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# Replacement Heifer Development: Part I - Management Tips

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*Johnny Rossi & Timothy W. Wilson, Extension Animal Scientists  
Mel Pence, Veterinary Field Investigator, College of Veterinary Medicine*

## Introduction

Effective replacement heifer development is critical in order to maintain an efficient cow-calf operation. Heifers represent the future of the cow herd, and management decisions should reflect the overall goals of the operation. When choosing replacement heifers, consider a few factors such as genetics, breed type, structure and maintaining a short duration breeding season. To provide the greatest return for your operation, manage heifers to calve at two years of age. Although a heifer may wean a smaller calf when calving at two versus three years of age, the heifer will produce one more calf during her lifetime.

## Selection

Producers normally replace 15 to 20 percent of their cow herd each year, which requires 35 to 55 percent of the weaned heifers to be retained. Expenses related to the heifer development process can be substantial, so management should not be compromised. Heifers born earlier in the calving season will be heavier, more likely to reach puberty earlier, and attain acceptable weights for breeding compared with younger, lighter heifers; therefore, potential replacement heifers should be born early in the calf crop. Careless selection could result in low pregnancy rates and lead to a high percentage of heifers needing to be replaced the following year. Of these heifers, additional selection criteria must be considered, such as individual dam records, structural soundness, and disposition to eliminate unwanted females. Other considerations may include color, horned or polled, and breed make-up, which add uniformity to the cow herd.

### *Puberty*

The importance of proper development from weaning to breeding cannot be overstated. Heifers that reach puberty early in the development period are more likely to conceive earlier in the breeding season. In turn, these heifers will calve early in the following calving season and are more likely to re-breed and “fit” the herd’s calving season. Heifers that are delayed in reaching puberty will breed later and should be culled. Within a contemporary group, beef heifer puberty is primarily controlled by three factors: age, nutrition, and genetics. Age can be accounted for in a contemporary group by selection. For a discussion on replacement heifer nutrition refer to Georgia Cooperative Extension Bulletin 1343-2, Replacement Heifer Development: Part II – Nutrition. Generally, age at puberty is earliest for British breeds, intermediate for Continental breeds, and latest for Brahman influenced breeds. Heifers should reach approximately 60 to 65 percent of their mature weight at breeding. Weight can also affect pubertal status. Genetics has less influence on puberty when selecting for traits specific for reproduction, since reproductive traits are lowly heritable, but they should not be ignored.

## **Birth to weaning**

During this period of development, the heifer is cared for by the dam and generally consumes only milk and pasture forages. Some producers use management practices such as creep feeding and growth promoting implants during this period to increase rate of gain. Both of these practices can have negative effects on future productivity and must be carefully evaluated prior to implementation.

### *Creep feeding*

Creep feeding replacement heifers with an unlimited high energy creep feed is not advisable. Creep feeding can cause a later decrease in milk production of heifers and result in lower weaning weight of their calves. Excessive weight gain prior to puberty will impair mammary tissue growth and development (*Buskirk et al., 1996*). Several studies have shown a 20 to 30 percent reduction in milk production of heifers that were creep fed prior to weaning. Manage heifers that may be selected for development separately from calves that will use creep feeding. When growth rates are severely impaired due to poor quality pasture or hay, creep feeding may be the only option. However, these feed resources may be better used after weaning rather than prior to weaning.

### *Utilizing growth implants*

Do not implant heifers identified as replacement females. Implants used for growing calves are Ralgro®, Compudose®, and Synovex-C®. Implant the remaining heifers that will be marketed to take advantage of the added weight gain. Heifer calves that are not yet identified as replacement heifers or feeder heifers can be implanted once if label directions are carefully followed. Using an approved product listed previously and administering it according to labeled directions is extremely important when using implants in potential replacement heifers. When choosing an implant for replacement heifers, determine if the implant is approved for heifer calves and identify the proper age to administer the implant. Implanting at the wrong age can have substantial negative effects on reproductive performance. Some producers believe that implanting heifers can affect the age at puberty. Age of puberty is not improved by implanting. Research has shown that implanting heifer calves will increase yearling pelvic area, but the difference is negligible by calving time (*Selk, 1997*). Dystocia may be reduced, in some cases, when heifers are implanted twice; however, these heifers may have reduced pregnancy rates. If replacement heifers cannot be identified early in life and must be implanted, it is recommended to implant only one time prior to weaning. Implanting according to the manufacturer's recommendations should have minimal effects on reproduction.

