Developing Beef Replacement Heifers on Roughage Diets

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Replacement heifer strategy is a critical component of productivity and longevity of mature cows. Short and Bellows[1] demonstrated nutrient composition and growth rate during the development phase play an important role in puberty age, first conception rate, and first calf productivity. Replacement heifers gaining <1.0 lb/day reached puberty later, conceived later in the breeding season, and had lower calf productivity than those gaining ≥1.5 lbs/day. Cushman, et al.[2], showed heifers conceiving early in the season will have significantly increased longevity and higher calf productivity over their lifetime. Conversely, Arije and Wiltbank[3] believe excessive weight gain may actually delay puberty, suggesting puberty may be restricted by age in heavy heifers and by weight in lighter heifers[4]. In north-central United States, many heifers are overfed due to an abundance of low-cost roughage and concentrate feed ingredients. Although little data suggests overfeeding has caused major instances of reproductive failure in replacement heifers, there is some evidence overfeeding and mismanagement have resulted in reduced longevity as they mature into multiparous cows[5]. Thus, there is a need to review replacement heifer development and management practices to maintain profitability of the cowherd.

Replacement heifer development goals: reach puberty by breeding season (at ~65% of mature weight), breed in the first 45 days of the season, maintain pregnancy to parturition, reach 85% of mature weight by parturition, carry calf to weaning while maintaining body condition, and rebreed the following season. Management supporting these goals clearly has genetic, environmental, and management components. During development phase, nutritional management will have the most impact on life-long productivity. Yet, genetic and environmental components cannot be ignored. Management philosophy must include the question, "are we selecting genetics to meet the feed we have or are we going to obtain the feed needed to support the genetics we want to propagate?" Nutrition protocol for functional heifer development needs to match the genetic-type selected. Days of 'roughing' heifers through the winter on low quality roughage alone are virtually gone – rapid growth of beef cattle genetics will not allow it. Substituting roughage and/or poor management with a high concentrate diet will not consistently yield good long-term results. High roughage diets balanced for energy and protein will consistently yield the best long-term results.

Heifer development programs can have many roughages (i.e., decent quality grass hay, corn stover, cereal grain straw). They should be tested to balance energy and protein. For example, replacement heifers need to weigh 850-900 lbs to reach puberty. Therefore, a 550 lb weaned heifer calf will need to gain ~350 lbs over ~180 days to reach puberty by the breeding season, requiring it to gain just under 2 lbs/day to meet the goal. If the base roughage is grass hay of 14% crude protein (CP) and 56% total digestible nutrients (TDN), you can feed ~19 lbs/day of roughage and supplement with 5.5 lbs of dry distillers grains (DDG), 3 lbs of DDG + 3 lbs of corn, or 5 lbs of corn + protein lick tub. If corn stover of 6% CP and 55% TDN is the base roughage, 21 lbs/day of roughage can be fed with 6 lbs of DDG, 3 lbs DDG + 3 lbs of corn, or 5 lbs of corn + protein lick tub.

It is key to assess development (weight gain) 45 days from breeding and adjust ration nutrient composition according to the direction cattle need to go in the final 45 days. It helps to keep heifers separate from the cow herd so feed intake remains consistent and they aren't getting pushed around by older, heavier cows.

[1]Short, R.E. and R.A. Bellows. 1971. Relationships among Weight Gains, Age at Puberty and Reproductive Performance in Heifers. J. Anim. Sci. Vol. 32 No. 1, p. 127-131.
[2]Cushman, R.A., L.K. Kill, R.N. Funston, E.M. Mousel, and G.A. Perry. 2013. Heifer Calving Date Positively Influences Calf Weaning Weights though Six Parturitions. Vol. 91, No. 9, p. 4486-4491.
[3]Arije, G. F., and J. N. Wiltbank. 1971. Age and weight at puberty in Hereford heifers. J. Anim. Sci. 33:401.
[4]Moseley, W. M., T. G. Dunn, C. C. Kaltenbach, R. E. Short, and R. B. Staigmiller. 1982. Relationship of growth and puberty in beef heifers fed monensin. J. Anim. Sci. 55:357.
[5]Mousel, E.M. 2012. Effect of first conception in replacement heifers on cow longevity in SD. Unpublished data.