21 Development of Replacement Beef Heifers

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Objectives

- Discuss heifer development
- Present strategies for developing the most economical feeding program for young heifers
- Present supplementation strategies
- Decide when to cull heifers that do not breed

Introduction to Replacement Heifers

The economic importance of beef cows having a live, healthy calf to market every 12 months is obvious and has been emphasized in many publications. Heifer management is the cornerstone of the overall program. This chapter is based on the premise that heifers given a good start are more likely to be productive, profitable cows. Proper growth and development of replacement heifers will aid in their ability to deliver and raise a healthy first calf and then rebreed for the subsequent calf crop. Two factors must be considered with replacement heifers:

1. They are expensive.
2. The management of first-calf heifers affects their productivity for the remainder of their lifetimes. Inadequate development of replacement females will be paid for eventually, either in larger feed bills or in open cows (nature's way of catching up). Lower rebreeding rates for heifers compared to mature cows are normal through the second calf. When the demands on heifers are studied, reasons for difficult rebreeding become apparent. The heifer up until maturity, at about 5 years of age, must grow and at the same time lactate and produce a calf. The loss of incisor teeth between the ages of 18 months and 4 years is an added handicap that reduces their ability to graze. It is difficult for heifers to make up growth during any of the critical first years.

Uniform calf crops are the result of short breeding seasons. Short breeding seasons for the entire cow herd must start with the replacement heifers. Short breeding seasons for the replacement heifers require that the manager/owner must think of them as a group as well as individuals. The objective is to have the entire complement of replacements bred closely in time and three weeks or more before the adult cows.

Number of Heifers to Keep

Matching the number of cattle to the grass and feed resources on the ranch is a constant challenge for any cow-calf producer. Producers also strive to maintain cow numbers to match their marketing plans for the long-term changes in the cattle cycle. Therefore, it is a constant struggle to evaluate the number of replacement heifers that must be developed or purchased to bring into the herd each year. As a starting place in the effort to determine the appropriate number of replacements, it is important to look at the average cow herd to understand how many cows are in each age category. Dr. Kris Ringwall, director of the Dickinson Research and Extension Center (North Dakota), recently reported on the average number of cows in their research herd by age group for the last 20 years. Figure 21.1 depicts the average percent of cows in this herd by age group.

Figure 21.1 indicates that the typical herd will on the average introduce 17% new first-calf heifers each year. Stated another way, if 100 cows are expected to produce a calf each year, 17 of them will be having their first baby. Therefore, this provides a starting point in choosing how many heifers need to be saved each year.

Next, the percentage of heifers that enter a breeding season that will become pregnant must be predicted. The prediction is made primarily upon the nutritional growing program that the heifers receive between weaning and breeding. Many years ago, researchers found that only one half of heifers that reached 55% of their eventual mature weight were cycling by the time they entered their first breeding season (Beverly and Spitzer). If these heifers were exposed to a bull for a limited number of days (45 to 70), not all would have a chance to become pregnant during that breeding season. Therefore, it would be necessary to keep an additional

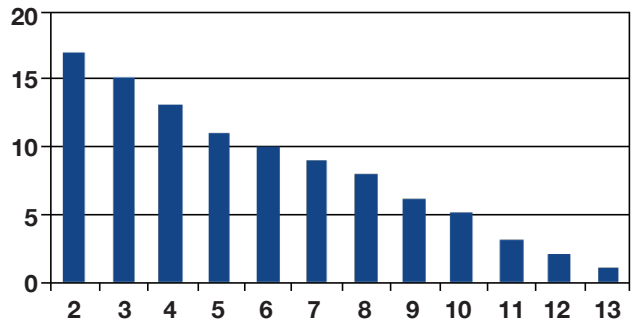

Figure 21.1 – Mean percentage of cows in Dickinson research herd plotted by age of cow. Source: Ringwall.

All Web addresses given in this chapter are subject to change. The links to these Web sites will be updated regularly at the Master Cattleman Web site, http://agecon.okstate.edu/cattleman/manual_chapters.asp

50% more heifers to make certain that enough bred heifers were available to go into the herd.

However, if the heifers were grown at a more rapid rate and weighed at least 65% of their eventual mature weight, then 90% of them would be cycling at the start of the breeding season and a much higher pregnancy rate would result.

Even in the very best scenarios, some heifers will be difficult or impossible to breed. Most Extension specialists and researchers recommend exposing at least 10% more heifers than are needed even when they are grown properly and all weigh at least 65% of the expected mature weight.

