

Heifer Management

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Introduction

The feed and management program for replacement heifers will have a lifelong effect on their productivity. It will determine how young they may be bred; whether they calve early, late, or not at all; whether they are good milkers or poor milkers; the weaning weights of their calves; and how long they remain in the herd. Feed accounts for 40% to 70% of the cost of raising replacement heifers; hence, it is important to know whether it is possible to save on feed during the growing period without adversely affecting reproduction. It is even more important to know whether their performance as adult animals can be enhanced by proper nutrition and management.

The goal of replacement heifer selection is to identify heifers that will develop into high-output, low-input cows with longevity; and ultimately, produce the optimum cow. The optimum cow is an elusive beast but does exist in a given production and marketing environment. Unfortunately, traits associated with high output (i.e., growth, milk production, carcass yield) are not favorably correlated with low inputs or longevity.

Proper selection and development of replacement heifers is one of the most important management programs in beef production. Replacement heifers should be selected and managed so they will calve early in the calving season, provide adequate milk production, and rebreed and calve every 365 days.

Research data collected at the Fort Keogh Livestock and Range Research Laboratory at Miles City, Montana, indicates that cows are culled from beef herds at an average age of 5 to 6 years. If replacement heifers are bred to calve as two-year-olds, they have been supported by the cow herd for 40% to 50% of their lives by the time their first calf is weaned. Therefore, it becomes more critical to wean a calf in subsequent years so development costs can be spread over several calves, rather than one if she does not rebreed after her first calf.

Heifers bred as yearlings to calve as two-year-olds will produce an extra calf in their lifetime compared with heifers calving first as three-year-olds, without detrimental effects on mature size, milk production, or calf weaning weights. The type of management heifers receive from birth to breeding has a great influence on their lifetime calf production. It is imperative that heifers be selected and developed properly for efficient and optimum production over 8 to 10 calf crops.

Development programs should focus on nutrition to achieve puberty by 12 to 14 months or younger with additional emphasis on early conception and rebreeding the following year. Care must be taken to ensure minimum calving difficulty through heifer and sire selection. Do not give heifers creep feed during the suckling period, as fat may be deposited in the developing udder, lowering subsequent milking ability.

Heifer Selection (Source: *NebGuide G80-493-A*)

The following factors should be kept in mind when selecting heifers.

At Weaning:

1. Select the largest and oldest heifers because they will usually reach puberty earliest. Also, these heifers are usually from the earlier calving and/or heavier milking cows.
2. Select heifers that are structurally large, physically sound, in good health, and have good growth potential. Performance records help to determine growth potential and to identify calves from above-average-producing cows. Do not save heifers that are very fat at weaning because of the tendency for reduced milk-producing ability.
3. If purchasing heifers is part of the replacement program, the availability of good quality stock is usually greatest at weaning time and replacements can be fed and bred as desired. For producers who wish to maintain a two-breed-cross cow herd and use terminal sires, buying replacement heifers is a must. With limited feed resources, purchasing bred heifers may be desirable, but their availability will be lower.

As Yearlings:

1. Save more heifers at weaning than actually needed for replacements so the growing heifers can be culled before breeding, and those failing to conceive during a short breeding season can be culled. If heifers can be bred as yearlings and only those conceiving early are kept for replacements, herd fertility can be improved.
2. Save only those heifers that conceive during a 30- to 45-day breeding season. Heifers should be pregnancy checked about 60 days after breeding, and open heifers should be moved to a feedlot for finishing.

Heifer Nutrition

After selecting heifers, normal growth and development through proper nutrition are necessary to reach the goals of early puberty, early breeding, and size at calving. Differences in breeds and animal gain needed must be recognized in developing a feeding and management program for heifer calves. A ration should provide for adequate growth, but not for fattening. British-breed heifers need to gain about 1 lb/head daily from weaning to breeding; larger breeds and crosses need to gain 1 to 1.5 lb daily.

