

# AGRICULTURAL GUIDE

Published by the University of Missouri-Columbia Extension Division

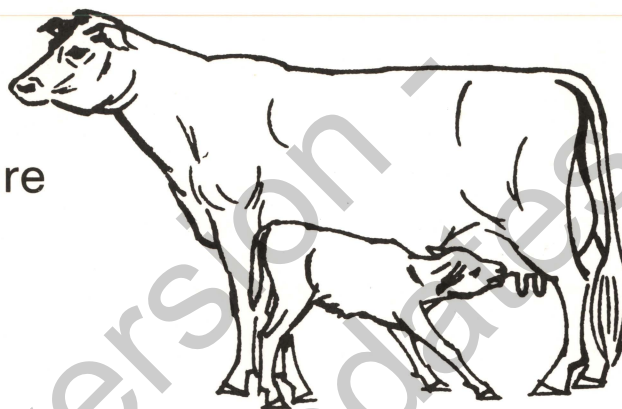
Dairy

DEC 29 1983

## Raising dairy replacements

An investment in the future

Barry Steevens  
Department of Dairy Science  
College of Agriculture  
and  
James G. Thorne  
College of Veterinary Medicine



In 1982, the life expectancy of cows in the DHIA program was 5.5 years or 3.5 lactations. During her life, a cow can be expected to produce three calves. Using a *plus-predicted\** sire, keeping all heifers that offer reasonable promise, and maintaining a 5 percent or less calfhod mortality are ways you can increase herd size and improve inherited productivity.

Unfortunately, on many farms, the number of replacements available is adequate only for replacing cows that die or suffer from disease, injury, sterility, or old age. If heifers are bred to a scrub or beef bull and calfhod mortality exceeds 15 to 20 percent, you'll have to depend on purchasing replacements.

Raising your own replacements prevents diseases from being introduced to the herd by purchased animals. You also have first opportunity to determine their merit as milk producers.

With a successful program for raising replacements, you'll have a heifer ready to freshen at 24 months. Most of the practices described in this guide sheet are important in achieving this goal.

### Before calving

In favorable weather, isolate the dam in a clean maternity stall or small pasture. Stalls that have been cleaned and have remained empty for three or more weeks are usually relatively disease free.

\*A Predicted Difference Score is a tool for predicting genetic results and should be used in picking the best sires and cows.

When cows or heifers are approaching parturition, you should check in on them at least every two hours. They'll probably need assistance at calving

- During unproductive labor (with cows two to three hours and with heifers three to six hours),
- When the front feet and not the head appear,
- When only one foot appears;
- When the tail or head and not the feet appear, or
- When only one foot from each twin appears.

If you wish to assist the cow with calving, clean the vulva and surrounding area with clean, warm water containing a disinfectant. Use a disposable plastic sleeve to prevent spread of disease. Obstetrical chains are valuable if used properly. Using a fence stretcher or other methods of extreme force is not wise and often can result in damage to the cow's uterus or pelvic structure.

Once the calf enters the pelvic canal, the birth process must be completed within minutes, or stoppage of blood through the umbilical cord may cause death.

Consult your veterinarian for professional assistance. With an examination, the vet can determine whether the calf can be delivered or a cesarean section is needed.

### At birth

Wipe the mucus from the calf's nostrils and mouth. When necessary, assist the calf in breathing by alternating pressure on the rib cage. Rubbing the calf dry is beneficial in cold weather. Dip the naval in a 7 percent

tincture of iodine or iodophor teat dip or a mixture of 50 percent tincture of iodine and 50 percent glycerin. Immerse the naval cord in the solution for 15 to 30 seconds. The longer immersion time provides for better killing of bacteria. If there is bleeding through the naval cord, tying it off with a disinfected cotton or linen cord may be necessary.

On the first day of life, the calf should receive 10 percent of its body weight in colostrum. For an 80-pound calf, this is 8 pounds or just less than 1 gallon. The calf should receive one half of the colostrum (2 quarts for an 80-pound calf) within four hours of birth to be most effective. The sooner a calf receives colostrum, the stronger his immunity. A calf that does not receive any or only a little colostrum has a poor chance of survival.

Colostrum from older cows contains the most immune bodies, while that from heifers contains the least. Check to make sure the calf has suckled. If a cow has a big, low-hanging udder, the calf may not be able to get down to the teats and may appear to be suckling but is actually not. Routine administration of 1 to 2 quarts of colostrum is recommended as soon as you find the newborn calf.