The need to properly estimate the expected mature weight is important in understanding heifer growing programs. Cattle type and mature size has increased over the last half century. Rules of thumb that apply to 1,000-lb mature cows very likely do not apply to many current commercial herds. Watch sale weights of culled mature cows from the herd to better estimate the needed size and weights for heifers in the program. Most commercial herds have cows that average at least 1,150 lbs. This requires that the heifers from these cows must weigh at least 747 lbs at the start of their first breeding season to expect a high percentage to be cycling when the bulls are turned in.

Heifer Development from Birth to Weaning

In most beef cow-calf operations, the early development of replacement heifers is entrusted entirely to the heifers' mothers. However, some producers use creep feeds to boost calf gains while the calves are still nursing the cows. Occasionally, some purebred operations raising embryo transfer calves will utilize dairy cows as surrogate mothers and these calves are exposed to large quantities of milk while growing. Even though the cost effectiveness of these practices is often debated, there is little doubt that they will increase calf gain.

A hidden expense, which might occur in a few instances, comes as a result of increased body condition in young heifer calves while still nursing their mothers. Heifers that become extremely fat from high energy creep feeds or very heavy milking mothers have been shown to have reduced milking ability of their own when mature. Mammary development is in a critical stage from 2 to 3 months of age until about 9 months, or just before puberty. If a calf is storing considerable amounts of extra fat during that time, excessive fat can be deposited in the mammary gland and inhibit its development. On the other hand, a certain minimum amount of fat is necessary for the gland to grow, so underfeeding can inhibit development as well.

Beef producers need to observe heifer body condition if they are using high energy creep feeds or dairy-based recipient cows. Because of the differences in birth weight and frame size, it is impossible to recommend a common average daily gain that is appropriate for all young heifers. Therefore, monitoring the body condition (fatness) of the heifer calf through visual appraisal may be the most practical way to evaluate the potential likelihood of excess fatness (Chapter 15). Creep feeding calves with a self-limited amount of high protein feed, such as soybean meal, can allow most heifer calves to grow adequately without concern for extreme fatness. One such creep-feeding program has been described by OSU beef nutritionists as the Oklahoma Silver program (chapters 16 and 17). Heifer growing programs that encourage maximum growth without excessive fatness will allow the young heifer to get off to a good start and bring her to the next critical growing segment.

Implant or No Implant

Research has clearly revealed that there is little, if any, benefit to using growth promoting implants in replacement heifers. In fact, in research trials where one implant was administered to heifer calves between 30 days of age and weaning age, usually about 7 months of age, calving difficulty was not influenced, and fertility was only slightly reduced, a 1% to 3% reduction in pregnancy rate (Selk). As seen with all classes of growing cattle, weight gain is improved in implanted heifers. However, this increased weight gain does not enhance reproductive traits in any way.

Additional research has shown that heifers implanted at birth and close to puberty (generally around 9 to 14 months of age) had substantially reduced fertility (7% to 39% reduction in pregnancy rate; Selk) compared to nonimplanted heifers. Similarly, heifers that were implanted more than once had substantially reduced fertility. Therefore, heifers that could potentially be kept as replacement females should either not be implanted at all, or they should be implanted only one time between 30 days of age and weaning age. Replacement heifers should not be implanted prior to 30 days of age or after about 7 months of age, and they should never be implanted more than once.

Many producers choose not to implant potential replacement heifers while still taking advantage of extra weaning weight from implanting heifers that will not be retained. In this scenario, the producer must select potential replacement heifers at branding or weaning time and implant the remaining heifers that will not be retained in the breeding herd. Individual identification and an accurate recordkeeping system is a must.

Immunizations from Birth through Weaning

Early immunization for Blackleg and malignant edema at approximately 2 months of age will be appropriate in most areas for all calves including those that become replacements. If heifers are to be vaccinated for Brucellosis, be certain to do this between 4 and 10 months of age in Oklahoma. It is advisable to vaccinate heifers nearer the younger age if possible. Other immunizations should be done three to four weeks prior to weaning. Booster injections can be given at weaning time. Visit with a local veterinarian about the need to vaccinate replacement heifers for:

- Infectious Bovine Rhinotracheitis (IBR)
- Bovine Virus Diarrhea (BVD)
- Parainfluenza–3 (PI_3)
- 7- or 8-way clostridial
- Hemophilus
- Leptospirosis
- Camplyobacter (sometimes called Vibriosis)
- Internal and external parasite control (chapters 29 and 30)

Fortunately many of the above immunizations are now included in combination vaccinations. Use the one that is most appropriate for the herd health history and local disease situation.

