



# By the Numbers

► by **Sally Northcutt**, director of genetic research, American Angus Association

## New carcass EPDs

A new genetic evaluation for carcass merit is in the works at the American Angus Association. The desire to simplify and enhance the genetic selection tools used by Angus breeders and their commercial customers to improve beef and ultimate consumer acceptance spurred the work on the Angus carcass evaluation. New expected progeny differences (EPDs) stemming from this research will simultaneously incorporate both carcass and ultrasound databases into a single set of carcass trait EPDs.

### Background

In an effort to standardize EPDs for beef producers, the Beef Improvement Federation (BIF) passed a *BIF Guidelines* revision that carcass EPDs be presented in a uniform format, combining ultrasound and carcass phenotypic data into a single set of EPDs. The key points from the revision are as follows:

- Whenever possible, carcass data from harvested fed cattle and ultrasound measurements from yearling breeding bulls and heifers should be jointly analyzed with multiple-trait models.
- Such an evaluation would provide genetic predictions for both carcass and ultrasound measurements, but since the carcass measurements are the economically relevant traits, the carcass trait predictions and their associated accuracy values should be published for use in selection.
- Both carcass and ultrasound measurements should be evaluated on an age-constant basis.

As a follow-up to the *BIF Guidelines* action, the American Angus Association's Board of Directors at its June meeting discussed the topic of carcass and ultrasound phenotypic data being analyzed in a combined genetic evaluation to produce a single set of EPDs on an age-constant, carcass-trait basis. It was unanimously approved to pursue combining the ultrasound and carcass Angus Herd Improvement Records (AHIR®) data to compute one set of carcass EPDs.

A subcommittee chaired by Jarold Callahan, with members Joe Hampton and Rob Thomas, was appointed to work with staff on the project. Since that time, research has been conducted to develop models to achieve that goal.

The objectives of the integrated carcass genetic evaluation process are as follows:

1. Integrate carcass and ultrasound evaluation runs into an animal model using the two phenotypic databases.

2. Provide a single set of carcass EPDs on an age-constant basis for carcass weight, marbling, ribeye and fat.
3. Inform membership and affiliates of the application and new format for carcass EPDs.

### Carcass and ultrasound data

Ultrasound scans are indicator traits measured on bulls, heifers and steers to assess genetic potential for carcass merit. For example, percentage intramuscular fat (%IMF) scans are an indicator of the genetic potential for marbling. Crews and co-workers (2003; *J. Anim. Sci.* 81:1427) summarized literature estimates of genetic correlations between carcass marbling and ultrasound IMF ranging from 0.46 to 0.77 in Angus cattle. The genetic correlation between the traits indicates that ultrasound is a useful tool in making genetic progress for the carcass traits of interest.

Since the genetic correlation between ultrasound and carcass traits is not perfect (not a correlation equal to 1), there can be inconsistencies for animals when carcass and ultrasound databases are analyzed separately. Also, the potential exists for confusion in how to use two sets of EPDs, one set for carcass and one for ultrasound.

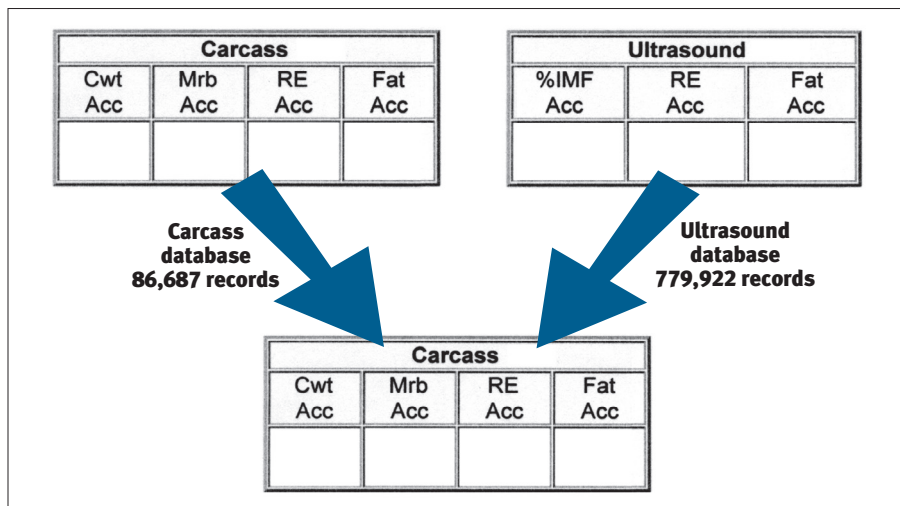
An integrated joint analysis of both databases into a single set of EPDs utilizes all the data simultaneously in unit of carcass traits. In addition, more precise techniques to account for variance differences of ultrasound records on different genders can be fully addressed in the new analysis. Within-evaluation adjustments can account for variance differences between bull and heifer scans, for example.