Early Puberty

Puberty is a function of breed, age, and weight. To reach puberty by 12 to 14 months of age, heifers must be fed properly to gain sufficient weight. Rate of gain can vary during segments of the development period, as long as heifers reach the desired weight before breeding time. Heifers of various breeds should achieve the following weights before the breeding season begins for a high percentage to be cycling.

Table 1. Weight needed to reach puberty by breeds

	Wt (lb)
Hereford (H)	600 - 650
Angus (A)	575 - 650
Shorthorn	575 - 650
H x A or A x H	600 - 625
Charolais crosses	675 - 725
Simmental crosses	650 - 700
Limousin crosses	650 - 700
South Devon crosses	625 - 675
Tarentaise crosses	600 - 650
Pinzgauer crosses	600 - 650
Gelbvieh crosses	600 - 650
Brahman crosses	700 - 750

To insure that all heifers reach these weights before breeding, they should be fed separately from the cow herd and, if possible, sorted according to size before the winter feeding period. Smaller heifers will require a higher concentrate ration than the larger, heavier heifers for the faster rate of gain necessary to reach the desired weights.

Target Weight Concept

The onset of puberty in a breed of heifers is influenced by age and weight. Typically in fixed breeding seasons, age has less of an effect than weight. Therefore the “target

weight” tool should be used. Heifers should weigh 61% to 65% of mature weight at the start of the breeding season. Mature weights of replacement heifers can be estimated using either sales receipts of cull cows or actual weights and hip heights to predict mature weights. Pre-breeding target weight estimates should be made for a group of heifers using their average weights. Once a target weight is determined, the average weaning weight is subtracted to give the amount of gain required. Dividing the amount of gain required by the amount of time available will give the daily gain required.

Example: Estimated mature wt = 1200 lb; estimated wt at breeding = 750 lb;
 weaning wt (Oct. 1) = 500 lb; exposed breeding date (Apr. 10);
 Oct. 1 - Apr. 10 = 191 days
 Daily gain required = $750-500/191 = 1.31$ lb/day

Management of replacement heifers needs to continue beyond getting them bred as yearlings. The next step is to continue a nutritional program that allows the heifer to grow to 85% of her mature weight at calving. In the previous example, the expected weight at calving should be 1020 lb ($1200 \times .85 = 1020$).

Daily gain required = $1020-750/284 = 0.95$ lb/day

Proper Feeding

The success of attaining target weights for replacement heifers depends upon a sound nutritional program that balances rations around forage quality. Knowing forage quality means knowing whether protein, energy, or both must be supplemented. Without forage testing, feeding a balanced ration is impossible; subsequently, heifer performance may suffer, and costs may be higher than necessary. As the example indicates, most heifers need to gain 1.0 to 1.5 lb/day during the entire feeding period. Nutrient requirements for growing heifers to gain at these rates are shown in Table 2.

Many different combinations of feeds can be used for growing heifers. Homegrown feeds (hay, silage, and grains) plus additional supplements (protein, mineral, and vitamins) can be used successfully and economically. Heifers need to be grown rapidly but not fattened, so high-quality hay and forages should be fed. If heifers are wintered on range, they should be fed at least 3 lb of grain and 1 lb of 40% protein supplement per head daily to attain the recommended weight gains.

Taking periodic weights is helpful in determining if heifers are gaining at a lower rate than calculated. Make sure weights are taken at the same time of day and use group weights because gut fill can cause bias errors in weights. Some cycling should be observed in the heifers by 45 days before breeding season; if not, additional grain or high energy supplement should be provided.

