitamin capsules is usually expensive and will not replace good feeding and management practices.

Salt

Salt is not present in common feeds and must be added to all dairy cattle rations. Feeds in some localities may also be low in iodine, cobalt, and other trace minerals. Including 1 pound of trace-mineralized salt in each 100 pounds of calf starter or grain mix will take care of possible deficiencies. In addition you can give calves free access to loose salt or salt blocks after they reach one month of age.

Calcium and Phosphorus

Calves need large amounts of calcium and phosphorus, and milk is a good source of both. When milk is removed from the diet, requirements for these minerals must be met. Calf starters should contain 1½ to 2 pounds of dicalcium phosphate per 100 pounds of mixture to adequately supplement the farm grains in the mixture. Older heifers should have free access to dicalcium phosphate or steamed bonemeal along with salt to supplement their high-roughage diets.

Five Weeks to Three Months of Age

If healthy calves are eating a good calf starter and have access to high-quality legume hay, you can take them off whole milk or milk replacer at about the end of the fifth week of age. Weak calves may need milk somewhat longer. Reducing the milk or replacer at the end of the fourth week as recommended in Table 1 encourages starter consumption and a smooth transition to dry feeding. However, abrupt weaning of vigorous calves is possible if starter intake is adequate at the time of weaning.

When you shift calves to dry feed, place them in pens that will hold about six to eight calves each (Fig. 5). All the calves in one pen should be about the same age. You can feed dry calf-starter mixture similar to the one in Table 2 to the group twice daily. High-quality legume hay and water should be available at all times.



Six to eight calves of about the same age and size can be kept in one pen after they are on dry feed. (Fig. 5)

The amount of starter needed by a calf depends on its condition and on the rate of growth desired. In general the objective of raising calves is rapid growth without getting the heifers too fat. Good roughage eaters may need less grain. Five pounds of calf starter or less per day will be enough for most calves under three months of age. But remember the dry calf-starter mixture is the main source of nutrients for most calves in this age group. Thus the composition of the concentrate mixture is very important.

Do not feed high-moisture silage to calves under three months of age. Such silage is too bulky to supply the feed nutrients that small calves need. Low-moisture silage is better, but feed it only in limited amounts and only when the calves have free access to high-quality dry hay as well. Also continue the feeding of dry feeds when you put calves under three months of age on pasture. Make sure a good supply of clean, fresh water is available to calves at all times. Heated water cups may be needed in cold-type housing.

Three to Twelve Months of Age

After calves reach three months of age a gradual shift can be made from the dry calf starter to the growing ration. By this time calves should be consuming con-



Calves four months of age or older should obtain a large part of their feed nutrients from roughage. (Fig. 6)

siderable amounts of good-quality roughage that can serve as the major source of nutrients (Fig. 6). Only simple, economical grain mixtures are needed to supplement the roughage.

Grain Mixture Depends on Roughage

Good-quality legume hay should form the basis of the ration, and heifers should have free access to hay, silage, or pasture. The kind and amount of grain mixture needed will depend on the kind and quality of roughage fed.

When good-quality legume roughage is fed free choice, a 12- to 13-percent protein grain mixture will be adequate. If the hay is only fair quality or if a considerable amount of corn silage is fed, a 15- to 16-percent protein grain mixture will be needed (see Table 4).

Table 4. — Grain Mixtures for Heifers Over Four Months of Age

	With good hay (12 to 13% protein)	With fair hay (15 to 16% protein)
	(lb.)	(lb.)
Ground corn.....	1,000	900
Oats or bran.....	200	200
Soybean meal.....	100	200
Dicalcium phosphate.....	15	15
Trace-mineralized salt.....	15	15

Feed heifers enough grain to keep them growing rapidly without getting them too fat. As a guide, feed about 1 pound of grain daily per 100 pounds of body weight to calves about four months of age. When older heifers start eating more and more roughage, you can reduce the amount of grain. The body condition of the heifers should determine the amount of grain to feed.

After heifers reach 9 to 10 months of age, they can make satisfactory growth on high-quality roughage alone. This is especially true if part of the roughage is good corn silage. If the roughage is of poor quality and lacks palatability, continue grain feeding until the heifers are 12 to 14 months of age.

The grain mixture for the milking herd can also be fed to growing heifers if the heifers receive the same roughage as the producing cows.

