



# Repro Tracks

► by **Cliff Lamb**, University of Florida

## Heifer development

One key to success the Angus Journal is focusing on for February is herd nutrition. An area of the beef cow-calf enterprise that requires sound nutritional management is in the area of heifer development.

### Selecting replacements

In most herds, 15%-20% of the cow herd is replaced annually by replacement females.

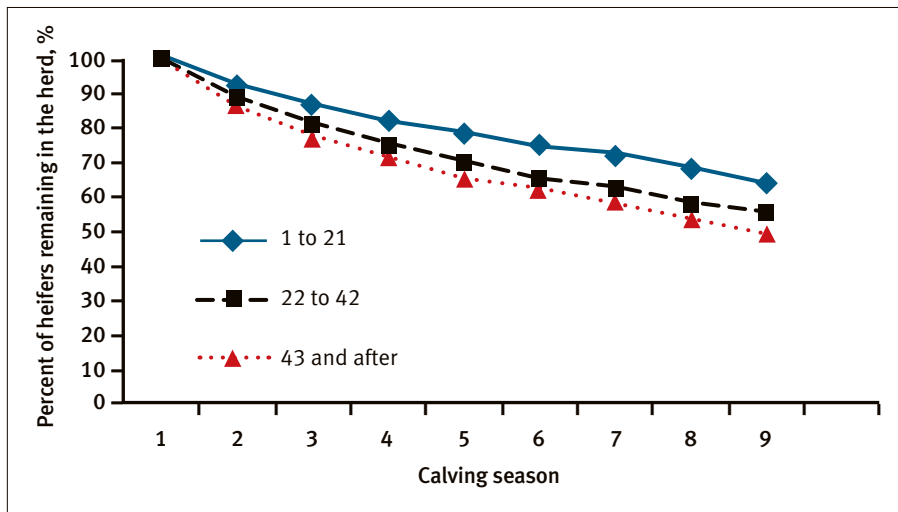
These replacement females represent the future genetics of the operation and could dictate the ultimate



profitability of the operation. However, failure to focus on sound development of heifers results in decreased reproductive performance and subsequent longevity of those females in the herd. Below I have addressed a few

questions that have been raised regarding development of heifers and their impact on lifetime productivity.

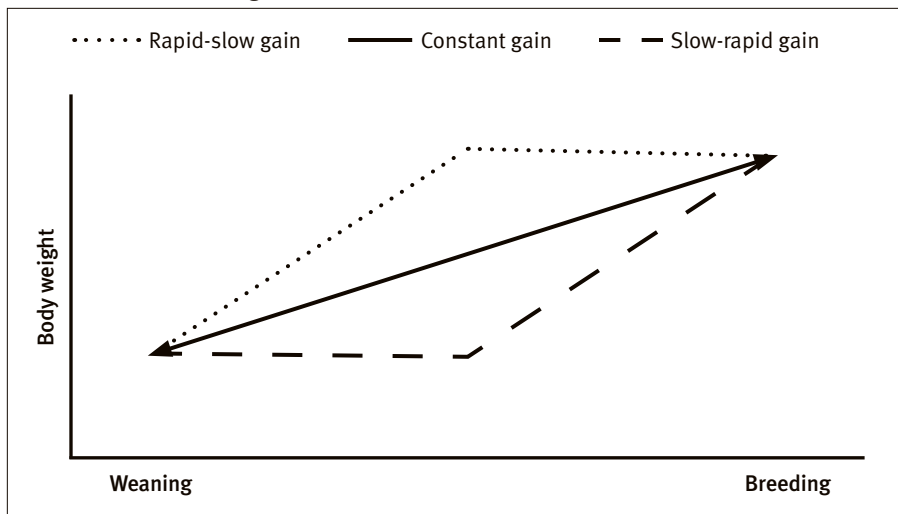
**Fig. 1: Herd survival analysis for heifers based on calving period during the first calving season as a heifer**



**Note:** Heifers that calved in the first 21 days of their first calving season were more likely to remain in the herd to produce a fifth calf.

**Source:** Cushman and Perry et al., 2012.

**Fig. 2: Illustration of different patterns of gain for replacement heifers from weaning to the start of the breeding season**



### Why is it important to have heifers give birth to their first calf early in the breeding season?

Yearling beef heifers that conceive early in their first breeding season and calve early as 2-year-olds will have greater lifetime productivity than heifers that calve at older ages. Heifers that produce their first calves early in the calving season tend to continue to calve early in subsequent calving seasons, resulting in increased production and efficiency.

An examination of the performance of heifers (n = 16,549) during a 21-year period at the U.S. Meat Animal Research Center (USMARC) in Clay Center, Neb., demonstrated that heifers that calved in the first 21 days of their first calving season were more likely to produce a fifth calf than those that calved later (see Fig. 1). These heifers weaned a heavier calf through their sixth calving season; thus, indicating that managing replacement heifers to become pregnant earlier in the breeding season to calve early in the calving season is of greater economic benefit to the cow-calf producer than any other single trait.

