2007 Beef Improvement Federation
39th Annual Meeting

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Beef Improvement Federation
1967 - 2007
40 Years of Innovation
June 6-9, 2007
Ft. Collins, Colorado

What Do You Give Up?

Are there sacrifices in the chase for carcass merit?

by ***Mathew Elliott & Shauna Rose Hermel***

FORT COLLINS, COLO. (June 8, 2007) — The theme for Friday morning's session at the 2007 Beef Improvement Federation (BIF) annual conference in Fort Collins, Colo., was Challenges to Conventional Wisdom. Bob Weaber, assistant professor of beef cattle genetics at the University of Missouri (MU), tackled the question, "Are There Sacrifices in the Chase for Carcass Merit?"

Weaber first looked at some of the motivators to improve carcass merit in beef cattle, the first among them being the value-based marketing systems that financially reward yield grade, quality grade, conformance and weight.

"Even in a wide Choice-Select spread, about two-thirds of the value difference from caracass to carcass in a grid-marketing system still comes from weight," he noted. "So we can't ignore that in either our production or selection strategies."

The top 10 challenges posed in the National Beef Quality audits (NBQAs) haven't changed significantly since the first audit, Weaber noted.

"We still face challenges with inappropriate carcass size and weight, inadequate tenderness, excessive external fat cover and an inappropriate mix of USDA quality grade," he said, noting "some challenges relative to the mix we provide our downstream partners — feeders and packers — in terms of end product quality and merit."

While breeders have applied some selection pressure for greater marbling, the mix of quality grades hasn't changed significantly, he pointed out. He walked producers through what pen average marbling scores were needed for a pen to be 50%, 60%, 70%, 80% and 90% Choice, then estimated the needed standard deviations of genetic improvement that it would require to reach the next level.

► **Selection pressure for marbling within breed can be made with little effect on other traits, said MU's Bob Weaber. The tradeoff lies in giving up heterosis to capitalize on the quality grade attributes of a single breed in a straight-breeding system.**

What are the tradeoffs?

Weaber used research he is currently working on with the American Simmental Association to look at the correlation between marbling and other selection criteria [traits for which there are expected progeny differences (EPDs)] and breeding objectives (traits for which there is an economic value in selection models). Correlations with various individual traits are displayed in the accompanying PowerPoint available in the newsroom.

The projections indicated selecting for big changes in marbling would not, on the average, cause a lot of change in other selection criteria and breeding objectives, Weaber said.

"These predicted responses to selection for marbling are not equivalents to the traditional computation of correlated response to selection," he added. "They have not been scaled by either the accuracy of prediction, selection intensity or generation interval."

All-in-all, Weaber said, there seems to be little risk in selecting for increased marbling score relative to changes in other traits from the perspective of additive trait selection within a breed.

Heterosis

The $64,000 question,Weaber said, is do the benefits of selection for carcass traits within breed (straightbreeding) outweigh the heterosis improvements of lowly heritable traits (especially maternal) garnered via crossbreeding?

"We've got to be careful and think about our total production system and, especially if we're commercial cow-calf producers, about where our revenue comes from," Weaber said. Producers have an obligation to pay attention to end product merit, but they also have an obligation to pay the bills.

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"Our selection strategies should really focus on both additive and nonadditive, using EPDs and crossbreeding systems appropriately to achieve the genetic levels and genetic potentials that we want," Weaber said. "We can't overlook either one."

Crossbreeding systems that maximize herosis in an F_1 terminal sire system are worth about $100 per cow per year above a straightbreeding program, he said, basing the numbers on literature values that are available.

Table 1: Heterosis lost per generation

Generation	Breed A fraction	Breed B fraction	Individual heterosis
1	1/2	1/2	100%
2	3/4	1/4	50%
3	7/8	1/8	25%
4	15/16	1/16	12.5%
5	31/32	1/32	6.25%

"Those are big dollars and those are real dollars," he said. "If we're going to make tradeoffs in our selection systems away from a system that effectively uses heterosis, we need to know how many dollars we need to offset in terms of additive selection."

That noted, Weaber explained that heterosis can be lost pretty quickly once you move away from the F_1 cross (cross of two pure breeds).

Look for the PowerPoint and audio file for this presentation in the newsroom. A proceedings paper is available on the "Symposium Papers" page.