Urea

You can feed grain mixtures containing urea to calves after they start eating roughage and begin ruminating. Up to one-third of the protein equivalent in the grain mixture can come from urea after calves start eating at least 1 pound of hay or its equivalent per 100 pounds of body weight per day. Adding as much as 5 percent molasses to grain mixtures with urea will help improve palatability and increase consumption.

Pasture for Calves and Heifers

After calves reach the age of six months they can get most of the feed nutrients needed for rapid growth from

good pastures. You can put younger calves on pasture, but should feed them enough good, dry hay and grain to furnish the major portion of their nutrient requirements. Calves younger than six months usually cannot eat enough pasture forage to meet their needs.

A mixture of immature, rapidly growing legumes and grasses makes the best calf pasture. If it is practical to do so, rotating the calves between several small plots will give them access to fresh, palatable forage. Under such a management system, clip the mature pasture plants after the calves are removed.

Good spring and early summer pasture and sunshine will provide the protein and vitamins needed by calves over six months of age, but they may need extra energy. Supply this energy by feeding 2 to 4 pounds of ground corn per day. Supply the supplemental minerals needed by giving the heifers free access to either dicalcium phosphate or steamed bonemeal and trace-mineralized salt in a weather-protected mineral box.

Calf pastures should contain enough shade for calves or be located close to the barn or a separate shed so the calf can go inside to get protection from the sun on extremely hot days. A good supply of clean fresh water should be available to the calves at all times.

One Year to First Calving

The feeding of yearling heifers is relatively easy. If you give them free access to good-quality hay, haylage, silage, or pasture, most of their nutrient requirements will be met.

Corn silage is a good feed for dairy heifers and may be fed at a rate up to 15 to 20 pounds per day along with

hay fed free choice. Grass silage may also be used. It takes about 3 pounds of silage of average moisture content to replace 1 pound of hay.

If the roughage is of only average to poor quality, some grain may also be needed. Grain mixtures similar to those listed in Table 4 are satisfactory. Use the grain mix fed to the milking herd if the heifers are getting the same roughage. The amount of grain needed will vary with the quality and the quantity of roughage consumed. In general feed enough grain to keep the growing heifer in good body condition.

Feed Requirements Increase Near Calving

The nutrient requirements during pregnancy, plus those needed for the growth of the heifer during the last three or four months before calving, will call for heavier grain feeding. With average roughage as much as 8 pounds of grain per day may be needed to furnish the heifer's nutrient requirements during this period.

Much more grain will be needed just before calving. Feed at least 1 pound of grain per 100 pounds of body weight during the last two or three weeks before calving. This will help get the heifer conditioned to high grain consumption to help meet her high nutrient requirements immediately after calving.

Expected Rate of Growth of Calves and Heifers

A tape placed snugly around the body just back of the front legs and shoulders is a convenient way of estimating the weight of heifers and can be used to determine if they are growing at a normal rate. Table 5 shows the expected heart-girth measurements and estimated weights at monthly intervals.

Table 5. — Normal Heart-Girth Measurement and Weight of Calves and Heifers During the Growing Period^a

Age in months	Holstein		Ayrshire		Guernsey		Jersey	
	Inches	Pounds	Inches	Pounds	Inches	Pounds	Inches	Pounds
At birth.....	31	96	29½	72	29	66	24½	56
1.....	33½	118	32	98	31½	90	29½	72
2.....	37	161	35½	132	34½	122	32½	102
3.....	40¼	213	38¾	179	38	164	32¼	138
4.....	43½	272	42¾	236	41¼	217	38¼	181
5.....	47	335	45½	291	44¼	265	41½	228
6.....	50	396	48¼	340	47	304	44½	277
7.....	52½	455	51¼	408	49¾	362	47¼	325
8.....	54¾	508	53	447	51¾	410	49¾	369
9.....	57	559	55	485	53¾	448	51¾	409
10.....	58¾	609	57	526	55	486	53¼	446
11.....	60½	658	58	563	56¾	521	55	481
12.....	62½	714	59	583	58¼	549	56½	520
13.....	63¼	740	60¾	630	59¼	587	57½	540
14.....	64¼	774	62	666	60½	615	58½	565
15.....	65¼	805	63	703	61¾	640	59	585
16.....	66¼	841	64	731	62½	674	59¾	611
17.....	67¼	874	65¼	758	63½	696	60½	635
18.....	68½	912	66	781	65	727	61½	660
19.....	69¼	946	66½	813	65½	752	62½	687
20.....	70½	985	67½	841	66¼	780	63	712
21.....	71½	1,025	68½	885	67½	816	64	740

^a From USDA Farmers Bulletin No. 2176.

