

# Beef Cattle Research Update

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## Genetic Improvement of Environmental Adaptation of Beef Cattle

Hohenboken et al. recently summarized the results of a symposium on environmental adaptation of beef cattle that was held in October, 2004. Following is a review of some of the major points covered in the paper, which was presented at the 2005 BIF meeting (Hohenboken et al. 2005. Proc. Beef Improvement Federation Res. Symp. and Ann. Mtg., Billings, MT, July 6-9, 2005).

\* Following the domestication of cattle in western Asia some 10,000 years ago, production gradually migrated outward from centers of domestication to eventually colonize much of Europe, Africa, and Asia.

\* Because initial migration rates were only about 6 miles per decade, natural selection easily accommodated the adaptation of cattle to their new environments.

\* In recent times, however, the speed of migration due to man's ability to rapidly transport animals, semen, and embryos throughout the world, together with the intensification of production systems, has resulted in environments that are changing more rapidly than cattle can adapt to such changes through natural selection.

\* The introduction of new genetics into a new environment can actually reduce the adaptation of the resident herd in its native environment.

\* In recent decades, rapid response to intense selection for increased

production has been achieved at the expense of decreased genetic merit for adaptation.

\* Breeding objectives are critically needed that would rationally combine selection for product quality, production, and adaptation.

\* Decision support tools are needed to evaluate alternative breed choices and mating systems for adaptability and production efficiency within specific environments.

\* A first step in designing breeding strategies would be to review existing knowledge of heritability, inbreeding depression, and heterosis for adaptation to significant nutritional, physical, climatic, management, and economic stressors within major production environments in North America.

\* Designed experiments will be needed to determine genetic correlations among adaptive traits and of genetic correlations between traits contributing to adaptation and those affecting production and end-product.

\* Breeding value estimation procedures (e.g., EPDs) should be developed for specific adaptive traits and for overall adaptation to particular environments.

## Strategies for Improving Reproductive Performance of First-Calf, 2-year-Old Females

Getting first-calf, 2-yr-old females rebred on schedule to maintain a 365-day calving interval can be one of the greater management challenges faced by cow-calf producers. In this symposium paper by Oklahoma State Univ. researchers, a number of post-calving management strategies to improve reproductive performance of 2-yr-old females was reviewed. Included were early weaning, positive postpartum energy balance, fat supplementation, undegraded intake

(bypass) protein supplementation, and prebreeding bull exposure. Following is a brief summary.

\* Early weaning calves prior to the start of breeding season (approximately 2 mos. of age) significantly decreases postpartum interval to first estrus and increases pregnancy rates.

\* Neither postpartum fat nor bypass protein supplementation has consistently improved reproductive performance.

\* Prebreeding bull exposure decreases postpartum interval and increases first-service conception rates.

\* Managing 2-yr-old females to calve at a body condition score of 6 (1=emaciated to 9=obese) and providing adequate postpartum energy to minimize loss of body wt. and body condition have the greatest impact on reproductive performance.

This review of research indicates that although early weaning and prebreeding bull exposure are effective strategies, nutritional management would appear to be the most effective strategy for improving reproductive performance of first-calf, 2-yr-old heifers. The authors noted, however, that any management intervention to improve reproductive performance needs to be evaluated in a systems and economic context (Banta et al. 2005. Proc. Anim. Sci. 21:151).

## Packer Share of Total Beef Retail Value is Low

There is a perception that packers generally receive more than they deserve of the total beef retail dollar. The reality is that packer margins are razor thin and they operate in the red about as much as they do in the black. Economists Erica Rosa and Jim Robb recently tracked producer, packer, and

retailer shares of total beef retail value over time. In recent years, their shares have been running in the following ranges: producer, 45-50%; packer, 5-10%; and retailer, 40-50% (SOURCE: NCBA Issues Update, Nov.-Dec., 2005).

### **Long-Term Winter Feeding of Low-Quality Forage Did Not Affect Productivity and Improved Profitability**

Previous research has shown that low-quality forages such as cereal straw when properly supplemented can be an economical winter feed source when traditional feed-stuffs are in short supply. However, these studies usually involved only one wintering period. The objective of this Utah State Univ. study was to evaluate the long-term effects of wintering beef cows on low-quality forage for sev-

eral consecutive years. Twenty-four crossbred cows were assigned to one of two winter diets: 1) meadow grass hay (GH); or 2) ammoniated wheat straw supplemented with alfalfa hay (AWS/AH). The wintering period was from December to April. Cows remained on these wintering programs for five consecutive years.

