Management of heifers to achieve sound reproductive performance

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Most beef producers replace up to 20% of their mature cows each year with heifers. Those heifers represent the future genetics and profit potential of the operation. However, beef producers today are faced with several decisions that impact the productivity of their operations, of which selecting and managing replacement beef heifers is critical to sustaining an ever decreasing profit margin. The unique challenge that each cow/calf producer is faced with is that these decision now will affect the profitability of an operation for at least a decade. The mindset for a cow/calf producer needs to take into account how the heifers that are selected now, as replacements, will affect their operation in ten to twelve years from now.

Yearling beef heifers that conceive early in their first breeding season and calve early as 2-yr-olds will have greater lifetime productivity than heifers that calve at older ages. In addition, 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. Therefore, management decisions regarding replacement heifers should focus on factors that promote early onset of puberty and early calving. To ensure that heifers conceive early in the breeding season, it is critical that they attain adequate weight to initiate their first estrous cycle before the onset of the breeding season. Current management practices target heifers to reach 60 to 65% of their estimated mature body weight by the start of the breeding season, but little is known about the importance of the timing of this weight gain. Reproduction was not affected adversely in beef heifers when weight gain from weaning to breeding was delayed until the last half of development. Managing heifers to attain puberty with minimal feed inputs and then taking advantage of compensatory gains when forages are available may have economic advantages. Therefore, we evaluated the reproductive characteristics and total feed input of beef heifers developed from weaning until approximately 45 d before breeding on restricted gain followed by rapid weight gain in the final 45 d to achieve 65% of expected mature body weight by the onset of the breeding season. This management approach of minimizing feed inputs, maintaining a lower body weight heifer for a longer period of time, and taking advantage of the potential for compensatory gains may have economic advantages by decreasing the cost of heifer development and may potentially enhance fertility to first service artificial insemination.

Reproductive disease and inefficiency is the largest source of lost income for beef cattle producers, and feed cost is the largest issue affecting profitability in commercial beef cattle. When beef animals are in acceptable body condition given their stage of production, dietary nutrients are partitioned into maintenance, support of physiological functions, and the increase of body fat reserves. When diet nutrients are unable to meet basal requirements, or when animals are in poor body condition thus requiring increased nutrient partitioning into growth and body reserves, reproduction can be compromised. The metabolic and reproductive response by heifers of differing body condition to energy restriction and refeeding are dependent on length and intensity of the restriction or repletion. The impact of initial body condition alters the initial point at which the continuum for events leading to anestrus is accessed. Secretory characteristics of LH appear to be highly dependent on energy status (the combined influence of energy intake and body condition). Metabolic mechanisms leading to cessation or re-initiation of pulsatility and release of LH lag behind those activated to sustain life or growth. What is apparent from these findings is the fact that these mechanisms appear to be activated gradually, and that initial body

condition impacts the period of time females can remain cycling in spite of severe energy restriction.

For beef females, periods of reduced nutrient intake are analogous with losses in BW, BCS, decreases in luteal activity, and ultimately cessation of estrous cycles. In addition, body energy reserves, in the form of body fat depositions, can play a large role in determining the reproductive performance of females. In most beef production systems, cattle undergo fluctuations in body condition that are a result of the interaction between nutrient requirement based on production (lactation, pregnancy) and seasonal variability in available nutrients, often due to forage quality and/or quantity. We determined that body composition influences the ability of cyclic, pubertal beef females to maintain estrous cyclicity in response to energy restriction. Once heifers become anestrus, initial body composition had no effect on the time required for heifers to resume estrous cycles in response to energy repletion. However, initial body composition did influence the degree of fatness required to resume estrous cycles. These data suggest that cattle with higher BCS may withstand periods of nutritional stress longer before sacrificing reproductive efficiency, but may also require greater BCS after repletion to initiate estrous cycles.

Estrus synchronization and artificial insemination (AI) remain the most important and widely applicable reproductive biotechnologies available for cattle. Improving traits of major economic importance in beef cattle can be accomplished most rapidly through selection of genetically superior sires and widespread use of artificial insemination. Procedures that facilitate synchronization of estrus in estrous cycling heifers and induction of an ovulatory estrus in peripubertal heifers will increase reproductive rates and expedite genetic progress. Estrus synchronization can be an effective means of increasing the proportion of females that become pregnant early in the breeding season resulting in shorter calving seasons and more uniform calf crops. Females that conceived to a synchronized estrus calved earlier in the calving season and weaned calves that were on average 13 days older and 21 pounds heavier than calves from non-synchronized females. Effective estrus synchronization programs offer the following advantages: 1) heifers are in estrus at a predicted time which facilitates AI; 2) the time required for detection of estrus is reduced thus decreasing labor expense associated with estrus detection; 3) cattle will conceive earlier during the breeding period; 4) AI becomes more practical; and 5) calves will be older and heavier at weaning. To avoid problems when using estrus synchronization, heifers should be selected for a program when the following conditions are met: 1) replacement heifers are developed to prebreeding target weights that represent at least 60 to 65 percent of their projected mature weight; and 2) reproductive tract scores (RTS) are assigned to heifers at 45 to 60 days prior to initiation of the breeding season to eliminate those females with immature reproductive tracts.