### Integrated genetic evaluation for carcass traits

Fig. 1 illustrates the current layout of EPDs produced separately from the existing carcass and ultrasound genetic evaluations. This includes four EPDs for carcass and three EPDs for ultrasound.

In contrast, the combined analysis, or integrated evaluation of the ultrasound and carcass phenotypic databases, would result in a single EPD for carcass weight, marbling score, ribeye area and fat thickness. The units of measure would be

**Fig. 1: Current layout of EPDs produced separately from the existing carcass and ultrasound genetic evaluations contrasted with EPDs for a combined analysis**



## Why new carcass EPDs?

- ▶ Consolidate predictions for animals with carcass and/or ultrasound data.
- ▶ Focus on the economically relevant traits affecting quality and yield grade.
- ▶ Enhance the genetic evaluation through improved prediction models.
- ▶ Simplify selection tools for commercial bull buyers using Angus genetics.

in carcass-trait format and analyzed on an age-constant basis. The existing ultrasound EPDs would no longer be published. The end point based on age is unchanged from the existing analyses as published in the Association's National Cattle Evaluation (NCE).

### New EPDs: an example

As an example, consider the model to create the new marbling EPD. Phenotypic marbling scores on steer and heifer carcasses, along with ultrasound %IMF records on bulls, heifers and steers, would be analyzed simultaneously under an animal model multi-trait genetic evaluation. The resulting evaluation produces a marbling EPD, presented in units of carcass marbling score, for every animal and pedigree ties in the analysis. The genetic correlation between marbling score and %IMF is utilized in the model. The %IMF data is evaluated as an indicator trait of carcass marbling of future Angus progeny.

The EPDs are different than the published EPDs known at this time for Angus cattle. The resulting new marbling EPD and accuracy is not directly comparable to the EPDs currently reported on Angus animals for carcass and ultrasound. This is essentially a new EPD produced by a joint analysis of two data sets.

As a reminder, the calculations of the dollar value indexes (\$Values) utilize carcass and ultrasound EPDs from separate evaluations into the index values. With the new integrated evaluation, the single set of new carcass trait EPDs will be incorporated into the current \$Value index procedures. No longer will separate EPDs for carcass and ultrasound need to be combined in this process.

### Key model differences

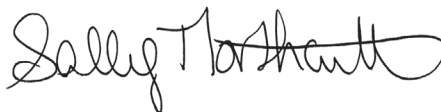
One reason the new EPDs are not comparable to previous models is how

the carcass data are handled. In the past, the carcass database was analyzed using a sire/maternal grandsire model. In the new integrated approach, the analysis of the carcass phenotypic database will undergo the most modeling changes, moving from a sire/maternal grandsire model to an animal model.

The carcass EPDs currently published use phenotypes on steers and heifers (along with ultrasound steer data) in a sire/maternal grandsire evaluation. The revision will place these records in an "animal model" format, with an associated pedigree involving the animal, the sire and the dam. Each steer or heifer with a carcass phenotype from harvest data will be an "animal" in the new model. In the past, the format has been to evaluate these records as "progeny" of a sire and his pedigree. This approach also engages more pedigree influence, if available, on the dams of the calves that are reported as carcass data.

### What's next?

Research continues on fine-tuning the analysis to create carcass EPDs for weight, marbling, ribeye and fat under the integrated evaluation. A future release of the new carcass EPDs is planned with the fall 2008 sire evaluation.



**E-MAIL:** [snorthcutt@angus.org](mailto:snorthcutt@angus.org)

**Editor's Note:** "By the Numbers" is a column by Association performance programs staff to share insights with Angus members about data collection and interpretation, the National Cattle Evaluation (NCE), genetic selection, and relevant technology and industry issues. If you have questions or would like to suggest a topic for a future column, contact Sally Northcutt, director of genetic research, or Bill Bowman, director of performance programs, at 816-383-5100.