## **Weaning to Breeding**

### *Heifer target weight calculations*

To maximize reproductive efficiency, develop heifers to reach a target weight at the start of the breeding season. Target weight equals 65 percent of the estimated mature weight of the heifer. Mature weight is estimated by determining the frame score of the heifer. Research has demonstrated that heifers can be developed to reach target weights ranging from 50 to 65 percent. There are many pros and cons producers must consider when determining the target weight they want to achieve. Only 50 percent of heifers will be cycling if they weigh 55 percent of their mature weight compared with 90 percent of heifers cycling when weighing 65 percent of their mature weight (*Sprott and Troxell, 1988*). Striving to reach a target weight at breeding of approximately 65 percent should result in an adequate weight for puberty to occur (*Patterson et al., 1992*). Target weights for breeding can be estimated using frame score and the estimated mature weight for that frame score. Frame score is determined using hip height and age. Table 1 lists the age and hip height for frame scores 3 to 7. To determine the frame score of a heifer, the approximate age of the heifer in months must be

determined. Next, a hip height measurement must be taken. To do this, position the heifer on a flat surface with her head in its normal position. Once calm, hip height can then be measured directly over the hooks. Using this information along with Table 1, an estimated mature weight and 65 percent target weight can be determined.

A few steps can be taken to determine the daily gain required to reach the estimated target weight.

- 1) Refer to Table 1 and determine the target weight.
- 2) Subtract the current weight from the target weight. This number is the total pounds of gain necessary to reach the target weight.
- 3) Calculate the number of days between the present time and breeding.
- 4) Divide the pounds of gain needed from step two by the number of days to breeding calculated in step three.
- 5) Adjust your ration to insure each heifer reaches her individual target weight by the beginning of the breeding season. You may need to separate heifers into different feeding groups to achieve this goal.

**Table 1. Hip height (inches), frame score, mature weight, and target weight for heifers**

<b>Age (months)</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
6	38.2	40.3	42.3	44.4	46.5
7	39.2	41.2	43.3	45.3	47.4
8	40.1	42.1	44.1	46.2	48.2
9	40.9	42.9	44.9	47.0	49.0
10	41.6	43.7	45.7	47.7	49.7
11	42.3	44.3	46.4	48.4	50.4
12	43.0	45.0	47.0	49.0	51.0
Mature Weight (pounds)	1,030	1,100	1,175	1,250	1,320
Target Weight (pounds)	670	715	764	813	858

*Beef Improvement Federation Guidelines (1996).*

### ***Reproductive Tract Scoring***

One method of identifying the genetic ability of a heifer to reach puberty within a contemporary group is by examining her reproductive tract for maturity. The Reproductive Tract Scoring system is based on a scale from 1 to 5, with 1 being very immature and 5 sexually mature (Table 2). This system can be used to identify and cull heifers that are less likely to become pregnant early in the breeding season. Do Reproductive Tract Scoring approximately 30 to 60 days prior to breeding, and remove any heifer receiving a score of a “one.” Removing these heifers will result in cost savings related to feed and breeding. Your veterinarian can help you in scoring your heifers’ reproductive tracts. Weight is critical to heifers achieving acceptable reproductive tract scores. If heifers are fed to reach their target weight by the start of the breeding season, culling due to low reproductive tract scores will be minimal.

**Table 2. Description of reproductive tract scores**

Tract Score	Uterine horns	Length (mm)	Height (mm)	Width (mm)	Ovarian structures
1	Immature <20 mm diameter, no tone	15	10	8	No palpable follicles
2	20 to 25 mm diameter, no tone	18	12	10	8 mm follicles
3	25 to 30 mm diameter, slight tone	22	15	10	8 to 10 mm follicles
4	30 mm diameter, good tone	30	16	12	>10 mm follicles, corpus luteum possible
5	>30mm	>32	20	15	>10

*Adapted from Anderson, et al., 1991*

## Herd Health

Herd health is crucial in developing replacement heifers, to protect against unwanted diseases that result in reduced fertility or abortions. Producers should contact their local veterinarian for specific suggestions related to vaccination schedule suggestions. The following are suggested procedures that can be used as a reference.

### Home raised heifers

- 1) At 4 to 6 months of age, use an approved Modified Live Virus product to vaccinate calves nursing pregnant cows for IBR, PI3, BVD, BRSV, 7-way Clostridia (7-way Black Leg), and 5-way Lepto/vibrio.