Strategically adjusting the feeding regimen to result in increased pregnancy rate for a greater majority of heifers to become pregnant at the beginning of the breeding season is critically important to beef producers.

### At what age and weight should my heifers be when I start the breeding season?

Heifer development continues to be one of the largest expenses to cow-calf operations primarily due to the cost of feed. Generally, replacement heifers should be bred to calve at 24 months of age in order to maximize lifetime productivity of breeding females. Therefore, heifers should conceive at 15

months of age and achieve puberty at 13-14 months of age because heifers are infertile on the pubertal estrous cycle.

For heifers to achieve puberty at 13-14 months of age, adequate nutrition is required to provide moderate rates of gain postweaning [1.5 to 2.0 pounds (lb.) per day] such that heifers can achieve a critical body weight prior to achieving puberty.

Body weight is a primary determinant of puberty attainment in beef heifers. Beef heifers usually achieve puberty at 52%-60% of mature body weight. When developing replacement heifers, a target body weight method has been used where heifers are provided a level of nutrition that will allow them to reach 60%-65% of mature body weight prior to the breeding season.

The rate of gain needed to reach the target body weight depends upon body weight at weaning and number of days until start of the breeding season. In recent years, there has been significant discussion on the use of a threshold that is lower than 60%. However, these strategies tend to be more ideal in well-managed, low-input cow-calf systems that expect lower overall pregnancy rates. Therefore, for producers expecting high pregnancy rates, a 60%-65% target is more ideal.

One factor that may impact attainment of puberty in heifers is age. Research indicates that a minimum age, as well as minimum body weight, is required for heifers to achieve puberty. Thus, in some cases, heifers fed for increased rates of gain surpass the minimum body weight by the time they reach the minimum age necessary to attain puberty. This would result in these heifers having increased body weight at puberty. Thus, heifer-development programs should consider both a target body weight and minimum age, which may reduce feed costs of developing replacement heifers.

### **Does the pattern of body weight gain affect pregnancy success in replacement heifers?**

The pattern of body weight gain prior to breeding can impact attainment of puberty by beef heifers. Heifer-development programs can be designed for heifers to gain

weight rapidly early postweaning, then maintain weight until the start of the breeding season, have a constant rate of gain up to the start of breeding, or maintain weight early postweaning, then gain weight rapidly just prior to breeding. These are illustrated in Fig. 2.

The primary method is to use a constant rate of gain from weaning to start of breeding. This method requires only moderate energy intake and supplemental feed. Using either of the other methods will require greater energy intake

during the rapid-gain period, but equal or less total supplemental feed through the entire feeding period to attain similar body weight prior to breeding.

This may not necessarily decrease feed costs because a more expensive feed will be needed for the rapid-gain period. Feed costs associated with using slow-rapid gain vs. constant gain will depend on relative price of feed ingredients. The advantage of the slow-rapid gain method is that a lighter animal is maintained longer, which will reduce feed required for maintenance.

Using the rapid-slow gain method may seem counterintuitive because a heavier animal must be maintained late in the feeding period, which would increase feed required for maintenance. However, if less-expensive, high-quality feedstuffs, such as higher-quality forage, are available early postweaning, then this method may reduce heifer-development costs.

Previous research evaluating pattern of body weight gain from weaning to breeding indicates that these methods can be successfully used to develop replacement

heifers. However, an important aspect is the length of time heifers were fed a high-energy diet. In studies where heifers were fed for rapid gain for only 60 days, age at puberty and proportion of heifers cycling prior to breeding was reduced in the slow-rapid gain heifers even though body weight prior to breeding was similar to constant gain heifers.

In contrast, studies where heifers were fed for rapid gain for 80 to 90 days either early postweaning or immediately prior to the breeding season have reported similar age at puberty and pregnancy rates to constant-gain heifers. Therefore, if slow-rapid or rapid-slow gain methods are used to develop replacement heifers, heifers should be fed a high-energy diet for a minimum of 80 days prior to reaching the target body weight, whether this is early postweaning or immediately prior to start of the breeding season.

### **Summary**

The primary objective of a beef cattle producer is to produce one live calf from every cow once a year. Many factors account for the failure of heifers and cows to maintain that yearly calving interval. The nutrition/reproduction interaction is a complex system involving many interactions between nutritional components and physiological signals, but the greatest opportunity for a heifer to become a productive cow is to ensure that she becomes pregnant early in her first breeding season, and sound nutritional management of replacement heifers is a key component to ensure successful lifetime productivity of those heifers in the herd.



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**Editor's Note:** *Cliff Lamb is a beef cattle specialist for the University of Florida and coordinator of the Florida Bull Test.*

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