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Raising the Replacement Heifer

The heifer receiving a balanced diet and good management can be bred to freshen at 24 months and be proper size to produce adequately. The goal is to provide both adequate energy and protein and with proper management, the animal will obtain optimal growth without getting fat.

Starter Rations for Weaned Calves

The best calf starters are high in energy, coarse textured, free of excessive fines, and contain at least 16 percent protein (18 percent if calves are weaned before 4 weeks of age). To encourage more intake, feed should consist of whole, coarsely ground, cracked or rolled grains. Molasses (up to 5 percent of the mixture) improves palatability and minimizes fines and dust. Finely ground feeds become "pasty" and less digestible. Whole grains, especially oats, can be fed with starter rations up to 6 months of age. Calf starters should be fed until calves are about 12 weeks or until the calf consumes considerable forage. Starter intake should be limited to 3 or 4 pounds per calf each day.

Many commercial calf starters are well formulated and convenient to feed. Simple, home-mixed calf starters are equally acceptable. Table 1 contains examples of some good starter rations.

Table 1. Example calf starter rations

Ingredients	Ration ^a		
	A	B	C
Corn, coarse grind	50	44	24
Oats, rolled or crushed	35	22	24
Beet pulp	—	—	20
Soybean meal	13	26	25
Molasses, liquid	—	5	5
Dicalcium phosphate	1	1	1
Trace mineral salt	1	1	1
Protein (% of dry matter)	16	20	20
Fiber (% of dry matter)	6	5	9

^aRation A recommended for calves weaned after 4 weeks of age and receiving forage.
 Ration B recommended for calves weaned before 4 weeks and consuming forage.
 Ration C recommended for calves weaned before 4 weeks and not receiving forage. Fifteen pounds of ground corn cobs and 5 pounds more oats may replace the beet pulp.
 All grain rations contain 200,000 IU of vitamin A and 50,000 IU of vitamin D/100 pound of starter.

12 Weeks - 1 Year

During this period of the herd replacement's life, free-choice forage and limited grain may be fed. The protein content of the grain mix need not be as high as that of the starter. The protein content and amount of forage fed will determine the need for a protein supplement in the grain. Pasture may be used successfully in the feeding program for young heifers, but it should not be expected to supply all of the nutrients for calves in this age group. A grain mix and some stored forage are desirable for young calves on pasture. Trace mineralized salt and a calcium-phosphorus supplement may be offered free-choice if not adequately supplied in the grain mix. All calves must have access to clean fresh water.

During this stage of the feeding program, grain should be limited to about 4 pounds and certainly no more than 5 pounds per day depending on forage quality (figure 1). If necessary, limit grain to keep calves from becoming overly fat. Excessive fat may result in breeding problems and also cause fatty tissue to be deposited in the udder. It has been demonstrated that over-conditioned heifers produce less in later life than those reared on a more moderate level of nutrition.

Table 2 lists grower rations for 300-400 pound calves. If protein content of forage is moderate (12-16 percent), little or no protein supplement will be required in the grain mix. Grain mixes prepared for the milking herd are acceptable so long as they are properly fortified with minerals and vitamins.

Table 2. Grower rations for 400-pound calves

RATION 1	RATION 2
5 lb Alfalfa-grass hay, free-choice (12-16% CP)	6 lb Corn silage (8-9% CP)
5 lb Grain mix	3 lb Grass hay (12-14% CP)
900 lb rolled barley	4 lb Grain mix
1000 lb rolled oats	1000 lb coarsely ground shelled corn
55 lb dry molasses	655 lb rolled or ground oats
20 lb trace mineral salt	300 lb soybean meal
20 lb dicalcium phosphate	20 lb trace mineral salt
5 lb vitamin premix	5 lb limestone
Grain ration: 12.8% crude protein	15 lb dicalcium phosphate
	5 lb vitamin premix
	Grain ration: 17% crude protein

Feeding Program for Heifers 1-2 Years of Age

If good quality forage is available, this may be the only feed required for heifers over 1 year of age (figure 1). Trace mineral salt and a calcium-phosphorus supplement are advised on a free-choice basis. Heifers should gain about 1.5 pounds per day. If growth is not satisfactory, some grain should be supplied to the growing heifer. Generally, only a small amount will be required. The rations in table 3 indicate the amounts to feed when various forage and grain combinations are offered to 700-pound heifers. On good pasture, heifers require no grain or forage, but as pastures mature, dry out, or are heavily grazed, supplemental feed should be provided. Heifers that are deficient in energy, phosphorus, or vitamin A may not exhibit estrus.