During the wintering period, body wt. and body condition score changes of the cows were similar. The only difference in body wt. change was that cows wintered on AWS/AH consistently gained 8.6 lb more than those wintered on GH during the last half of the grazing season. There were no significant differences between treatments in milk production, calf weaning wt., postpartum interval to rebreeding,

pregnancy rate, or keep/cull rate. An economic analysis revealed a 17.7% increase in profitability for cows that were wintered on AWS/AH. The authors concluded that long-term feeding of low-quality forages in the nutritional management of beef cows had no negative effects on productivity and enhanced profitability (Wayment et al. 2005. Proc. Western Section ASAS 56:277).

### **E. Coli Incidence is Down**

The Food Safety & Inspection Service (FSIS) recently announced a dramatic decline of 54% in E. coli 0157:H7 positive test results on raw ground beef from fiscal 2003 to 2005. A recent report from the Centers for Disease Control (CDC) indicated that, for the first time, incidence of E. coli infections fell below the 2010 National Health

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Objective of one case per 100,000 persons (SOURCE: John Gregerson, Meat Marketing & Technology).

### Profitability of Calves Sired by Terminal Versus Maternal Breeds of Bulls

Colorado State Univ. scientists used 80 steer progeny produced by mating British cross females to one of three terminal sires (Charolais) or one of five maternal sires (three Angus and two Red Angus-Composites) to compare the effects of sire type (terminal vs. maternal) on performance, carcass traits, and profitability.

Steers sired by terminal bulls were significantly heavier at most stages of production, from birth to harvest, and grew faster from birth to weaning than steers sired by maternal bulls. Terminal-sired steers consumed significantly more feed, but there were no differences between sire types in feed conversion or cost of gain. Carcasses sired by terminal bulls were significantly heavier than those sired by maternal bulls, but other carcass traits did not differ.

Profitability was compared using two different marketing scenarios—selling calves at weaning or retained ownership through harvest. If sold at weaning, terminal-sired calves would generate \$39.52 more net return than maternal-sired calves. If retained through harvest, terminal-sired calves would generate \$83.62 more net return than maternal-sired calves. These results suggest that for commercial cow-calf producers who routinely retain ownership of their calves through harvest and who have access to a reliable source of affordable

females, the use of a terminal crossbreeding system may be a viable strategy for enhancing profitability (Schneider et al. 2005. Colorado State Univ. Beef Report).

### Effects of Early Weaning on Forage Disappearance and Performance of Spring-Born Calves

Researchers at the Universities of North Dakota State (NDSU), South Dakota State (SDSU), and Wyoming (UW) collaborated in a 3-year study to evaluate the effects of weaning calves 75 days earlier than normal on subsequent performance. Early-weaned (EW) calves were weaned in mid-August, and Normal-weaned (NW) calves were weaned in early-November. Following is a brief summary of results of the first year of the study.

\* Native range disappearance tended to be reduced when calves were early weaned.

\* EW calves gained faster and more efficiently during a 7-8 week backgrounding phase. Nevertheless, NW calves were still heavier at the end of the backgrounding phase.

\* Early weaning resulted in improvements in cow body wt. and condition.

\* NW calves were heavier than EW calves at the end of the 7-8 week backgrounding phase.

\* NW calves were 170 lb heavier at arrival to the finishing year than EW calves; however, final harvest wt. did not differ.

\* NW calves required 61 fewer days on feed.

The authors concluded that early weaning can result in sparing a significant amount of forage and

that it is advantageous to cow body condition score. They also noted that early weaned calves performed adequately during the post-weaning period (Landblom et al. 2005. South Dakota Beef Report).

### Heritabilities and Relationships Among Carcass and Meat Palatability Traits for 14 Cattle Breeds

In a collaborative study, Kansas State, Cornell, and Texas A & M universities used data from 7,719 progeny of fourteen different breeds enrolled in the NCBA Carcass Merit Project to determine heritabilities, relationships, and ranges in carcass and meat palatability traits.

\* Heritability estimates for fat thickness and flavor were low (.19 and .07), but were moderately high to high for marbling (.68), shear force (.40), sensory panel tenderness (.37), and juiciness (.46).

\* Marbling was lowly correlated with shear force and with sensory panel tenderness.

\* The range in avg. shear force among sires across all breeds was very high (13.8 lb). Likewise, the range in avg. shear force among breeds was quite high (8.7).

\* More than 20% of steaks were unacceptable in tenderness.

The high heritability estimates for marbling, shear force, sensory tenderness, and juiciness indicate that selection for these traits would be effective. The poor relationship between marbling and tenderness indicates that selection for marbling would result in little improvement in tenderness (Dikeman et al. 2005. J. Anim. Sci. 83:2461).