Research Briefs

► **Summaries** of current **beef cattle** research

Highlights in breeding, genetics

The following research highlights are presented by Harlan Ritchie, Steven Rust and Daniel Buskirk, beef cattle specialists at Michigan State University, East Lansing.

Balance is best

Heifers sired by bulls with balanced expected progeny differences (EPDs) reached reproductive competency earlier than those sired by bulls with high growth traits or large scrotal circumference (SC).

In a study by New Mexico and Missouri researchers, Brangus heifers sired by bulls with differing EPDs for growth and SC were evaluated for growth, feed intake, serum concentration of leptin and puberty from 12.5 to 15.5 months of age. Sires fit one of three EPD profiles, including:

1. high-growth, moderate SC (HG-MSC);
2. moderate-growth, large SC (MG-LSC); or
3. balanced EPD values.

Heifers were individually fed a diet containing 79.4% total digestible nutrients (TDN) and 11.6% crude protein (CP). There were no significant differences among sire groups in weaning weight (WW), yearling weight (YW) or average daily gain (ADG). However, feed intake was significantly greater ($P<0.01$) for the HG-MSC and MG-LSC groups than the balanced-EPD group. Serum leptin concentrations were similar among sire groups.

Age at puberty was significantly earlier ($P<0.02$) for the balanced group relative to the other two groups (13.7 vs. 15.1 and 15.5 months). Pregnancy percentage was higher for the balanced heifers (87% vs. 71.4% and 75.0%), but it was not statistically significant, presumably due to the low numbers of heifers in the study.

These results suggest that Brangus heifers from a sire with balanced EPDs achieve reproductive competency earlier than those from sires with HG-MSC or MG-LSC EPDs. The authors indicated this relationship may be related to differences in mechanisms that influence feed intake, but it appears to be independent of serum leptin concentrations among sire groups.

(Shirley et al. 2003. J. Anim. Sci. 81 [Suppl. 1]: 236.)

Increase cow efficiency

Selection against residual feed intake (RFI) may reduce costs of production in the breeding herd. RFI is defined as actual feed intake minus expected feed intake.

Recent research has shown that growing/finishing cattle having a lower RFI are more efficient than those having a higher RFI. In a recent review of RFI research in Australia, R.M. Herd et al. (2003) reported that selection for RFI measured postweaning will lead to a decrease in feed intake by replacement females and mature cows, with no decline in growth performance or increase in cow size.

In research with Angus cattle, the group found that the genetic correlation between postweaning RFI and average daily feed intake by the cow is high (0.64), and the correlation between postweaning RFI and the cow RFI is very high (0.98).

The researchers noted that the genetic correlations indicate that selection against postweaning RFI has the potential to lead to a decrease in feed intake and improvement in feed efficiency of the breeding herd (the young growing/finishing generation, as well as the mature cow herd). They noted that development of an EPD for RFI seems practical. Such an EPD would best be used in an economic selection index to account for genetic correlations with other traits, the researchers reported.

However, the expense of measuring RFI, compared with other traits currently measured in genetic evaluation programs, is a barrier to widespread industry application.

(Herd et al. 2003. Beef Industry Research Centre, Armidale, NSW, Australia, and the Agricultural Research Centre, Trangie, NSW, Australia.)

Changing the population

In 1988, U.S. Department of Agriculture (USDA) scientists at the Miles City, Mont., station allotted a composite population of cows to two selection lines, which included:

- a control line in which bulls were selected purely at random; and
- an index line in which bulls were selected based on the following index: index = 365-day weight minus (3.2 × birth weight).

There were approximately 120 cows per line, and the study was carried out for 12 years (three generations). The objective was to determine if selection using the index would improve efficiency by increasing postnatal growth while holding birth weight in check. For the index line, direct genetic changes per generation were as follows: birth weight, 0.99 pound (lb.); 200-day weight, 7.54 lb.; 365-day weight, 17.07 lb.; and mature cow weight, 13.89 lb. For the control line, direct genetic changes in these traits were small and close to zero. On the maternal side, genetic changes were small for both lines.

These results show that selection for the index had a favorable impact on the shape of the growth curve, restricting response in birth weight and mature cow weight. The authors concluded that despite a genetic antagonism that compromises selection response for decreased birth weight and increased postnatal growth, favorable genetic responses can be achieved with the selection index used in this study. They added that even greater selection intensity would be available across a breed using the National Cattle Evaluation (NCE) and artificial insemination (AI) than was the case in this study.

(McNeil. 2003. J. Anim. Sci. 81:2425.)

Milk EPD reflective of weaning weight

Differences in the milk EPD were reflective of differences in WW EPD in a multistate research trial. A large five-state, five-year study was conducted to validate the hypothesis that the milk EPD truly reflects

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differences in weaning weight due to milk. Cows were maintained at six locations representing relatively diverse environments throughout the southeastern quadrant of the United States.

Twenty-four Angus sires were selected for either low- or high-milk EPD, but similar growth EPDs, and mated to Angus cows. The average spread in milk EPD between the low and high lines was 39 lb. (-13 to +26). Lactation records for 192 daughters were used to evaluate 12-hour milk yield and weaning weight of progeny.

The correlation between sire milk EPD and 12-hour milk yield was moderate to high (0.56). The difference between lines for 12-hour milk yield was 1.45 lb. The difference between low and high lines in calf weaning weight was 34 lb., which compared favorably with the spread between lines in milk EPD (39 lb.).

There was no statistical interaction between genetic line and location, which means that sires tended to rank similarly within each location. When milk EPDs were first published in the 1980s, there was considerable skepticism among beef producers. However, this study, along with previous studies, indicates that differences in the milk EPD are reflective of differences in weaning weight among progeny.

(Baker et al. 2003. J. Anim. Sci. 81:1406.)