While calves may begin nibbling on good quality hay as early as 5-10 days of age, it is not necessary to feed forages before 8 or 10 weeks. When forages are inconvenient because of the housing and management system, it may be desirable to incorporate a forage factor (more fiber) into the starter ration. Ration C (table 1) is a suitable ration for calves not receiving hay or silage. Corn silage should be limited before 3 months of age because of its high moisture (limiting intake) and low protein content.

Table 3. Rations for 700-pound heifers that are gaining 1½ pounds per day

RATION 1	RATION 2
42 lb Corn silage (33% DM)	7 lb Alfalfa hay
1 lb Grain mix	20 lb Corn silage
160 lb corn and cob meal	2 lb Grain mix
1705 lb 44% supplement	1940 lb corn and cob
98 lb dicalcium phosphate	35 lb monosodium phosphate
12 lb limestone	20 lb trace mineral salt
20 lb trace mineral salt	5 lb vitamin premix
5 lb vitamin premix	Grain ration: 8.0% crude protein
Grain ration: 38.1% crude protein	
RATION 3	RATION 4
15 lb Alfalfa hay	20 lb Corn stover (stalklage)
3 lb Grain mix	3 lb Grain mix
955 lb barley*	1095 lb corn and cob meal
1000 lb oats	860 lb 44% supplement
20 lb trace mineral salt	20 lb trace mineral salt
20 lb monosodium phosphate	20 lb dicalcium phosphate
5 lb vitamin premix	5 lb vitamin premix
Grain ration: 11.8% protein	Grain ration: 23.5% crude protein
* Could substitute corn and cob meal	

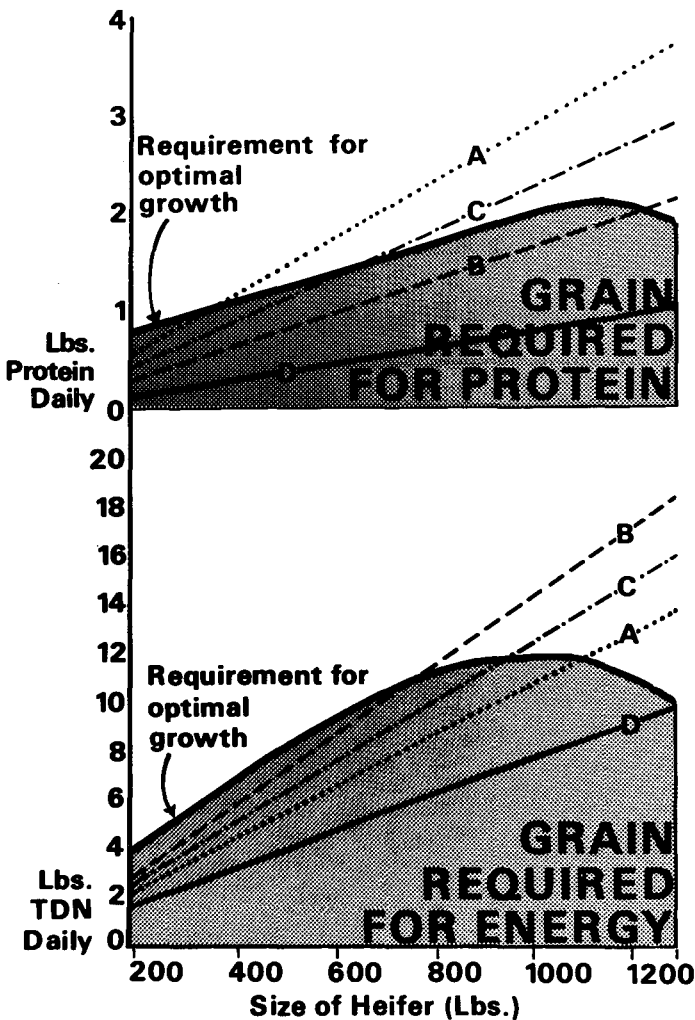


Figure 1. Daily dairy protein and energy requirement of Holstein heifers from 200 to 1,300 pounds