Weaning stress can result in serious health problems, especially respiratory disease. Heifers that are affected with respiratory disease and pneumonia often have significant lung damage, do not grow and develop properly, and must be culled prior to breeding.

Development from Weaning to Breeding

The period between weaning and breeding is a very critical time in the life of a beef female. At weaning she is 7 to 10 months old and weighs approximately 350 lbs to 650 lbs. Some six months later, she is exposed to the bull or to artificial insemination. Hopefully, most heifers are bred in the first 21 days and 80% or more are pregnant after a 45-day breeding season. Growing programs for weaned replacement heifers must be adequate to allow enough gain from weaning to 13 months of age to allow a high percentage of heifers to begin cycling. Since most beef breed replacements will need to gain 240 lbs between weaning and breeding, the heifers must gain at least 1.33 lbs/day.

It should be emphasized that replacement heifers need to be fed separately from the rest of the herd. Because of their size, age, and higher nutritional demands, they simply cannot compete with the rest of the cow herd, nor can they be expected to efficiently utilize poorer quality forages and still breed as yearlings.

If there are wide ranges between the smaller and larger heifers, they should be divided into two feeding groups to reach their desired weight by breeding time. The days between initial weighing and beginning of the breeding season are then calculated. The average daily gain necessary to reach the desired breeding weight is determined, and the heifers are fed to attain that average daily gain. The addition of approved levels of ionophores such as monensin (Rumensin®) or lasalocid (Bovatec®) to the ration will improve the average daily gain and enhance onset of puberty.

Age, weight, breed, and adverse environmental stresses such as temperature and parasitism affect the onset of puberty. Of these factors, weight is the one that most producers can readily influence. Researchers and ranchers have observed that high percentages of heifers will not reach puberty until they have reached a minimum weight. These weights usually represent about 65% of the potential mature size. Therefore, the first target weight to consider is that at the beginning of the breeding season. If the heifers weigh about 55% of the mature size, producers can expect only 50% of them to be cycling at the beginning of the breeding season. However, about 90% of most beef heifers will be cycling when they weigh 65% of their mature weight (Table 21.1).

Table 21.1 – Puberty weight of heifers by breed (assumes small to moderate frame).

Breed	Wt. at breeding (lbs)		Anticipated mature wt. (lbs)
	50% cycling	90% cycling	
(Average puberty age 13 to 16 months)			
Angus	550	650	1000
Brangus	600	700	1075
Charolais	700	775	1190
Hereford	600	700	1075
Shorthorn	500	600	925
British x British	575	675	1040
Charolais x British	675	775	1190
Jersey x British	500	600	925
Limousin x British	650	775	1190
Simmental x British	625	750	1150
(Average puberty age 16 to 20 months)			
Brahman	700	750	1150
Santa Gertrudis	700	750	1150
Brahman x British	675	750	1150

Source: Beverly and Spitzer.

Many ranchers have not recently weighed the adult cows in their herd to know what average mature weight to expect. Therefore, most commercial ranchers underestimate the mature size and underestimate the target weights for the heifers. Recent data from the American Angus Association, with records of over 20,000 cows, indicates that average mature size in the seedstock portion of their breed is about 1,200 lbs. Heifers from 1,200-lb mothers will need to weigh about 780 lbs by the start of the first breeding season. If the mature size of the herd is 1,100 lbs then the heifers can be about 715 lbs when breeding begins. Only heifers with a potential mature size of 1,000 lbs can be expected to cycle at 650 lbs. These weights will not be exact since there is considerable variation within breeds, but the data show that large cattle must be fed for greater growth rates than smaller cattle.

Individual rather than group weights need to be considered when developing replacements. Simply because a group of heifers has reached a desired average weight at 15 months of age does not mean that all will reach puberty. If the group averages 700 lbs, some probably will weigh 600 lbs and others 800 lbs. Those that weigh 600 lbs will not breed well, while those weighing 800 lbs have been fed more than was

required. Replacement heifers should be sorted by size and fed to reach the desired weight, thereby giving the most feed to the heifers that need it.

Age is also an important factor, especially in Brahman cattle. Many of these heifers will not reach puberty until they are 16 to 20 months of age. The same rule of thumb concerning 65% of the mature weight still applies for Brahman cattle, but the additional days of age also are important.