Table 2. Nutrient requirements of weaned heifer calves^a

Heifer wt (lb)	Gain (lb)	Daily requirements					
		DM intake (lb)	Total crude protein (lb)	ME (Mcal/lb)	TDN (lb)	Ca (lb)	P (lb)
Medium frame							
500	1.0	11.8	1.11	1.02	7.3	0.036	0.025
	1.5	12.1	1.25	1.13	8.3	0.046	0.027
600	1.0	13.5	1.19	1.02	8.4	0.038	0.027
	1.5	13.8	1.32	1.13	9.5	0.046	0.029
Large frame							
500	1.0	12.4	1.16	0.98	7.3	0.038	0.025
	1.5	12.9	1.32	1.05	8.3	0.049	0.026
600	1.0	14.1	1.25	0.98	8.3	0.039	0.027
	1.5	14.8	1.41	1.05	9.4	0.049	0.028
700	1.0	15.9	1.34	0.98	9.4	0.040	0.029
	1.5	16.6	1.49	1.05	10.6	0.049	0.032

^aSource: NRC. 1984. Nutrient requirements of beef cattle. National Academy Press, Washington, DC. Requirements do not include extra energy needed during extremely cold weather.

Rations for wintering heifers that average 500 lb to produce a gain of 1.0 lb/day are shown in Table 3. A salt-mineral mix should be supplied free choice, using a moderately high phosphate (7% to 10% P) and calcium mineral. Vitamin A can be added in the supplement or to the salt mixture at a rate of 500,000 IU per 1.0 lb of salt.

The importance of the first winter's nutritional level on heifer development, reproductive performance, and calf production is emphasized in Table 4. Heifers fed to gain over a pound per day cycled early and had high conception rates: 55% in 21 days and 90% in 50 days. Pelvic areas were larger in the heifers on the high and medium nutrition levels, and these heifers tended to have less calving difficulty and fewer calf deaths. Calf weaning weights and percent cows rebred also tended to be higher for these two groups. Overall production efficiency, which takes into account reproduction, calf weaning weights, and cow size, was higher for the heifers on the high nutrition level than for the heifers in the other two groups.

Table 3. Wintering rations for 500-lb medium frame replacement heifers to gain 1.0 lb/day^a

Ingredient ^b	Ration ^c (lb/day)				
	A	B	C	D	E
Bermuda hay 7% - 8% CP	7		10		
Alfalfa hay 16% CP	4	12		4	
Grass silage 35% DM				25	30
Cracked corn	3	2	3		
Soybean meal			1		1
Salt and minerals			free choice		

^aThese rations do not include extra energy needed for extremely cold weather or wet hair coats.

^bFeeds are of average quality.

^cTo increase gains to 1.5 lb/day, add about 1 lb corn or 4 lb of silage to rations. Approximately the same additions can be fed to large frame heifers of 600 lb to gain 1 lb/day.

Breeding of Heifers

Replacement heifers need to be on a good health program. They should be vaccinated prior to breeding for brucellosis, vibrio, leptospirosis, IBR. (red nose), and other diseases prevalent in the area. A good vaccination program is a good insurance policy.

Producers should consider breeding heifers 15 to 20 days before the cow herd. This practice has several advantages. It permits more time and labor to be given to the heifers during the calving season. Heifers can be watched more closely and delivery assisted if necessary, helping to reduce calf death losses. It also allows for a longer period from calving to rebreeding, which is needed by first calf heifers to regain body condition and begin cycling. Heifers should conceive earlier for their second calf, and conception rates should be higher in a short breeding season. Calves will be older and heavier at weaning. The disadvantages are that it lengthens the calving season and requires more feed after calving.

Another recommended practice is to begin with an abundance of heifers, breed them for 30 to 45 days, and cull the open ones at pregnancy check about 60 days after removing

the bulls. This practice selects heifers with high fertility, produces heavier calves at weaning, promotes early rebreeding in the following season, and also insures a short calving season.