Colostrum may be given by nipple, bottle, or an esophageal feeder. It is very important that all of these feeders be cleaned and disinfected before using because dirty containers can cause calf scours.

If possible, a calf should be fed milk from its dam for at least two days. Surplus colostrum can be fed, but it is higher in solids than normal whole milk. Consequently, slightly less surplus colostrum should be fed. In 36 to 48 hours after calving, the composition of colostrum changes to approach that of whole milk.

The most successful milk replacers are composed of a high percentage of milk solids. They contain 18 to 24 percent protein, 10 to 15 percent fat, and 0.25 percent or less fiber. They are usually fortified with vitamins A, D, and E, and an antibiotic.

Some milk replacers contain 20 to 24 percent fat. They are specially formulated for veal production rather than for raising dairy replacements. Consequently, they are more expensive.

Healthy calves can be switched to once-a-day feeding. This saves labor, particularly for the specialized calf raiser, who has several calves and feeds a milk replacer. For the dairy producer who feeds whole milk or has calves of various ages, once-a-day feeding probably saves little time. Generally, once-a-day feeding results in gains comparable to calves fed twice daily. Calves fed once daily have a slightly higher incidence of scours. Observe calves several times a day whether they are fed once or twice a day. Under some systems, 8 pounds of milk replacer is the daily maximum.

When calves begin consuming some dry starter, offer water at least once a day and more frequently in warm weather. Then increase dry calf starter after

each liquid feeding to meet the calf's growing needs.

Dry calf starter should contain 3 to 5 percent fat, 16 to 18 percent protein, and 8 percent or less fiber. It's also fortified with vitamins and antibiotics. While it is possible to mix a satisfactory dry starter, the relatively small volume needed and the importance of feed freshness makes it impractical for most producers to prepare their own.

A calf should be consuming 2 pounds of dry starter before you discontinue milk replacer feeding.

Offer bright, high quality grass or mixed hay to calves at any time; however, they will eat dry starter more readily if they don't get hay. Hay fed before six weeks of age has little or no influence on rumen development.

Medium-to-poor quality hay fed to calves may result in potbellied calves. Some producers do not feed their calves any hay until they are weaned.

If viral calf scours are a problem, give oral vaccinations with rota-corona calf scour vaccine as soon as possible after birth on the first day.

To prevent anemia, give calves an injection of 150 mg. of an iron dextrin solution with a low molecular weight in the first week. Also, a vitamin A and D combination and selenium-vitamin E may be injected at two to three days of age. Nasal vaccination of infectious bovine rhinotracheitis (IBR or rednose) may be given during the first week of life.

Start a permanent identification record that includes date of birth, sire, and dam before the calf is removed from its dam. Also, identify grade calves by sire.

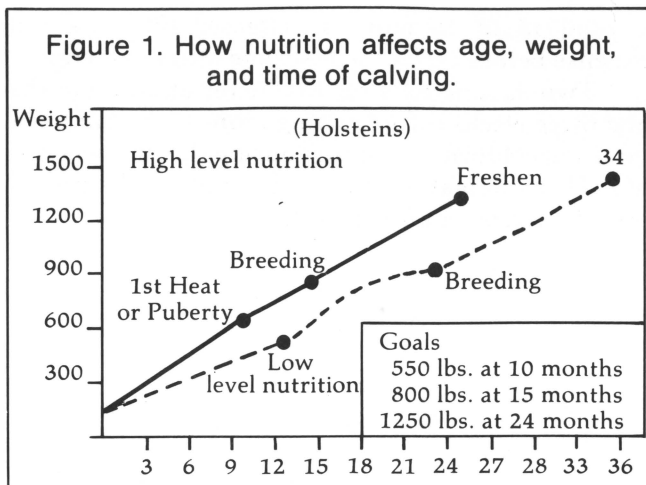
Only three of every five records in the DHI program have valid sire identification. In 1970, more than 780,000 DHI records that might have been useful in proving the merit of dairy sires had to be discarded because sire identification was lacking. This information can be used in developing sire performance data.

### Three to 60 days

Provide individual well-ventilated calf quarters that are free from drafts and dampness. Calf hutches are ideal quarters (see Guide 3451). Give close attention to sanitation and regularity in time and amount of feeding. The amount of milk fed daily or its equivalent in replacer should not exceed 8 to 10 percent of the body weight of the calf. It's better to start with slightly less and increase the amount as the calf indicates its ability to consume it. You can use nipple bottles or buckets, or teach calves to drink from a pail. Pails are easier to wash and sanitize; however, nipples provide an easy method of measuring the amount fed.