Booster heifers three weeks after primary vaccination if label instructions require a booster.

Vaccinating for Brucellosis, Pasteurella, and Pinkeye are optional.

Use parasite control as needed.

- 2) Yearling Age: Re-vaccinate for IBR, BVD and, 5-way Lepto/Vibrio, and deworm.

### Purchased heifers: Biosecurity of newly purchased heifers

- 1) Isolate 30 to 60 days (Do not add to herd 30 days pre-calving to 30 days post calving).

Test on arrival for BVD-PI and Lepto.

Vaccinate on arrival for IBR, BVD, PI3, BRSV, Lepto and Vibrio, and deworm.

Booster as required by vaccine label.

## Early Weaning

Heifers should be a Body Condition Score of 6 at calving. When heifers are in a BCS of less than 5 at calving, reproductive potential will likely be reduced. Increasing nutrition will improve pregnancy rates but not enough to maintain high pregnancy rates and a yearly calving interval (*Bell et al., 1990*). To achieve high ( $\geq 90$  percent) pregnancy rates and maintain a yearly calving interval, implement alternative management strategies. The most effective management practice is to wean the calf early to remove the demands of lactation on the cow. This management practice is often used with first calf heifers. However, early weaning can also be an effective management tool to increase re-breeding rates in thin, mature cows.

In most herds, first calf heifers have the lowest body condition at the beginning of the breeding season. These heifers will likely need some cessation of nursing by reduced exposure to the calf or by weaning the calf to achieve higher re-breeding rates. Early weaning of the calf at the initiation of the breeding season will result in high re-breeding rates if adequate supplementation is supplied. Removing the demands of lactation greatly reduces energy and protein requirements. Calves should be a minimum of 60 days old prior to weaning. Calves at this age can consume dry feed or pasture plus a concentrated supplement.

Table 3 shows the weights and condition scores of heifers that had their calves weaned at the start of the breeding season or weaned after the end of the breeding season. Weight and body condition score at the end of the breeding season were greater for heifers that had early versus normal weaned calves. Most importantly, heifers that had their calves weaned at the start of the breeding season had a 90 percent re-breeding rate versus only 50 percent for heifers that nursed their calf throughout the breeding season. Another advantage to early weaning is decreased feed costs of the cow. Cows will consume about 20 to 30 percent less feed after early weaning compared with lactating cows and will gain significantly more weight than lactating cows. Research has also shown that TDN requirements are approximately one-third less for a dry first calf heifer to maintain equal condition scores as a lactating first calf heifer (*NRC, 2000*). This would represent a substantial reduction in feed costs for fall calving cows, which are fed harvested feeds through much of the lactation period. The improvements in pregnancy rates and reduced feed costs make early weaning the best option for cows that are below the desired body condition score at breeding time. A high quality diet must be supplied to the early weaned calf. High quality pasture such as ryegrass, rye, wheat, and/or clover and supplemental grain at 1 percent of body weight per day can produce similar gains in early weaned calves compared with calves nursing (*Arthington, 2002*). Calves will not gain at acceptable levels if allowed to graze perennial pastures such as fescue, bermudagrass, or bahiagrass. Gains will still be lower than nursing calves if fed supplemental grain when grazing perennial pasture. Early weaned calves can also be fed a grain based diet to achieve acceptable gains (*Lusby et al., 1991*). Refer to Georgia Cooperative Extension Special Bulletin #53 for example rations for early weaned calves. The bulletin can be accessed at: <http://pubs.caes.uga.edu/caespubs/pubcd/SB53.htm>.

**Table 3. Effect of early weaning first calf heifers on weight and body condition score**

Item	Beginning of breeding season <sup>a</sup>	End of breeding season	Weaning <sup>b</sup>
Normal weaned weight, lbs	941	919	982
Early weaned weight, lbs	907	954	1,074
Normal weaned, BCS	3.88	4.27	4.50
Early weaned, BCS	3.9	5.11	6.25

<sup>a</sup>Initial weight was collected at the start of the breeding season

<sup>b</sup>Final weight was collected at weaning

*Adapted from J.D. Arthington, 2002*

## Summary

Manage heifers to first calve at two years of age. They need to conceive early in the breeding season to maximize lifetime production and efficiency. Heifers should weigh 65 percent of their estimated mature weight at the start of the breeding season. Early weaning is an option for heifers with poor (<5) body condition to improve re-breeding rates.

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