Breeding Age

Adequately fed heifers can be bred at 15 to 16 months of age. Holsteins should weigh about 800 pounds at this age. Ayrshires and Guernseys should weigh 650 to 700 pounds and Jerseys should be 575 to 600 pounds.

Housing for Calves and Heifers

The housing for young dairy calves must be designed to provide a clean, dry pen that is free of drafts. The arrangement should allow for efficient use of labor in caring for the calves. It can be a tight, fully insulated building equipped with an adequate forced-air ventilation system, or it can be an open, cold-type barn that is draft free. Do not use an uninsulated building with no mechanical ventilation that is closed up during cold weather. Such buildings produce extremely moist conditions. Keeping calves healthy and obtaining rapid growth are difficult in such quarters.

The housing for the dairy calf is neglected by many dairymen. Most dairy barns have insufficient space for the calves. If there is space, the pens are damp and generally make it hard to keep calves in good health.

Many times the calf barn is attached to the main dairy barn. When this is the case completely partition it from the dairy barn and ventilate it independently so the excessive moisture produced in the dairy barn isn't introduced into the calf barn.

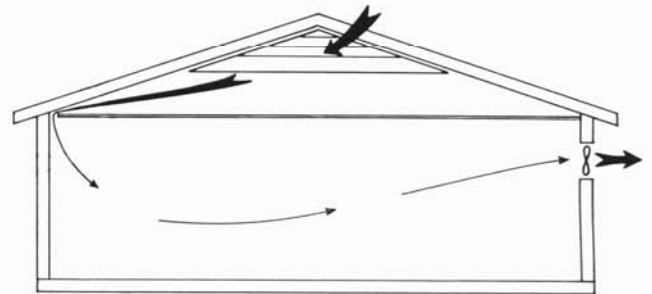
Many producers want to draw air from the dairy barn to the calf quarters so they can use the heat from the cows to heat the calf quarters. They don't realize that they are also bringing in much moisture with this warm air. Moving the warm, moist air from the dairy barn into unheated calf quarters can produce condensation and damp conditions. If the calf quarters are uninsulated, this moisture problem is greatly increased. A practical solution is to move the calves out of the dairy barn into a separate calf barn.

Warm, Closed Buildings

Good insulation and mechanical ventilation are needed to control the environment inside a warm, closed calf barn. Supplemental heat may be needed during cold weather to furnish enough heat for moisture removal. Properly designed buildings of this type make good calf barns and are being used successfully.

A closed building must have good insulation. Provide a minimum insulation value of 14 (3 inches of batt insulation or its equivalent) in the walls and ceiling. Protect the insulation with an adequate vapor barrier (4-mil plastic film) on the warm side of the wall just under the inside lining. The vapor barrier keeps the moisture produced inside the building from getting inside the wall where it would ruin the insulation and deteriorate the wall materials. Install a serviceable inside lining — one that is durable and easily cleaned.

It may be necessary to delay breeding heifers that are underfed until they reach the necessary size. This will add to the cost of raising the heifer and will delay the time when it will start making a return on the money that has been invested in rearing it.



A slot inlet provides good air distribution with minimum drafts. (Fig. 7)

Good fan ventilation is also essential to maintain calf health in a closed building. You must provide some ventilation even during cold weather. The calves give off moisture and need ventilation regardless of the outdoor temperatures. The ventilation system must be designed to provide uniform air distribution without drafts.

