REPRO TRACKS

by Cliff Lamb, Texas A&M University

Developing Replacement Heifers

The efficiency of developing heifers from weaning until breeding has a major impact on the overall profitability of cow-calf operations.

To ensure satisfactory performance during the first breeding season, replacement heifers must be subjected to an adequate development program.

A program should provide proper conditions for heifers to conceive, maintain full-term pregnancies, calve without assistance, wean a healthy calf and conceive again as first calf-heifers.

Knowledge of the basic physiology underlying heifer performance and the available breeding preparation strategies is important. This awareness allows producers to adjust their replacement heifer system and increase the economic returns of their operations.

Puberty and nutrition

Age at puberty is a major factor influencing reproductive success of heifers. Ideally, they should reach puberty approximately 60 days before the beginning of their first breeding season, increasing their chances of becoming pregnant and allowing them to conceive earlier in the season.

The timing of first conception is also important to the overall productivity of a heifer. Females that calve at the beginning of their first calving season have shown a greater probability of pregnancy in the subsequent breeding season when bred as first-calf heifers. Therefore, increasing the proportion of females calving earlier can increase the economic returns for cow-calf producers.

Management strategies that lower the age at which heifers reach puberty can have a great impact on the reproductive efficiency and positively affect overall profitability for the producer.

The period of time preceding puberty is called the peripubertal period. From a hormone (endocrine) standpoint, this is characterized by dominant follicles (containing oocytes) that fail to ovulate as a result of negative feedback of estradiol, which is secreted from the follicle and inhibiting secretion of gonadotropin releasing hormone (GnRH) in the hypothalamus.

This negative feedback of estradiol decreases as puberty approaches and allows the secretion of GnRH, which ultimately leads to ovulation of a follicle and attainment of puberty.

Nutrition is a key factor influencing the age at which heifers attain puberty and, consequently, reproductive performance. An adequate plane of nutrition is required for pregnancy to occur.

When establishing the nutritional scheme for a heifer development program, it is important to consider that beef heifers generally reach puberty at 55–60% of their expected mature body weight.

With that in mind, the use of a target average daily gain (ADG) is a common and effective way to prepare heifers for breeding. It is recommended that heifers achieve 60–65% of their mature body weight before the breeding season starts.

A nutritional program should be capable of providing sufficient energy and protein to heifers so they can attain this final target weight before the beginning of the breeding season.

Pelvic area measurements and reproductive tract score

Dystocia, or calving difficulty, is a concern for heifer development and management. The incidence of dystocia is increased in heifers not fully grown at the time of first calving. Heifers with small pelvic areas are more likely to have greater calving difficulty.

The measurements of pelvic area can help producers determine which animals are ready to be exposed to breeding and decrease the risk of dystocia by helping them select animals with larger birth canals.

Another valuable pre-breeding strategy is the use of reproductive tract scores (RTS). The RTS system is utilized to assess reproductive maturity and determine a heifer's ability to conceive.

Through rectal palpation or ultrasonography, reproductive tract structures may be evaluated. Each heifer receives a score from 1 to 5 (Table 1) based on uterine and ovarian characteristics. This information allows producers to select heifers with greater chances of becoming pregnant as replacement heifers and to potentially cull females that mature later than desired.

Table 1. Reproductive tract score (RTS) description.

RTS	Uterine Horns	Ovarian Structure
1	<20 mm diameter, no tone	No palpable structure
2	20–25 mm diameter, no tone	8 mm follicles
3	25–30 mm diameter, slight tone	8–10 mm follicles
4	30 mm diameter, good tone	>10 mm follicles, corpus luteum possible
5	>32 mm diameter, good tone, erect	>10 mm follicles, corpus luteum present

Adapted from Anderson et al., (1991).

Herd health

Adequate herd health is essential for optimal performance. Several diseases (such as Infectious Bovine Rhinotracheitis, Bovine Viral Diarrhea, brucellosis, leptospirosis, trichomoniasis, campylobacteriosis, neosporosis) can cause embryonic loss and abortion, which result in significant economic losses. Fortunately, the majority of diseases in heifers can be controlled with proper vaccination protocols and adequate nutrition.

Standard vaccination protocols are available in Table 2, but working closely with veterinarians once they have become familiar with the operation and the local diseases that can impact the herd is advisable.

The veterinarian also has an important role in establishing management strategies that assist in the control of infectious diseases. An example of a management strategy is the breeding soundness examination (sometimes referred to as a BSE) of bulls prior to the breeding season, which helps control certain diseases and prevent poor results related to male infertility.

The control of parasites is also important. Adequate deworming protocols are required to guarantee optimum fertility and animal performance.

The profitability of cow-calf operations depends on an adequate heifer replacement system. The reproductive performance of heifers relies on the use of adequate management strategies during the prebreeding period.

Understanding the mechanisms controlling the age of puberty can help producers comprehend the available heifer development strategies and customize a development program that fits their own operations. AJ

Editor's Note: Cliff Lamb is the animal science department head and a professor at Texas A&M University in College Station, Texas.

Table 2. Standard vaccination protocol.*

Vaccine	Period of Vaccination
Clostridium	3 months and weaning
IBR	Weaning and prior to breeding
BVD-PI3	Weaning and prior to breeding
BRSV	Weaning and prior to breeding
Brucellosis**	4–12 months
Campylobacteriosis (Vibriosis)	Weaning and prior to breeding
Leptospirosis	Weaning and prior to breeding

*Producers should work with their veterinarian to choose a vaccination protocol that fits their operation.
**States with brucellosis-free status do not require vaccination.