Growing Programs for Developing Heifers from Weaning to Breeding

As was pointed out previously, yearling heifers conceiving early in their first breeding season will have increased lifetime production and efficiency. It is critical that these heifers attain enough weight to initiate their first estrous cycle before the onset of the breeding season. Current management practices target heifers to reach 65% of their estimated mature weight by the start of the breeding season. Until recently, very little was known regarding the importance of the timing of this weight gain. Would it be desirable to have the heifers gain at an even pace at approximately 1.33 lbs per day? Or, could growing the heifers slowly through most of the winter and then putting them on a very high plane of nutrition for the last two months prior to breeding gain some biological and economical efficiency?

Kansas State University and OSU researchers (Smith et al.; Lynch et al.; Marston et al.) have independently studied the timing of gain. KSU workers noted that heifers that gained at 0.55/per day until the last two months and then were grown at 2.5 lbs/day were equal in reproductive performance to heifers grown at 1.31 lbs/day from November to May. The heifers that were pushed in the last two months actually were more efficient, consuming 12% less DM than the conventionally grown heifers. At OSU, heifers that were wintered at 0.6 lb/day then drylotted gained 1.92 lbs/day and reached puberty 20 to 30 days younger than their counterparts fed to gain at more uniform rates. This indicated that growing programs that allow heifers low to moderate rates of gain during most of the growing phase and then accelerate their growth leading into the breeding season may be cost effective and result in more heifers cycling early. This could be critical to the success of an AI and estrous synchronization program (chapters 23 and 24).

Cost Comparisons under Different Feed Cost Scenarios

To help make decisions about heifer growing strategies, Table 21.2 contains total cost comparisons of feed for heifers from weaning on Nov. 1 to start of breeding season on May 1. The SLOW-FAST program is designed to rough heifers through the winter as inexpensively as possible. The assumed SLOW diet is 2 lbs/hd/day of a high protein supplement such as soybean meal. The remainder of the diet is prairie hay (5.8% crude protein) fed free choice. Average daily gain on this diet for medium frame 500-lb heifers is only 0.35 lb/day (1996 NRC). The FAST gain portion is a self-fed ration programmed to achieve the required 3.16 lbs/day gain and reach the 65% of mature weight target the last 60 days. This ration is as follows:

10% Cottonseed hulls
5% Alfalfa pellets
49.5% Corn
30% Corn distillers grain
4.5% Molasses
1% Vit A, Rumensin® 80, limestone, salt, zinc sulfate

During this FAST growing phase the heifers will average 620 lbs and consume at 20.4 lbs on an as-fed basis.

The diet that was formulated to achieve the EVEN GAIN from November to May was chosen to achieve 1.33 lbs gain/day. Average weight of the heifers during this growing program would be 595 lbs and they would need to consume 15.4 lbs of the following ration daily to reach the desired target weight:

47% Prairie hay
35% Corn
14% Cottonseed meal
3% Molasses
1% Vitamin A, salt, Rumensin® 80, zinc oxide

A second alternative, if alfalfa hay is available, would be:

66% Alfalfa hay (18%)
33% Corn
1% Vitamin A, salt, Rumensin® 80, zinc oxide

The total feed ingredient costs for these heifer-growing programs were compared under four different corn price scenarios (Table 21.2). Because most other feeds are affected by the corn price, it was used as the basic feedstuff. Hay prices and cottonseed meal prices are listed as estimates of what they might be as the corn price changed.

Table 21.2 – Price comparisons of EVEN GAIN and SLOW-FAST growing programs under different feed price situations.

Corn	$2/bu	$3.10/bu	$4.60/bu	$5/bu
CSM	$160/T	$220/T	$240/T	$260/T
Hay	$50/T	$60/T	$80/T	$80/T
EVEN GAIN	$104.78	$145.80	$184.89	$195.70
SLOW-FAST	$99.08	$133.55	$178.56	$195.48

Under lower grain price situations as outlined above, the SLOW-FAST gain approach appears to be slightly less expensive. The added advantage of more heifers cycling earlier could make these growing programs the method of choice on ranches that synchronize and breed artificially.