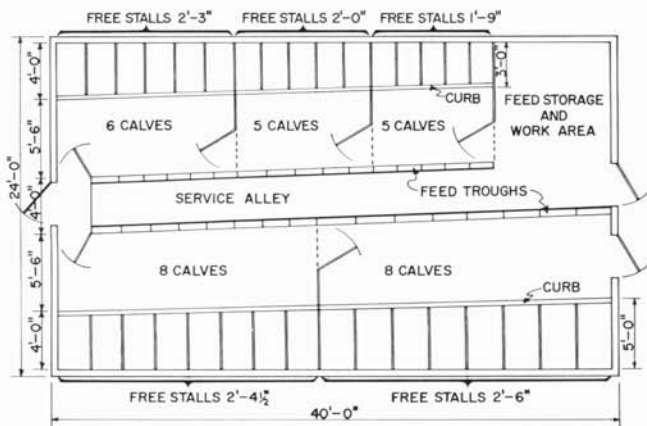
Use exhaust fans that provide 10 c.f.m. (cubic feet per minute) of ventilation per 100 pounds of calf. Have some means of providing less than the maximum ventilation during the coldest weather. Use one fan with two speeds or a motorized shutter or use two or more fans. Space air inlets so they will provide good air distribution without creating drafts. With exhaust fans in one side, a slot inlet in the ceiling along the opposite side will provide good air distribution with a minimum of drafts (Fig. 7).

Control the fans with thermostats or with a combination timer-thermostat. The timer-thermostat combination has the advantage of providing some air movement at all times, depending on the setting of the timer.

During cold weather you may need supplemental heat to maintain proper temperature while providing proper ventilation. The amount of heat required will depend on the amount of window area, how tight and well insulated the structure is, and the number and size of the calves. A good general recommendation is to provide a minimum of 1,000 Btu's per hour for each calf. You can easily provide heat with a space heater. Properly vent to the outside all space heaters that use oil or gas. Use a thermostat to maintain the necessary temperature in the building.

Free Stalls

Some Illinois producers have raised calves from 1 day old in free stalls. Figure 8 shows a suggested layout for



A suggested layout for using free stalls for calves is shown in this floor plan. (Fig. 8)

using free stalls for calves. Suggested free-stall sizes are: 2 feet by 4 feet up to 6 months of age; 3 feet by 5 feet from 6 months to a year; 3½ feet by 6 feet from 12 to 16 months; and 4 feet by 7 feet until the heifer calves. You may need to adjust stall sizes to fit your particular calves. The important thing is that the calves must not be able to turn around in their stalls. Do not leave the calves in the stalls too long so they outgrow the stalls and tear them up.

Free stalls can also be used for older calves. In open-front buildings, stalls adjacent to the open front should be protected with a solid wall four feet high or higher.

Slotted Floors

Slotted floors are practical in calf barns but put them only in tight, insulated, warm buildings. Drafts are a major problem if you use slotted floors in other types of houses. Use ¾-inch, 9-11 gage, flattened, expanded metal supported every foot, or use 3- to 4-inch-wide slats spaced ¾ inch apart. The slats could be made of wood (oak), metal, or concrete.

Cold, Open Buildings

A cold, open building is one in which some portion of the building is left open at all times for natural ventilation. The inside temperature is only slightly above the

outside temperature and fluctuates with it. Such buildings make good calf barns if they are designed to protect the calf from rain, snow, winds, and drafts. Young calves can stand low temperatures if they are protected from the elements and have a dry bed to lie on.

You can raise calves in open buildings in most of Illinois—even during extremely cold temperatures—if they are protected from direct drafts and have a clean, dry bed. Open-front buildings that have individual pens each with an outside run work well (Fig. 9). The open front should face south or east. *The other three sides must be tight to eliminate drafts.* Doors or curtains may be used to close a portion of the open front on windy days or when rain or snow could be blown into the building.

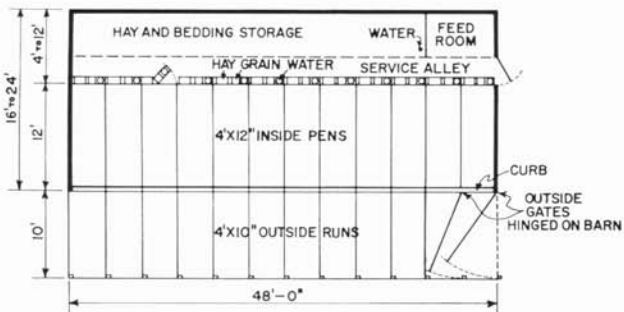
The cold building with pens is usually less expensive to build than the insulated, ventilated building. Chicken or hog houses sometimes can be converted into excellent cold-type calf barns. The south side can be cut out to provide ventilation. Usually a concrete platform is poured along the front of the building on which individual runs are constructed. Such an open calf barn is shown in Figure 10.