- KEY—**
- Line A = nutrients supplied by legume-grass forage (52% TDN, 14% protein) consumed at the rate of 2 pounds dry matter per 100 pound body weight.
 - Line B = nutrients supplied by corn silage (70% TDN, 8% protein) consumed at the rate of 2 pounds dry matter per 100 pound body weight.
 - Line C = nutrients supplied when forage consumption is one-half legume-grass forage and one-half corn silage.
 - Line D = nutrients supplied by corn stover, slough grass or other low quality forage (50% TDN, 5% protein) consumed at the rate of 1.5 pounds dry matter per 100 pound body weight.

Size and Age to Breed Heifers

Size is a better indicator than age alone of deciding when heifers should be bred. There is a difference in growth rates among individuals as well as among breeds. Adequately fed heifers can be bred when they are 15-16 months old. It may be necessary to delay breeding small-for-age heifers. Since the gestation period is about 9 months, they will calve when they are 24-25 months old. This should be your goal. A dairy bull with a high plus "predicted difference" for improving production can and should be used to obtain maximum genetic improvement. Bulls that sire small calves resulting in easy calving are identified by many A.I. organizations.

You can estimate heifer weight by a weight tape if you do not have a large scale. Place the tape snugly around the body just behind the front legs and shoulders. Table 4 indicates minimum age, weight, and chest circumference (in inches) to determine if a heifer should be bred.

Table 4. Minimum age and size to breed dairy heifers

Breed	Age (months)	Size (pounds)	Chest circumference (inches)
Ayrshire	13	600	59
Brown Swiss	15	750	64
Guernsey	13	550	57
Holstein	14	700	62
Jersey	13	500	55
Milking Shorthorn	14	650	60

The Month Prior to Freshening

Although nutrient requirements are not high, this is a critical stage in providing replacement heifers with sufficient feed to support both the unborn calf and sustain body growth. Some grain should be fed for 2 weeks prior to calving to establish the rumen microflora that digest grain.

Avoid excessive calcium intake (over 100 grams per day) and meet the minimum phosphorus needs (40 grams per day). Supplemental vitamins A and D (injected or fed) may improve calf survival and lower the incidence of retained placenta and milk fever.

Provide the heifer plenty of opportunity for exercise. If udder edema is a frequent problem, restricting salt intake the last 2 weeks before freshening may help. Do this by removing the salt sources and feeding only the salt added to the grain mixture.

Management Considerations for Optimum Rate of Growth

- Calves may be placed in groups about 1 week after weaning. Ten calves per group is maximum for easy detection of those doing poorly.
- Age differences between animals in a group should not exceed 2 months until they reach 600 pounds (about 10 months of age). Older animals should be in 2 or 3 different groups, divided by size of animal.
- Good quality forages should be fed to the younger calves. Do not use hay that cows have refused for feeding heifers under 600 pounds.
- Separate the males and females before they are 6 months of age. If not done previously, dehorn at this time or as soon as possible when flies are not a problem.
- Treat all animals within a group, as needed, for worms.
- Vaccinate replacement heifers for diseases prevalent in your area. Consult your local veterinarian in establishing a recommended program.
- Acquaint the heifer with the tie-stalls and/or milking parlor by providing daily access for 2 weeks before calving.
- Free-choice mineral (calcium-phosphorus and trace mineralized salt) should be available. Vitamins A & D should be provided if residue feeds are given and heifers are housed indoors.

Other Information

Bulletin 218. Feeding the Dairy Herd
 Dairy Husb. Fact Sheet 9. Using Colostrum to Raise Dairy Calves
 Dairy Husb. Fact Sheet 10. Milk Replacers in Raising Dairy Calves
 Dairy Husb. Fact Sheet 7. Corn Silage in Dairy Cattle Rations
 Folder 313. Keeping Dairy Calves Healthy