



Research Update

► Summaries of current beef cattle research

Winter research highlights: Part I

The following research highlights are presented by Harlan Ritchie, Steven Rust and Daniel Buskirk, beef cattle specialists at Michigan State University, East Lansing. The reviews summarize studies and trends reported at scientific meetings or in scientific and industry publications, which are cited at the end of each item.

Genetic trends in a population of cattle selected for feed efficiency

In a collaborative study, Cornell University and Iowa State University scientists used data from Warden's Angus Farm, Council Bluffs, Iowa, to evaluate genetic trends for feed intake (FI), residual feed intake (RFI), average daily gain (ADG), and midtest weight (MW). Warden's Farm has tested yearling bulls for feed efficiency since 1981, accumulating FI records on more than 450 bulls. In this study, researchers used records from 309 bulls born from years 1991 through 2004. Genetic trends are shown in the following table.

As shown in Table 1, selection has resulted in cattle with increased genetic merit (decreasing trends) for FI and RFI, as well as increased genetic merit for ADG and MW.

These trends are especially strong since 1999. (Kirschten et al. 2007. J. Anim. Sci. (Suppl. 1). Abstract 934)

World is losing livestock breeds at an alarming rate

At a recent International Technical Conference of the Food & Agriculture Organization (FAO), it was announced that the current rate of livestock breed extinctions is "alarming." FAO noted that many breeds at risk of extinction have unique genetic characteristics that may be useful in confronting challenges such as disease or climatic extremes, which could prove fundamental to the food security of future generations. Furthermore, widely used breeds need to be managed more wisely. For example, among many of these breeds, within-breed genetic diversity is being undermined by the use of just a few popular sires.

According to FAO's State of the World's Animal Genetic Resources report, at least one livestock breed each month has become extinct over the past seven years, which means those genetic traits have been lost

forever. The report went on to say that about 20% of the world's breeds of cattle, swine, poultry, goats and horses are currently at risk of extinction. Alexander Mueller, FAO assistant director-general stated, "The options that these resources offer for maintaining and improving animal production will be of enormous significance in the coming decades."

(SOURCE: Feedstuffs magazine)

UN plans to preserve endangered breeds

The United Nations (UN) wants to see more breeds of farm animals preserved. To accomplish this, it plans to increase the creation of gene banks in developing nations, where nearly 70% of surviving breeds exist. Such banks, which store eggs, semen and embryos of many breeds, including endangered species, are well-established in the United States and the rest of the industrialized world. These banks will also aid scientists' efforts in "landscape genomics," which matches breeds to the environments that are most favorable to them.

(SOURCE: Kiplinger Agriculture Letter)

Genetic analysis of 2-year-old heifers rebreeding to calve at 3 years of age

Getting a first-calf 2-year-old heifer to rebreed and produce her second calf on time as a 3-year-old can be a challenging task for cow-calf producers. The objective of this collaborative study by Montana State University and Colorado State University scientists was to determine if rebreeding of first-calf heifers is under any degree of genetic control.

Records on 417 females were analyzed to determine genetic parameters and the percentage of females that produced a calf as a 3-year-old after having their first calf as a 2-year-old. Cattle included in the analysis were Hereford and Tarentaise purebred cows as well as F₁ and F₂ half-blood and ¾-blood females from these true breeds.

Overall, 72% of females were successful in breeding back to produce a calf as a 3-year-old. Success rates for the individual groups were 73%, 79%, 64% and 62% for purebreds, F₁, F₂ and ¾-blood cows, respectively.

Two methods to estimate the heritability of this trait showed that it was lowly heritable

Table 1: Genetic trends for feed intake, residual feed intake, average daily gain and midtest weight in herd evaluated for feed intake

| Year | Feed intake, lb. | Residual feed intake, lb. | Avg. daily gain, lb. | Midtest wt., lb. |
|------|------------------|---------------------------|----------------------|------------------|
| 1991 | -0.119 | -0.018 | 0.004 | 0.20 |
| 1992 | -0.126 | -0.121 | 0.00 | -2.53 |
| 1993 | -0.315 | -0.105 | 0.013 | 3.77 |
| 1994 | -0.121 | -0.141 | 0.022 | 2.56 |
| 1995 | -0.037 | 0.068 | 0.020 | 9.72 |
| 1996 | | | | |
| 1997 | 0.00 | -0.190 | 0.055 | 14.44 |
| 1998 | | | | |
| 1999 | 0.092 | -0.112 | 0.033 | 22.0 |
| 2000 | -0.229 | -0.412 | 0.00 | 16.47 |
| 2001 | -0.152 | -0.280 | 0.112 | 8.80 |
| 2002 | 0.086 | -0.229 | 0.046 | 23.20 |
| 2003 | -1.50 | -0.478 | 0.179 | 21.83 |
| 2004 | -4.01 | -0.690 | 0.126 | 22.73 |

Note: Records previous to 1991 and for years 1996 and 1998 were not available for analysis.

Success rates for getting 2-year-old first-calf heifers to breed back to calve at 3 years of age were 73%, 79%, 64% and 62% for purebreds, F₁, F₂ and 3/4-blood cows, respectively.

(0.08 and 0.14). The authors concluded that although it is a lowly heritable trait, there does appear to be a genetic component, and selection against females who fail to rebreed should result in a positive genetic response.