Bottles or pails must be washed and sanitized with the same strength of sanitizer that you'd use to sanitize milking equipment. Do this at each feeding. Keep feeders clean and remove uneaten feed frequently.

Figure 1. How nutrition affects age, weight, and time of calving.



Under some systems, calves are switched directly from their dam's milk replacer. Usually switching from milk to milk replacer over a week's time is more successful.

If scours occur, severely reduce the daily ration, and offer it in two to four feedings. In severe cases, withdraw all feed until the scours abate.

Diarrhea from overfeeding can be easily controlled by reducing the feed intake.

Diarrhea caused by bacteria or viruses is more difficult to control. It causes severe fluid losses, and the calf suffers from dehydration. The eyes appear to be depressed in the head. Unless body fluids can be replaced orally, subcutaneously (introduced beneath the skin), or intravenously, the calf will soon die from the diarrhea or from complications with pneumonia.

Preventing all calfhood diseases is probably impossible, so recognizing sick calves is important. An increase in body temperature 1 or more degrees above the normal 100 to 102 degrees F is usually preceded by 12 or more hours of diarrhea, pneumonia, or failure to eat. Take body temperature with a rectal thermometer inserted for two minutes. Take the temperature of any animal in question.

Producers often place too much faith in a single shot when a calf appears off feed or ill. By the time signs of illness are apparent, the treatment is probably too late. Sustain treatment for at least three days for satisfactory results. A single shot is not effective over a long enough period to achieve the degree of protection desired. Most prophylactic antibiotic treatments are non-selective; they destroy as many desirable bacteria (those helping the calf to build immunity and to digest feed) as they kill undesirable organisms.

Complete dehorning at three to seven days of age with paste or electric cautery (instrument for cauterizing). Use care in dehorning with paste because it is caustic. If calves get wet, the rain water may mix with the paste, run down the head, and damage the eyes and skin. Keep calves in separate stalls after dehorning with paste to prevent them from licking each other.

Early protection against respiratory infections such as Infectious Bovine Rhinotracheitis (IBR), Parainfluenza (PI-3), and Bovine Virus Diarrhea (BVD) are now available. Vaccinations again in later months are necessary to provide continuing immunity.

## Sixty days to six months

Continue feeding dry starter and excellent grass or mixed legume hay. Pen calves not being fed liquid milk replacer or milk according to age in groups of 10 or less. After three to four months, gradually shift calf starter to a growing ration of 14 to 16 percent protein. Continue feeding all the good hay the calf will eat. Some silage may be offered.

Calves do not gain adequately on pasture feeding alone. Feed 2 to 4 pounds of concentrate as well.

Maintaining a good growth rate is important during the first six months. Large breed calves should gain about 1½ pounds a day, and small breed calves about 1 pound per day. Occasionally, check the age and weight of calves, so you won't be disappointed later when slow growth may be more obvious.

Vaccinate against blackleg, malignant edema, and other clostridial diseases at three months and again after six months of age. Vaccinate against leptospirosis, if this disease is present in the community.

A Brucellosis vaccination between four and 11 months of age may be desirable. Several states adjacent to Missouri now require imported cows to have been vaccinated as calves for Brucellosis.

Vaccination for BVD and IBR at six months of age is optional. If heifers were vaccinated earlier, re-vaccination after six months of age is necessary to provide good immunity.

Routine treatment for external parasites is important where cattle are concentrated in a small area. Calves should be dewormed two months after weaning and at least every six months until calving. Calves should not follow older cattle on pasture. Provide feed bunks and hay racks. Animals should not be fed on the ground because parasite infestation is greatest close to the ground. Putting animals on a different pasture after deworming aids in reducing re-infestation of worms.

## Six to 12 months

This should be a time of rapid growth. Daily gains of 1⅔ pounds for large breed heifers or 1¼ pounds for heifers of small breeds (see Table 1) can't be achieved by roughage alone. Feed 2 to 6 pounds of grain daily depending on the breed of heifer and the quality of forage offered.

Give the Leptospirosis vaccine (five strains) at six to eight months and at every six months thereafter.

Table 1. Daily nutrient requirements of growing heifers\*.