Calving Difficulty and Bull Selection

Calving difficulty (dystocia) is of great concern to producers with first-calf heifers, as it constitutes the primary cause of calf losses at birth. The major causes of dystocia in first calf heifers are an oversized calf or an undersized heifer. A large calf and/or a heifer with a small birth canal (pelvic size) cause difficult deliveries. Two practices can reduce calving difficulty. One practice is to grow-out and develop heifers to be larger at calving. If heifers weigh 80% to 85% of their mature weight at calving, they should have less dystocia. Pelvic area of heifers can also be measured, and heifers with small areas culled. Since the heritability of pelvic area is about 50%, selecting heifers and bulls on pelvic size can be beneficial.

Table 4. Effects of nutrition and development on reproduction and calf production of Hereford replacement heifers^a

	Winter Nutrition Level		
	High	Medium	Low
No. heifers	51	51	51
Winter ADG (lb/day)	1.1	0.8	0.55
Wt after weaning (lb)	418	418	418
Wt before breeding (lb)	587	555	532
Age before breeding (days)	417	417	417
Summer ADG (lb/day)	1.5	1.6	1.7
% cycling by 12 mo. of age	26	12	14
% cycling by 15 mo. of age	96	73	77
% conceived in 21 days of breeding	55	20	18
% conceived in 50 days of breeding	90	55	63
No. calving	46	28	32
Wt before calving (lb)	822	817	802
Yearling pelvic area (cm ²)	146	145	138
Calf birth wt (lb)	71	69	69
Calving difficulty (%)	30	18	38
Calf losses first week (%)	6.5	10.7	12.5
Calf weaning wt (lb)	441	435	416
Cows rebred (%)	91	93	88
Production efficiency (lb) ^b	443	230	265

^aDeutscher, G. H. 1975. Cow-calf field day proceedings. South Dakota State Univ.

^bPounds of calf weaned per 1000 lb of cow exposed during the breeding season.

The second practice is to reduce calf size or birth weight. Calf birth weight is the major cause of calving difficulty. Since birth weight is 40% heritable, selecting bulls that sire calves with moderate birth weights can be effective in reducing difficulty. Birth weight information on a bull and his sire can also be helpful. Many sire directories have calving ease indices on sires that indicate those to be used on heifers.

Some bulls within a breed and some breeds of bulls cause more calving difficulty than others. Table 5 shows the calving difficulty experience by four-year-old and older Hereford and Angus cows bred to large beef bulls. Using bulls from the larger breeds can increase calving difficulty considerably.

Producers must be careful in selecting bulls if no prior calving information is known. Many yearling bulls are used on heifers satisfactorily, but the old belief that a young bull will sire smaller calves is not true. Select bulls for moderate birth weights adjusted for dam age, and select against large shoulders, bones, and head; thick muscling; and large hindquarters. Some producers use Longhorn bulls on small heifers; however, this practice is not foolproof. Also, the calves from these matings may not be as desirable or valuable at weaning as other crosses or straight breeds.

Table 5. Effects of sire breed on calving difficulty and calf birth weight^{a,b}

Breed of Sire	Calving Difficulty (%)	Birth Wt (lb)
Hereford and Angus	2.9	79
Jersey	2.9	69
Red Poll	3.7	79
Tarentaise	6.0	83
Sahiwal	6.2	84
Pinzgauer	6.3	86
Gelbvieh	8.0	86
Brown Swiss	8.4	86
Limousin	9.4	86
Brahman	10.0	90
Chianina	11.8	89
South Devon	11.9	83
Simmental	14.9	89
Charolais	18.4	91
Maine Anjou	20.4	91

^aCows were Hereford and Angus, 4-yr-olds and over.

^bU.S. Meat Animal Research Center, 1982. Characterization of breeds of diverse biological types. Beef Research Program, Progress Report No. 1 ARM-NC-21. MARC, Clay Center, NE.

Summary

The search for and development of the optimum cow is rigorous and seems never ending. In recent years, value-based marketing has added new dimensions to the search. Cow-calf producers should establish current genotype (carcass traits) positions to establish whether or not change in their herd is in fact needed, before focusing extreme selection pressure on carcass traits. When change is needed, one solution might be the development of selection indices within a production/marketing environment.



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