Using Wheat Pasture

Years of research and experience with stocker cattle wintered on small grain pasture prove that the SLOW-FAST is a good choice for a heifer growing ration. Heifers weaned in October are old enough to make good use of wheat pasture that becomes available in late November. In those years when good wheat pasture is grown, grazing the heifers on wheat will allow 1.5 lbs/day gain throughout the winter growing period. Heifers wintered on good wheat pasture will be heavy enough to enter the breeding season in April or early May in excellent body condition and at the target weight. Some caution must be taken to avoid severe weight and condition loss if heifers are wintered on wheat pasture, removed from wheat, and then placed on lower quality pasture such as native or Bermudagrass until the breeding season begins. Setting aside a few acres of small grain pasture for graze-out allows the replacement heifers to graze high quality pasture well into May. Some producers have reported disappointing conception rates on heifers grazing lush wheat pasture. Other producers have indicated that they have excellent results from using wheat pasture for replacement heifer growing programs. No definitive research data is available to directly address this unanswered question. When comparing the price of renting wheat pasture with those programs listed above, it should be noted that the price per pound of gain of the least expensive scenario in Table 21.2 is $0.41. The most expensive program costs $0.81/lb of gain. Wheat pasture, if available, will compete well with those costs.

Using Ionophores in Replacement Heifer Diets

In an effort to ensure more replacement heifers are bred to calve early in their first calving season, ranchers should consider using a supplement containing an ionophore in the growing diet of the heifers. Ionophore is the generalized name for the feed additives monensin (Rumensin®) and lasalocid (Bovatec®). Both are presently approved for use with growing programs for replacement heifers.

Research conducted in Texas (Moseley, McCarter, and Randel) and Wyoming (Moseley et al.) indicated that growing heifers fed 200 mg monensin/hd/day reached puberty at an earlier age than did similar heifers fed similar diets containing no monensin. Similar data is available for lasalocid.

Most stocker cattle research indicates that the addition of 100 mg to 200 mg of an ionophore increases average daily gain by 0.1 lb to 0.2 lb/day. Over a 150-day growing period of a replacement heifer, this means an additional 15 lbs to 30 lbs in average weight improvement of the heifers by breeding time.

Yearling Immunizations

Replacement heifers should be given booster immunizations at 1 year of age. Often this will include a modified live form of the respiratory disease vaccinations (BVD, IBR, PI_3) and the clostridial diseases. The modified live vaccines must be given at least 30 days prior to the start of the breeding season. The annual vaccinations for Leptospirosis and (if recommended) Campylobacter could be given at this time as well. See your local veterinarian for additional information.

After the First Breeding Season

Many Oklahoma ranchers breed the replacement heifers about a month ahead of the mature cows in the herd. In addition, they use a shortened 45- to 60-day breeding season for the replacement heifers. The next logical step is to determine which of these heifers failed to conceive in their first breeding season.

As the bulls are removed from the replacement heifers, arrange with a local veterinarian to have those heifers evaluated for pregnancy in about 60 days. In two months, experienced palpation technicians should have no difficulty identifying which heifers are pregnant and which heifers are not pregnant or open. Those heifers that are determined to be open after this breeding season should be strong candidates for culling. Culling these heifers immediately after pregnancy checking serves three very useful purposes.

1. Identifying and culling open heifers early will remove subfertile females from the herd. Lifetime cow studies from Montana indicated that properly developed heifers exposed to fertile bulls that did not become pregnant were often subfertile compared to the heifers that did conceive (Bellows). In fact, when the heifers that failed to breed in the first breeding season were followed throughout their lifetimes, they averaged a 55% yearly calf crop. Despite the fact that reproduction is not a highly heritable trait, it makes sense to remove this genetic material from the herd so as to not proliferate females that are difficult to get bred.
2. Culling open heifers early will reduce winter costs. If the rancher waits until the next calving season to find out which heifers do not calve, the winter feed expense will still be lost and there will be no calf to help pay the bills. Money can be better spent in properly feeding cows that are pregnant and will be producing a saleable product the following fall.
3. Identifying the open heifers shortly after the breeding season (60 days) will allow for marketing the heifers while still young enough to go to a feedlot and be fed for the choice beef market. The grading change of several years ago has a great impact on the merchandising of culled replacement heifers. B maturity carcasses, those estimated to be 30 months of age or older, are no longer allowed to be graded choice, and may be discounted because of new Bovine Spongiform Encephalopathy export rules. Therefore, it is imperative to send heifers to the feedlot while they are young enough to be fed for four to five months and not be near the B maturity age group. Auction barn order buyers will be especially leery of heifers that may be near 18 to 20 months of age because B maturity beef receives a considerable discount when harvested at the packing plant.