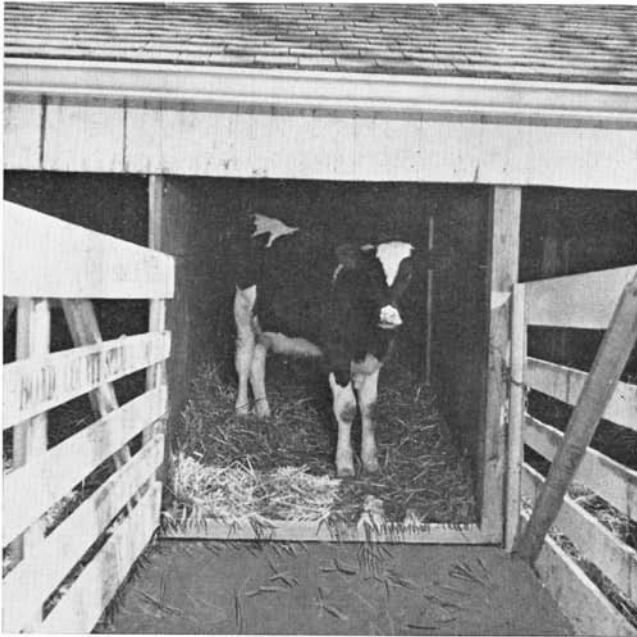
An existing building that has been converted to a good open-front calf barn. (Fig. 10)

Other major advantages of the open-front building are the time saved in cleaning pens and the dry, healthy conditions maintained inside the house. Good ventilation helps keep the bedding dry. An outside run helps keep the bedding clean because calves are not completely confined to the bedded area.

Use bedding inside the building and provide a curb (Fig. 11) to confine the bedding to the stall. Generally remove droppings every one to three weeks and add bedding as needed. Clean each pen completely when the

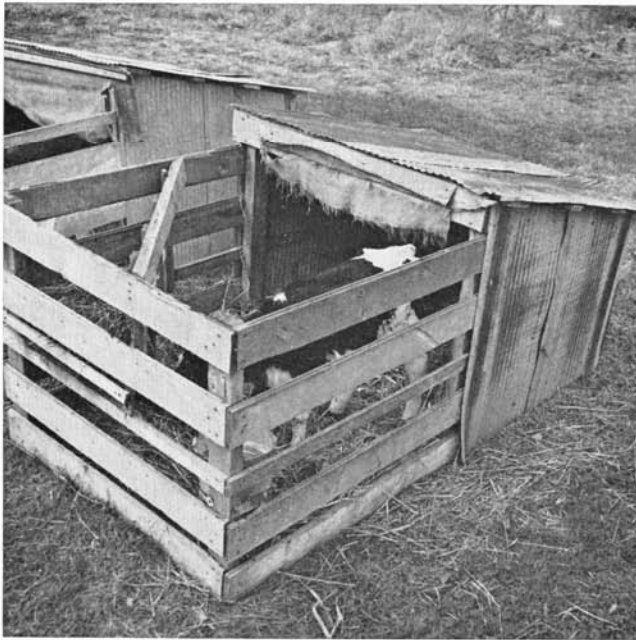


Floor-plan of open-front calf barn with individual pens, each having an outside run. (Fig. 9)



Solid partitions between stalls minimize drafts. Provide a curb to confine bedding to the stall. (Fig. 11)

calf is removed from the building. Clean the manure onto the concrete slab in front of the building. Swing the gate partition against the building to keep the calves inside. This makes it possible to scrape the slab and load the manure with a conventional tractor with blade and loader.



Individual calf cubical (4 feet by 4 feet) with outside run. Having no floor, the building can be moved to clean ground for a new calf. (Fig. 12)