Age (Months)	Body weight (lbs.)	Daily gain (lbs.)	Protein Total (lbs.)	NE <sub>m</sub> (Mcal)	NE <sub>gain</sub> (Mcal)	TDN (lbs.)	Ca (gm.)	P (gm.)	Vitamin A (1000 IU)
<b>Growing heifers (large breeds)</b>									
	90	.9	.33	1.2	.70	1.7	8.2	5.0	1.8
	100	1.2	.44	1.4	1.00	2.5	8.2	5.9	1.9
	125	1.2	.52	1.9	1.10	2.9	11.8	7.0	2.4
	150	1.4	.64	2.0	1.20	3.4	14.1	7.7	2.9
	200	1.6	.85	2.3	1.50	4.3	17.2	9.1	3.8
6	300	1.6	1.04	3.1	1.70	5.7	18.6	11.3	5.8
8	400	1.6	1.30	3.8	1.90	7.1	20.4	13.6	7.7
	500	1.6	1.47	4.5	2.20	8.4	22.7	16.3	9.6
12	600	1.6	1.61	5.2	2.40	9.6	23.6	17.2	11.5
	700	1.6	1.74	5.8	2.50	10.5	24.5	18.1	13.5
15	800	1.6	1.85	6.4	2.70	11.5	25.8	19.0	15.4
	900	1.6	1.92	7.0	2.80	12.3	26.3	20.4	17.3
	1000	1.4	1.97	7.6	2.60	12.6	27.2	20.9	19.2
24	1100	1.2	1.99	8.1	2.30	12.8	27.2	20.9	21.2
	1200	.8	2.01	8.7	1.60	12.5	27.2	20.0	23.1
	1300	.4	1.88	9.2	.82	11.5	24.5	18.1	25.0
<b>Growing heifers (small breeds)</b>									
	55	.7	.25	.8	.5	1.2	5.9	4.1	1.0
	65	.8	.28	.9	.6	1.4	6.4	4.5	1.2
	100	.8	.36	1.4	.7	2.2	9.1	5.9	1.9
	125	1.0	.48	1.6	.9	2.8	10.9	6.6	2.4
	150	1.2	.59	1.8	1.1	3.3	12.7	7.2	2.9
6	200	1.2	.75	2.3	1.1	3.9	15.4	8.2	3.8
11	300	1.2	.96	3.1	1.2	5.2	16.8	10.4	5.8
	400	1.2	1.22	3.8	1.4	6.6	19.5	13.1	7.7
15	500	1.2	1.41	4.5	1.6	7.8	21.8	15.4	9.6
	600	1.2	1.56	5.2	1.8	8.9	22.7	16.3	11.5
21	700	1.0	1.67	5.8	1.6	9.5	23.1	16.8	13.5
24	800	.6	1.58	6.4	1.0	9.1	21.8	16.3	15.4
	900	.4	1.51	7.0	.7	8.9	20.4	15.9	17.3
	1000	.4	1.60	7.6	.7	9.6	22.2	18.1	19.2

\*1978 NRC Requirements  
454 grams = 1 pound.

### Twelve to 20 months

Proper nutrition is essential for growth and development of the dairy heifer, Figure 1 shows how nutrition affects age, weight, and time of calving.

Regardless of the feed level though, heifers within a breed tend to reach sexual maturity at about the same size. Breed by weight and size rather than age. Small breed heifers at 600 pounds, and large breed or Holstein heifers should be bred at 500 to 750 pounds, respectively. (See Figure 2.)

An abundance of good quality roughage should provide ample nutrients for adequate growth during this period. Four to 6 pounds of grain per day fed four weeks before and during the breeding season may improve conception. If only stored forage is available at breeding time, supplement the ration with vitamin A.

If vaccination for IBR and BVD has been done earlier, repeat it one month before breeding. If modi-

fied live virus vaccines (intramuscular) are used, vaccinate at least 30 days before breeding. A vaccination and procedure guide is listed in Table 2. Consult your veterinarian for specific recommendations.

### Twenty to 24 months

Some grain may be needed during this time, particularly during the last two or three weeks. Heifers lightly underfed up to calving will be smaller in size. They tend to be less productive during the first lactation but may partially recover size and in production if they're well fed after calving.

Underfeeding affects the size of the heifer more than it does the development of the fetal calf. Calves from heifers that are underfed are only slightly smaller than normal. Consequently, a slightly higher incidence of calving difficulties usually occurs with underfed heifers.

Figure 2. Large breeds growth chart.

