BEEF CATTLE RESEARCH UPDATE

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Feeding Interval Effects on Growth, Puberty, and Pregnancy Rates in Beef Heifers

The development of heifers is an important economic consideration in a cow-calf operation.[1] Research has shown that heifers that calve by two years of age have greater lifetime productivity than heifers that calve at an older age. Thus, heifers must be maintained at an adequate plane of nutrition to reach puberty and conceive by 14 to 15 months of age. Since the management of first-calf heifers affects their productivity for the remainder of their lifetimes, supplementation of heifers is a common practice.

Frequency of supplementation is an important management and economic option to consider when designing supplementation programs for beef cattle fed forage-based diets. Numerous research studies have shown that supplementing cattle with high protein supplements (cottonseed meal) three times or once weekly usually gives similar performance compared to daily feeding.[2,3] In contrast, low-protein grain- based supplements should be fed daily to reduce the disruption of ruminal function (due to starch) which results in decreased forage intake and digestibility. However, little data is available on the effects of supplementing heifers at different intervals on growth and reproductive performance. University of Florida research (2008) showed that feeding an energy supplement based on digestible fiber by-products (predominately wheat middlings and soybean hulls, ~20% crude protein on as fed basis) daily instead of three times weekly enhanced the nutritional and metabolic status of forage-fed Brahman-crossbred females.

Additional Florida research examined the effects of daily versus three days per week (3X) supplementation on age at puberty, estrous synchronization response, and pregnancy rates of yearling Brangus and Angus heifers fed bermudagrass round bale silage ad libitum.[4] In this study, 60 heifers were supplemented with dried distiller's grains and soybean meal to gain approximately 1.5 lb/day either daily or three days per week.

These researchers reported that heifers supplemented daily had similar daily gains as compared to 3X heifers (1.82 vs. 1.79 lb/day). In addition total silage offered and total supplement consumption was similar between treatments. This data supports previous research conducted in cows showing that three day per week supplementation does not significantly affect cow perforamcne.[2,3] Heifers supplemented daily tended (P = 0.09) to have a greater percentage reach puberty (60%) by the time of AI breeding compared to 3X heifers (40%). The authors pointed out that it is unclear if this difference is due to the feeding regiment or just due to the limited number of heifers in the study. In addition, the estrous response tended (P = 0.10) to be greater in daily supplemented heifers (77%) than in 3X heifers (57%). In contrast, synchronized pregnancy rates (43 vs. 57%, P = 0.30) and total 28 day AI pregnancy rates (63 vs. 70%, P = 0.59) were similar between daily supplemented and 3X heifers, respectively.

These researchers concluded that feeding developing heifers three times weekly offers a management practice that may help significantly reduce labor cost without sacrificing heifer growth rates or pregnancy rates.

Effect of Concentrate- vs. Forage-Based Finishing Ration on Carcass Traits and Palatability

Finishing beef cattle on forage or grass as compared to grain can decrease the concentration of saturated fatty acids while increasing the ratio of polyunsaturated fatty acids (PUFA) and the concentration of beneficial conjugated linoleic acid.[5] Even though forage-based finishing systems

can enhance the nutritional value of beef, data evaluating their effect on carcass traits and palatability traits is limiting.

Recent Oklahoma State University research examined the effects of concentrate versus forage finishing on carcass characteristics, beef palatability, and color stability of ribeye steaks from half-sibling Angus heifers while statistically accounting for slaughter age.[6] All of the heifers in this study were backgrounded on wheat pasture in central Oklahoma prior to being assigned to a finishing diet. After backgrounding, the heifers were assigned to finishing diets. The concentrate-finished heifers (average initial weight = 587 lb) were fed in a natural program (no implants, nonimplant metabolic modifiers, or antibiotics) at a commercial feedlot in McLean, TX. These heifers were slaughtered when they reached an average weight of 1200 lb (approximately 140 days on feed) at a commercial slaughter facility in Fort Worth, TX. The forage-finished heifers (average initial weight = 577 lb) were rotated between grass and wheat pasture with access to an antibiotic-free mineral supplement. These heifers were slaughtered when they reached an average weight of 1000 lb (grazing period of approximately 505 days) at a commercial slaughter facility in Booker, TX. At slaughter, ribeye muscle samples were obtained and fabricated into steaks for tenderness evaluation as measured by Warner-Bratzler shear force (WBSF) and sensory evaluation by a trained panel.

As would be expected, concentrate fed heifers produced heavier carcasses than forage fed heifers (744 vs. 655 lb, $P = 0.08$). Carcasses from concentrate fed heifers had greater fat thickness (0.73 vs. 0.34 inches, $P < 0.01$), greater numerical USDA Yield Grades (3.38 vs. 2.25, $P = 0.01$), and greater marbling scores than forage fed heifers (modest 90 vs. traces 70, $P< 0.01$). Steaks from the concentrate fed heifers had lower WBSF values (8.09 vs. 11.13 lb) indicating greater tenderness, greater sensory tenderness ratings, greater beef flavor intensity, lesser grassy/cowy flavor intensity, and greater painty/fishy flavor intensity than steaks from forage fed heifers ($P < 0.05$). Diet did not affect lean color over the entire length of retail display (7 days).

These researchers concluded that although incorporating forages into beef finishing diets can be nutritionally beneficial to humans, several differences in beef palatability attributable to finishing diet composition will occur. Overall, carcass and palatability traits favor concentrate-based finishing rations.

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