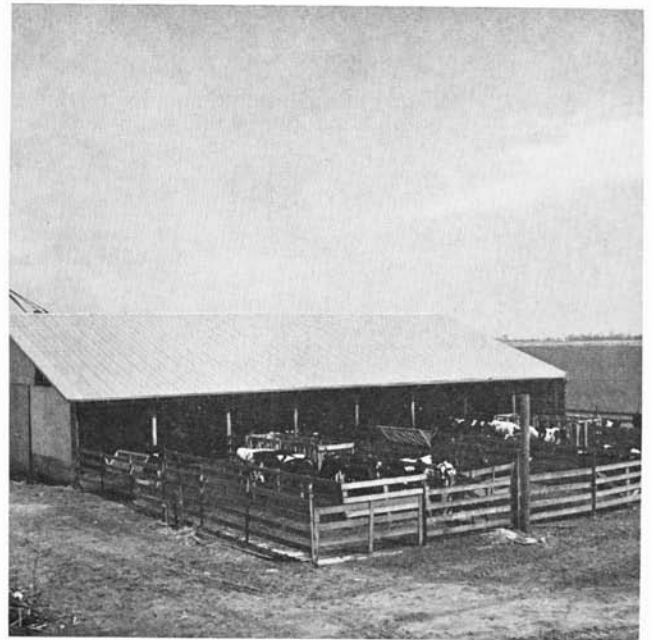
Individual Calf Houses

Small houses for one calf are used extensively in the western states and a few have been used in Illinois. They usually open to the south, have three tight walls, and a small open pen in front. Since they do not have floors, they are cleaned by moving them to a clean location. The main disadvantage of these houses is the amount of labor required to feed and water the calves twice daily. Figure 12 shows an individual calf house in use in Illinois. This particular unit is a 4- by 4-foot building with a 4- by 4-foot outside pen.

Housing for Older Heifers

Place heifers ranging in age from three to six months in the same building. They do not need individual pens, so group them by size and age in pens of six to eight calves each. Efficient use of labor in feeding and cleaning out the pens and adequate ventilation are important considerations in designing housing for calves of this age group.

The conventional open-front pole building with outside runs in front of the building works well for older heifers. Figure 13 shows such a unit for older calves. This particular building also has plenty of storage for hay and bedding. In this unit the pens for the smaller calves are 10 feet by 20 feet inside the building and the outside runs are 10 feet by 50 feet. Pens for the larger calves are 20 feet by 20 feet inside and the runs are 20 feet by 50 feet. There is room for about 10 calves in each pen.



An open-front pole building with outside runs where 8 to 10 heifers are grouped per pen is a good facility for older heifers. (Fig. 13)

Special Management Practices

Good management is the key to successful calf raising. In addition to proper feeding, providing the needed housing, and controlling diseases and parasites, you must give a few other items careful attention at the appropriate times.

Feeding Pails

Utensils in which you feed whole milk or milk replacer to calves must be cleaned thoroughly after each feeding (Fig. 14). First wash each bucket with a good cleansing solution and then with a sanitizing agent. Dried milk or milk replacer is a good place for bacteria to grow and multiply. Severe digestive upsets can result from such contamination of the feeding pails.

Either the nipple-pail or the open-type bucket are satisfactory for feeding milk or milk replacer. It may take less effort to teach a calf to nurse from a nipple pail than to drink from an open pail. Also a rapid consumption of milk from an open pail may at times cause digestive upsets.

To teach a calf to drink from an open pail, place your fingers in its mouth and after it starts to nurse, lower its head into a pail of warm milk or milk replacer. It may be necessary to repeat the process several times. A stubborn calf may need to be backed into a corner and restricted by standing astride its neck.



Thoroughly wash and sanitize feeding pails immediately after each feeding. (Fig. 14)



Calves on dry feed should have free access to clean, fresh water. (Fig. 15)

Calves Need Water

Keeping plenty of clean, fresh water before the calves at all times is especially important when the calves are put on dry feed early in life (Fig. 15). Heated water cups may be needed in cold-type housing.

Dehorning

Most dairy cattle have horns. But since these horns serve no useful purpose under today's management and since they can be a potential hazard, you should remove them when the calves are one to two weeks of age. At this time the horn buttons are very small, and a neat, clean job of dehorning is possible without much discomfort to the animal.

You can use dehorning liquids, pastes, or caustic potash sticks to remove horns from calves. Follow the instructions given on the label of dehorning liquids or pastes. When you use caustic sticks clip the hair from the horn button, and then moisten a caustic stick and rub it vigorously over the horn button. When you apply enough caustic the skin will soften so you can break it easily. To avoid the possibility of the caustic running down the face of the calf and into its eyes, place a ring of vaseline or grease around the entire horn following caustic application.