Certainly the percentage of open heifers will vary from ranch to ranch. Do not be concerned if after a good heifer development program and adequate breeding season, it is found that 10% of the heifers still are not bred. These are the very heifers that you want to identify early and remove from the herd. It just makes good business sense to identify and cull nonpregnant replacement heifers as soon as possible.

Growing Bred Replacement Heifers

Bred replacement heifers that will calve in several months need to continue to grow and maintain body condition. Ideally, 2-year-old heifers should be a body condition score (BCS) 6 (Figure 21.2) at the time that their first calf is born. This allows them the best opportunity to provide adequate colostrum to the baby, repair the reproductive tract, return to heat cycles, rebreed on time for next year, and continue normal body growth. From breeding until calving time, the heifers need to gain 1 lb to 1.5 lbs/hd/day, assuming they are in good body condition after the breeding season. Heifers will need supplemental protein if the major source of forage in the diet is Bermudagrass, native pasture, or grass hay. If the forage source is adequate in quantity and average in quality (6% to 9% CP), heifers will need about 2 lbs of a high protein (38% to 44% CP) supplement each day. This will probably need to be increased with higher quality hay such as alfalfa or additional energy feed (20% range cubes) as winter weather adds additional nutrient requirements. Soybean hulls or wheat middlings may also be used to ensure adequate energy intake of pregnant heifers.

Wheat Pasture for Bred Heifers

Although the wheat pasture can be used for gain of stocker cattle or weaned replacement heifers more efficiently, wheat pasture, if adequate rainfall produces growth, can be used as a supplement for pregnant replacement heifers. Using wheat pasture judiciously makes sense for pregnant heifers for two reasons. Pregnant heifers consuming full feed of wheat pasture will gain about 3 lbs/hd/day. If they are on the wheat too long, the heifers can become very fat and cause dystocia (calving difficulty). If wheat pasture is used for bred heifers, use it as a protein supplement by allowing the heifers access to the wheat pasture on at least alternate days. Some producers report that one day on wheat pasture and two days on native or Bermudagrass works better. This encourages heifers to rustle in the warm season pasture for the second day, rather than just stand by the gate waiting to be turned back into the wheat. Whatever method is used to grow the pregnant replacement heifers, plan to have them in good body condition by calving so that they will grow into fully-developed productive cows.

Body Condition Score at Calving is Key

One of the major constraints in the improvement of reproductive efficiency of beef cows is the duration of the post-calving anestrous period. If cows are to maintain a calving interval of one year they must conceive within 80 to 85 days after calving. Body condition at calving time determines to a great extent the rebreeding performance of beef cows in the subsequent breeding season. Based on research of mature and young cows from several studies, cows that maintained body weight, and ample energy reserves before parturition, exhibited estrus sooner than cows that lost considerable body weight and consequently had poor energy reserves.

Body weight change during pregnancy is confounded with embryo and placenta growth. Therefore the estimation of body fat by use of body condition scores is more useful in quantifying the energy status of beef cows. The numeric system of body condition scoring is an excellent estimator of percentage body fat in beef cows. BCS accounted for 85% to 91% of the variation in stored body energy in cows. Examples of different body condition scores are shown in Figure 21.2.

The processes of fetal development, delivering a calf, milk production, and repair of the reproductive tract are all physiological stresses. These stresses require the availability and utilization of large quantities of energy to enable cows to be rebred in the required 85 days. Add to these physiological stresses the environmental stresses of cold, wet weather on spring calving cows, and often energy intake of range beef cows is below body maintenance needs. As the intake falls short of the energy utilized, then the cow compensates by mobilizing stored