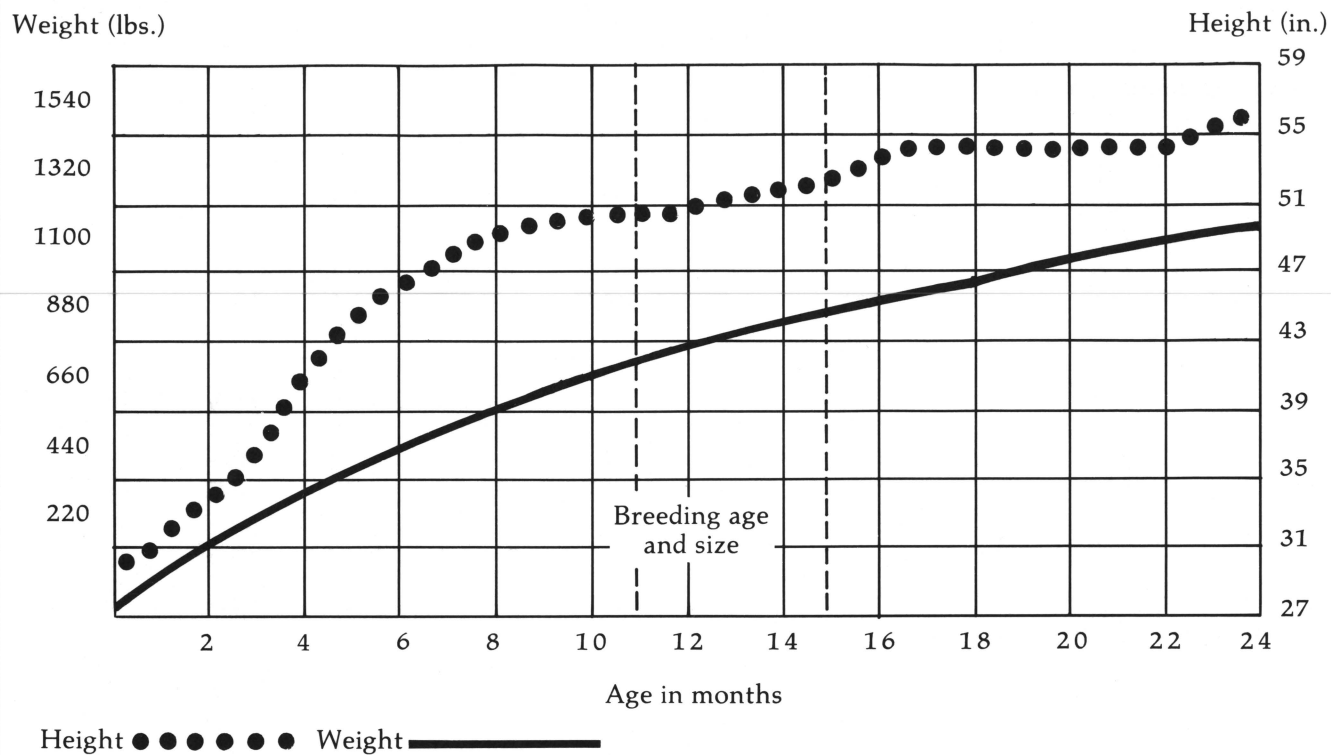


Table 2. Suggested schedule for injections and procedures for replacement dairy calves.

	When	Repeat
Colostrum	2 quarts within 4 hours to total of 10 percent of body weight in first 24 hours.	8-10 percent of body weight for 2-3 days.
Vitamin A and D	3-7 days	
Selenium—Vitamin E	3-7 days	
Iron Dextrin Solution (150 mg. low molecular)	2-3 days	
Viral Calf Scours	1st day (if cow is not vaccinated)	
Infectious Bovine Rhinotrachitis (IBR)	1st Week—nasal	6 months (nasal or injectable) 12-14 months (injectable)
Parainfluenza	1st Week (nasal vaccine) with IBR	6 months (nasal or injectable)
Hemophilus	4-6 weeks	8-10 weeks
Brucellosis (Bangs)	4-11 months	
Blackleg, malignant edema—other clostridial diseases (7 way)	3-4 months	6-8 months
Bovine Virus Diarrhea (BVD)	6 months	12-14 months
Leptospirosis (5 strains)	6 months	every 6 months

Consult your veterinarian for specific recommendations for your herd.

On the other hand, heifers fed more abundantly than necessary should be bred earlier to prevent fatty tissue from infiltrating the mammary gland. Also, production may be impaired if breeding is delayed. Calves from fat, early-bred heifers will be about as large as those from heifers bred later. Again, expect a higher incidence of calving difficulties.

Feeding excessive levels and delaying breeding

beyond 15 to 16 months increases the time and expense before replacements come into production.

Two vaccinations for the heifer at two months and three weeks before calving protects the calf from viral and coliform calf scours during the first week of life. This vaccination causes immunity to be passed into the colostrum for the calf.