Electric dehorners are available in different sizes or with exchangeable tips of different sizes. To use it, place the hot iron over the horn button to burn the skin away. After some experience with the iron, you can dehorn a calf in about 1 minute. For best results with this method, the calf should not be over one month of age. Mechanical dehorners also do an adequate job in skilled hands.

Identification

To aid in the selection of heifer calves from the best cows, use some means of identifying every calf to be raised as a herd replacement. Color markings or photographs are probably the best ways to identify the broken-color breeds. Tattoo numbers, ear tags, or brands are best for solid-colored animals. You can use ear tags and brands on the broken-colored breeds as well.

Regardless of the system used, you must make a permanent record for each animal and must keep it up to date. Such records should include the identification number or sketch, the date of birth, and the sire and dam. Handy pocket-size books and other forms are available from most livestock supply houses.

Remove Extra Teats

Some of the small, extra teats on dairy heifers may later become a nuisance if they start secreting milk. They may also detract from the appearance of the udder.

The best time to remove these teats is when the calf is one to two months of age. But be careful to remove only the extra teats.

There is usually little or no bleeding and no severe shock to the young animal when you remove extra teats properly. First thoroughly wash and disinfect the area around the teat. Then stretch the teat slightly and cut it off with clean scissors or a sharp knife. Disinfect the cut teat with iodine or other appropriate antiseptic.

Protect Calves and Heifers From Flies

Flies can be very annoying to dairy animals of all ages and can cause reduced efficiency of gain in young calves and heifers.

A fly that is particularly disturbing to cattle is the adult form of the cattle grub. This fly attacks cattle during the summer months by laying eggs on leg hairs. This makes cattle run for the shelter of brush, trees, or

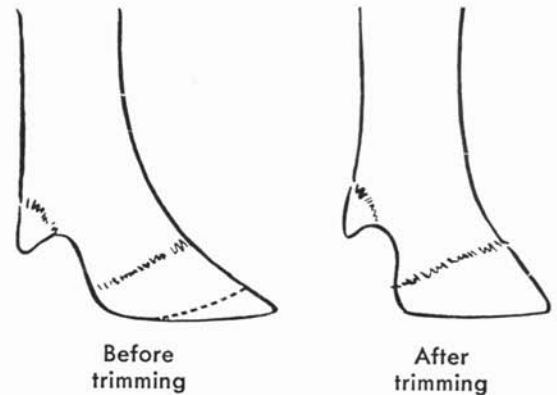
stalls. After the eggs hatch in early winter the small larvae of the grubs work their way through the skin and fleshy tissue. In later winter they emerge in the back area and can be detected as large bumps.

Regular spraying of the animals helps control these and other flies. Some sprays are safe to apply directly onto the animals. Others are designed to use only on and around stalls and shelters. Follow carefully the directions printed on the label.

Good sanitation practices also help control of flies. Don't allow manure to accumulate in the lots during the fly-breeding season.

Trim Hoofs

The feet of heifers kept in small pens or stalls may need trimming from time to time. The bottom of the feet may need to be shaped and the long toes cut back. A sharp knife, chisel, or hoof trimmer can be used. Be careful not to take off too much because this can make the feet sore. Figure 16 shows an overgrown hoof and one that is properly trimmed.



Hooves before trimming and after trimming. (Fig. 16)

Management Recommendations

1. Be sure the pregnant cow receives adequate nutrients to help her produce a strong, healthy calf.
2. Provide a clean, dry, disinfected maternity stall for the cow and her new calf.
3. After the calf is born, dry it immediately and keep it warm.
4. Disinfect the navel with iodine at birth and again the next day.
5. Wash the cow's udder before the calf nurses. Be sure the calf receives colostrum.
6. Do not overfeed. Overfeeding may cause more harm than slight underfeeding.
7. Keep calves away from each other after they nurse so they won't suck each other's navels, ears, and teats.

Sucking can cause blind quarters and mastitis in heifers.

8. Keep feeding utensils and boxes clean. Contamination causes disease buildup.
9. Give young calves free access to good-quality legume hay. Get them on dry feed as soon as possible.
10. Feed a grain mixture that will adequately supplement the kind and quality of roughage available.
11. Provide proper housing. Either cold, open barns or warm, fully insulated barns are satisfactory for both calves and heifers if the barns are constructed properly.
12. Control flies.
13. Follow good disease-prevention procedures.
14. Isolate and treat sick animals immediately. Early treatment by a veterinarian is important.