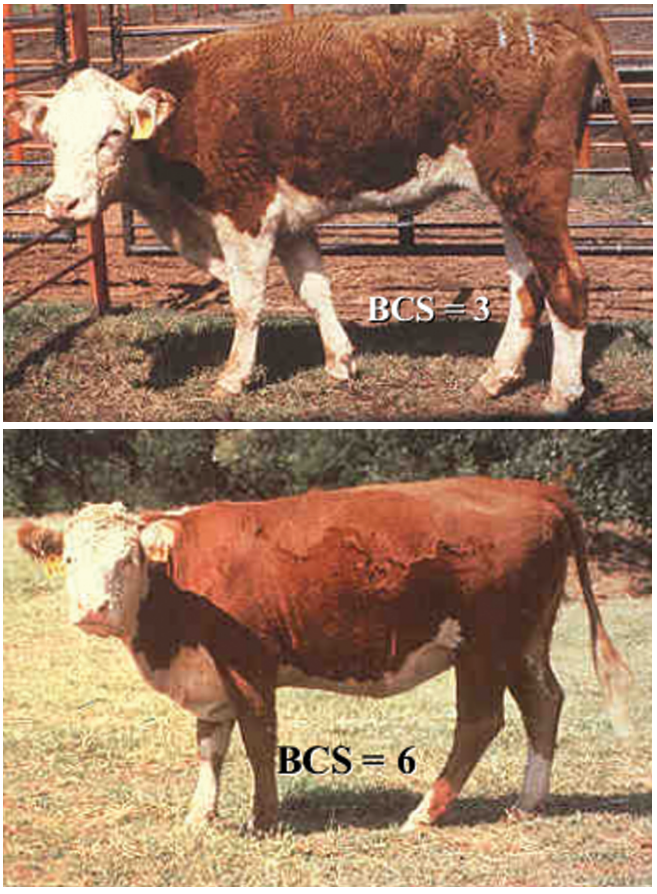

Figure 21.2 – A very thin heifer BCS 3 (top) and a correctly developed heifer BCS 6 (bottom).

energy or adipose tissue and over a period of several weeks, a noticeable change in the outward appearance of the cow takes place. This is a change in the body condition and can be monitored by assigning body condition scores to cows and quantifying the degree of change. Cows that are in a thin body condition at calving return to estrus slowly. Postpartum increases in energy intake can modify the length of the postpartum interval. However, increases in the quality and quantity of feed to increase postpartum body condition can be very expensive. Can the improvement in reproductive performance achieved by expensive postpartum feeding to thin cows be adequate to justify the cost of the additional nutrients?

What if Heifers are Thin at Calving?

Oklahoma scientists used 81 Hereford and Angus x Hereford heifers to study the effects of BCS at calving and post-calving nutrition on rebreeding rates at 90 and 120 days after calving (Bell et al.). Heifers were divided into two groups in November and allowed to lose body condition or maintain body condition until calving in February and March. Each of those two groups was then redivided to either gain weight and body condition postpartum or to maintain body condition postpartum. Figure 21.3 illustrates the change in body weight of heifers that calved in a BCS 5 or greater or those that calved in a BCS less than or equal to 4.9. The same pattern that has been illustrated in the other experiments is manifest clearly with these heifers.

Thin heifers that were given ample opportunity to regain weight and body condition after calving actually weighed more and had greater body condition by eight weeks than heifers that had good body condition at calving and maintained their weight through the breeding season. However, the rebreeding performance (on the right side of the legend of the graph) was significantly lower for those that were thin (66%) at parturition compared to heifers that were in adequate body condition at calving and maintained condition through the breeding season (91%).

Post-calving increases in energy and, therefore, weight and body condition gave a modest improvement

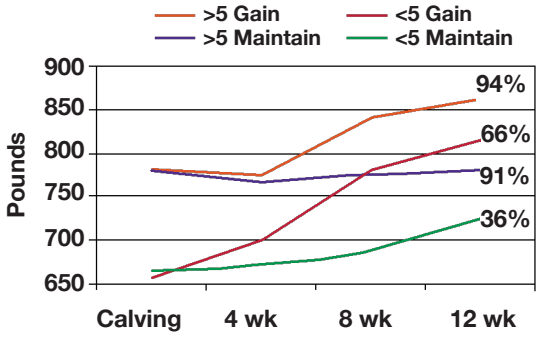

Figure 21.3 – Postpartum body weight of heifers with body condition greater than 5 or less than 5 at calving and fed to gain or maintain weight. Pregnancy rates are indicated on the right side of the graph. Source: Bell et al.

in rebreeding performance, but the increased expense was not adequately rewarded. The groups that were fed to maintain postpartum condition and weight received 4 lbs of cottonseed meal supplement (41% CP; $0.13/lb) per day. The supplement cost for the 69-day-feeding period was approximately $36 per cow. The cows in the gain groups were fed 28 lbs of a grain mix (12% CP; $0.073/lb) at a total supplement cost of $141. Both groups had free choice access to grass hay (Wettemann). The improvement in reproductive performance (66% pregnant versus 36% pregnant) of the thin 2-year-old heifers was not enough to offset the large investment in feed costs.