(Rumph et al. 2007. J. Anim. Sci. 85 (Suppl. 1). Abstract 220)

Restricted feeding of heifers during postweaning enhanced efficiency

A total of 397 crossbred heifers were used to evaluate the effects of two levels of feeding during the postweaning period on growth, gain/feed, and ultrasound carcass measurements, as well as the associations among these traits. The heifers were assigned to a control diet (fed to appetite) or a restricted diet (80% of that consumed by controls) during a 140-day postweaning period. Heifers were individually fed a diet of 68% corn silage, 18% alfalfa, 8% barley and 6% protein-mineral supplement [dry-matter (DM) basis]. Ultrasound measurements of loin muscle area, intramuscular fat (IMF), and subcutaneous fat (SQF) thickness over the loin muscle were made on Day 140.

Feed restriction significantly decreased ($P<0.01$) body weight (644 lb. vs. 692 lb.), ADG (1.15 lb. vs. 1.43 lb. per day), loin muscle area (8.8 sq. in. vs. 9.4 sq. in.), IMF (3.2% vs. 3.5%), and SQF (0.12 in. vs. 0.15 in.), but increased gain/feed (0.12 vs. 0.11). The magnitude of correlations of DM intake with ADG, body weight, loin muscle area and body condition score (BCS) were greater in restricted than control heifers.

Pregnancy rate tended to be reduced in restricted heifers (86.3% vs. 91.5%). However, ADG was significantly greater ($P<0.001$) in restricted than control heifers while grazing native range in the seven months after restriction (1.12 lb. vs. 1.01 lb. per day).

The authors summarized by noting that restricted heifers consumed 22% less feed on a per-pregnant-heifer basis during the development period and had a greater magnitude of association between DM intake and several growth-related traits at the end of

the 140-day postweaning period, which is indicative of improved feed efficiency.

(Roberts et al. 2007. J. Anim. Sci. 85:2740)

Effect of weaning method on calf performance

The objective of this Michigan State University study was to determine the effect of weaning method on the subsequent performance of beef calves. A total of 227 Angus × Simmental calves averaging 173 days of age were allotted to three treatments:

1. Abrupt-weaned (AW);
2. Fenceline-weaned (FW); and
3. Two-step weaned (TW).

Dams of AW calves were moved to remote pastures. Dams of FW calves were moved to adjoining pastures with fenceline contact. TW calves had a plastic nose flap fitted, on Day 5 had the nose flap removed, and all dams moved to remote pastures. Body weights were obtained on all calves on days 0, 5, 14, 28 and 42. Blood samples taken on these same days were analyzed for plasma haptoglobin, a protein released in response to stress stimuli.

Although FW calves had significantly greater ($P<0.001$) ADG between days 0 and 14 than AW and TW calves, there were no

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significant differences among treatments from days 0 to 42.

Haptoglobin levels were highest on Day 5, and were significantly higher ($P < 0.001$) in both AW and TW calves than in FW calves. Haptoglobin levels returned to baseline by Day 14. Following weaning and backgrounding, calves were transported to a feedlot and fed for an average of 207 days. There were no significant differences in ADG, nor were there any significant differences in the percentage of calves that received one or two or more medical treatments during finishing.

The authors concluded that although FW calves gained more weight and had lower haptoglobin levels shortly after weaning, there were no sustained differences in performance due to weaning method.

(Buskirk et al. 2007. J. Anim. Sci. 85 (Suppl. 1). Abstract W249)

Byproducts are decreasing feed costs

As ethanol production continues to increase, the use of byproducts is becoming commonplace in more regions of the country. In many regions, wet distillers'

grains (WDGs) are trading at 75% of the value of corn and in areas where the distillers' grains supply is burdensome, prices may be as low as 25%-50% of the value of corn.

From an economic standpoint, if a feedyard includes 20% of WDGs into the ration at 75% of the value of corn, it will lower the ration cost on a DM basis by approximately 3%-4%. As the percentage of distillers' in the ration increases and the price of the byproduct declines, larger savings can occur. However, the lower ration cost may be partially offset by lower cattle performance and the additional cost of handling the product.

(SOURCE: Kevin Good, Cattle-Fax Update)

Combating endophyte-infected tall fescue

The objective of this University of Tennessee trial was to evaluate Endo Fighter™ mineral (ADM Animal Nutrition Inc.) for use when beef cattle are grazing endophyte-infected tall fescue. The study was conducted near Dandridge, Tenn., from April through September 2006, using 125 beef steers (604 lb.) in a 126-day grazing period.

Steers were allotted to one of two treatments:

1. Control (Master Gain® mineral); and
2. Treatment (Master Gain with Endo Fighter).

Mineral mixtures were formulated for consumption of 0.25 lb. per head per day. Recorded cattle behaviors were grazing (shade or no shade), lying (shade or no shade), and at water. The maximum temperature reached at least 85° F on 72 days of the trial.

Treatment steers had a significantly higher ($P < 0.01$) ADG than Control steers (1.76 lb. vs. 1.52 lb. per day). More Treatment cattle ($P < 0.01$) were observed grazing than Controls (761 vs. 200 occurrences, respectively), and more Control cattle located in shade than Treatment cattle.

The authors concluded that offering a mineral product containing Endo Fighter resulted in greater gains and increased grazing behavior by cattle grazing tall fescue pasture during the summer.

(Fisher et al. 2007. J. Anim. Sci. 85 (Suppl. 1). Abstract W109)

