Marbling EPD and CAB Acceptance

Research finds a positive, direct relationship in carcass database.

by ***Steve Suther***

High quality standards for the *Certified Angus Beef*® (CAB®) brand mean most cattle don't have what it takes to make the grade. High demand among consumers means the Certified Angus Beef LLC (CAB) Supply Development team must find ways to get more cattle to achieve those high quality specifications.

The incentive is there. Market studies show that producers of CAB-accepted carcasses earn more than $20 million a year from cattle sold on value-based grids, not to mention the larger per-carcass premiums for USDA Prime. Most of those premiums for finished cattle are passed back to the calf level, where known Angus-base cattle sell for $10-$20 per head more than non-Angus.

How can producers position themselves to reap the rewards? They need to know what it takes for an animal to achieve CAB acceptance from both a genetic and a management standpoint, says Larry Corah, CAB vice president. Nearly half of all fed cattle meet the preliminary requirement of 51% or greater black hide coloration, but only 18.3% of those met CAB specifications last year.

Looking for answers

In 1999, CAB began a research project with Iowa State University (ISU) animal scientists Gene Rouse and Doyle Wilson and then-graduate student Mark Scott, who is now on staff at Michigan State University. The team would analyze 10 years of a CAB carcass database that included more than 100,000 records and a 23.4% CAB acceptance rate.

The first phase of the study, completed in late 2000, found 92.3% of the steers that failed to make CAB did so solely (84%) or partially (8.3%) because of insufficient marbling.

That suggested a logical next step, as Wilson said at the time: "to start looking at the genetic merit of sires that have been used in the [progeny-testing] program." Toward that end, Scott looked at relationships between the CAB acceptance rate and the various carcass expected progeny differences (EPDs) in the 28,131 progeny records with known sires.

The White Paper, "Accuracy of Predicting *Certified Angus Beef*® Acceptance Rates Using Carcass Expected Progeny Differences," by Scott, Wilson, Rouse and T.B. Bailey, is being prepared for submission to the *Journal of Animal Science* for peer review.

Scott also looked at carcass weight (CW), ribeye area (REA), fat thickness and percent retail product (%RP) in the 1,571 available Angus sires, but found a significant link to CAB acceptance rate only in the case of marbling score EPD. Correlating actual progeny carcass measurements to sire EPDs, again the data pointed toward marbling score EPD as the best predictor of CAB acceptance rate.

"The association between CAB acceptance rate and marbling score EPD displays a positive, linear relationship," Scott says. The exact correlation was calculated at 0.37, while other carcass trait correlations ranged from 0.05 to -0.03. That narrowed the focus. No one suggests selection should be based on one trait, but the analysis charted marbling score EPD values linked to various CAB acceptance rates, so that producers may include those levels in balanced-trait selection (see Table 1).

According to Beef Improvement Federation (BIF) and American Angus Association statements, EPDs are estimates of how future progeny of a sire are expected to perform relative to the progeny of other sires listed in the database. They are based on the combined performance of an animal, its ancestors, relatives and progeny. The more data behind an EPD, the greater the accuracy is. Accuracy is expressed as a number from zero to one, with one being perfect. Therefore, 0.99 is the practical high in accuracy. Yearling bulls may have EPD accuracies of 0.1 or less.

Using the information

"The higher the marbling EPD level, the higher the CAB acceptance rate," Wilson says. But the study also looked at the relationship between EPD accuracy and CAB acceptance rate, especially at lower levels. "As one might expect, the lower the accuracy, the more variation is observed in the CAB acceptance rate," Wilson comments. "The take-home message is to use bulls that have moderately high accuracy levels (0.7 and higher)."

"CAB acceptance rate is going to be affected by how much marbling potential the dam passes on," Wilson cautions. "On cows with little marbling potential, even a sire with an extremely high marbling EPD may have trouble overcoming this lack of genetics for marbling from the dam's side."

Management and environment have a large impact on whether genetic potential is realized, Scott says. Though carcass traits are moderately heritable, "the actual progeny carcass trait is influenced mostly by environment." And although the few environmental factors known in this study (plant location, slaughter year and month) did not affect CAB acceptance rates, feedlot management, nutrition and weather do.

"To better understand how results from this study apply to the target population (all commercial beef cattle), one must first look at differences between the target and sample populations," Scott says.

There is a relatively higher level of marbling genetics in the cows behind this progeny database, among other differences, he notes. The data were gathered for Angus seedstock producers who wanted carcass information on progeny of specific bulls (25% of the database) and producers with commercial Angus-based cows who wanted individual carcass information on their cattle. Steers make up approximately 90% of the database, and most of the cattle were finished in Nebraska feedlots as calf feds.

Other considerations

"No experimental design was used in this study to test different treatment effects or control variability among the animals; nor was randomization a part of the design," Scott says, adding that the data is "observational."

"Even though marbling score EPD explained nearly 14% of the variability of CAB acceptance rate, 86% of the variation is left unexplained," Scott says. Results must be taken with consideration that CAB progeny records do not include a random sample of Angus sires and that there are basic differences in marbling score EPDs between Angus and other cattle.

Furthermore, "traits such as marbling score and yield grade are included in the specifications for CAB, yet these traits and their corresponding carcass EPDs may influence other traits that affect whether an animal achieves CAB certification," Scott notes.

And, for some sires, he adds, "inevitably, their carcass EPD will change as more progeny records become available, which may change the outcome of the predicted mean CAB acceptance rate."

That said, the fact remains that the database shows a positive, linear relationship between CAB acceptance rate and marbling score EPD, which explains a significant amount of the genetic variation. And if the genetic potential for marbling is low, management cannot make up for it, Corah points out.

Scott looks to the developing database in the CAB Feedlot-Licensing Program (FLP) to explain those environmental and management factors that are crucial to the whole picture.

"Some of the variation in CAB acceptance rates may be related to the nutritional need of the calf while it is still in the herd, being backgrounded or in the feedyard," he says, adding implant strategy, seasonal variation and health as other factors to take into account.

"Further investigation of predicting CAB acceptance rate with carcass EPDs is warranted under controlled experimental conditions," Scott concludes.

"If a producer is targeting a 35% CAB acceptance rate, then he should be using a sire with a marbling EPD of 0.2 or greater, with a moderately high accuracy (0.7 or higher)," says Doyle Wilson, Iowa State University. "Forty-five percent CAB acceptance levels should be achievable with sires that have EPD levels of 0.4 and higher on a consistent basis. But remember, high-genetic-merit sires may not be able to overcome deficiencies from the dam's side."

Table 1: Predicted CAB® acceptance rate mean given marbling score EPD levels

Marbling score EPD	Mean CAB® acceptance rate	No. of sires
-0.60	0.0	3
-0.50	1.4	0
-0.40	6.5	8
-0.30	11.6	26
-0.20	16.7	77
-0.10	21.8	196
0.00	26.9	665
0.10	32.0	307
0.20	37.1	157
0.30	42.2	65
0.40	47.3	39
0.50	52.4	19
0.60	57.5	6
0.70	62.6	3