Other data sets have shown conclusively that cows that calve in thin body condition but regain weight and condition going into the breeding season rebreed at a slower rate than those that calve in good condition and maintain that condition into the breeding season. Table 21.3 from Missouri researchers illustrates the number of days between calving to the return to heat cycles depending on body condition at calving and body condition change after calving.

This data clearly shows that young cows that calve in thin body condition (BCS 3 or 4) cannot gain enough body condition after calving to achieve the same rebreeding performance as cows that calve in moderate body condition (BCS 5.5) and maintain or lose only a slight amount of condition. Cows must rebreed 85 days after calving to calve again at the same time next year. Notice that none of the averages for cows that calved in thin body condition were recycling in time to maintain a 12 month calving interval. The body condition score target for 2-year-old heifers at calving should be 6. This condition score will give the heifer the best opportunity to calve with no additional threat of dystocia and the very best opportunity to rebreed in 85 days.

Sort Young Cows from Mature Cows

First calf heifers have historically been the toughest females on the ranch to get rebred. They are being asked to continue to grow, produce milk, repair the reproductive tract, and have enough stored body energy (fat) to return to heat cycles in a short time frame. Two-year-old cows must fill all of these energy demands at a time when their mouth is going through the transition from baby teeth to adult teeth. If these young cows are pastured with the larger, older cows in the herd, they

Table 21.3 – Predicted number of days from calving to first heat as affected by body condition score (BCS scale 1 = emaciated; 9 = obese).

	Condition score change after calving to day 90						
BCS at Calving	-1	-0.5	0	0.5	1	1.5	2
3	189	173	160	150	143	139	139
4	161	145	131	121	115	111	111
5	133	116	103	93	86	83	82
5.5	118	102	89	79	72	69	66

Source: Lalman et al.

very likely will be pushed aside when the supplements are being fed in the bunk or on the ground. The result of these adverse conditions for young cows very often is a lack of feed intake and lowered body condition. Of course, lowered body condition in turn results in delayed return to heat cycles and a later calf crop or smaller calf crop the following year.

North Dakota State University data of commercial cow herds recorded over a 21 year period illustrates the differences in size of very young cows and the very mature (11-year-old+) cows (Figure 21.4). Very young cows and very old cows cannot compete with middle age cows that weigh 200 lbs to 250 lbs more.

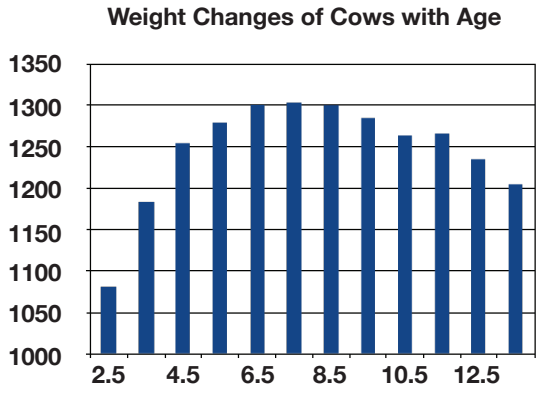

Figure 21.4 – The average weight of commercial beef cows in North Dakota SPA data by year of age. Source: Ringwall.

Cost of Replacement Heifer Development

Detailed information about growing heifer costs is located at http://www.csubeef.com/content/view/70/71 and is from Colorado State University in the form of an EXCEL spreadsheet.

This will allow producers to address the question of buying versus raising replacement heifers from a strictly economic basis. It does NOT address the increased risk of introducing diseased cattle into the herd if replacements are purchased from an unknown source.

Conclusion

Properly immunize heifers at 2 months, weaning, and at 1 year of age according to a veterinarian's recommendation. Heifers must reach 65% of their mature weight by the start of the breeding season. The most economical growing program for replacement heifers utilizes standing or harvested forages as a major portion of the diet. Heifers may be grown slowly then given higher energy feed to accelerate the rate of gain to achieve the required 65% of mature size by the start of the breeding season.

Utilize the highest quality hays and/or the best pastures because young cattle cannot utilize low quality roughage as well as mature cows. Use an ionophore to improve feed utilization and hasten the onset of puberty.

Breed replacement heifers three to four weeks ahead of the adult cows. Cull all open heifers after the first breeding season. Grow bred heifers adequately so that they have a BCS 6 at calving time. Sort young cows, 2- and 3-year-olds, from older, larger cows to ensure adequate feed intake for young, growing, but smaller cows.

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