



By the Numbers

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

Dissecting NCE EPDs

We're spoiled. We submit performance records, such as weaning and yearling weights, and the next morning we are able to review interim expected progeny differences (EPDs) for the animals of interest.

Just a snapshot

Interim EPDs are only a snapshot of the performance and are calculated using key items included in the interim formulas. At best, these items include the animal's own performance relative to a valid contemporary group and sire and dam EPD information.

Some interims may not even include an individual's own record. Interims are a great start, but they are not as good as it gets. That's why a National Cattle Evaluation (NCE) EPD is computed using the available database for a particular trait (or traits) twice annually, with results typically released in July and December.

Big picture

NCE EPDs have more complexity and come from genetic evaluations encompassing three major sources of information: the individual's own record, pedigree information and progeny

performance records. Different combinations of these three may exist.

For example, a young bull may have his weaning and yearling weights, as well as pedigree information, contributing to his NCE EPD, but he may not have progeny yet. His dam may not have her own weight records, but she appears as a parent in the evaluation with associated pedigree ties.

The sire of this dam may be a pedigree tie in the evaluation, having grandprogeny with records, although he and his direct progeny have no weight records included. A variety of combinations exist based on pedigree, performance and progeny information.

Individual performance records used in an evaluation encompass all the records in the American Angus Association's database that have met the edits for the trait and a valid contemporary group. For example, an evaluation to generate EPDs for weaning weight direct (WW), yearling weight (YW) and maternal milk (MILK) uses 4,530,588 weaning weight records and 2,252,619

yearling weights. This run generated 5,525,550 EPDs for each trait in the fall 2005 evaluation.

If an animal's own record was not used in the evaluation, this usually traces to an improper contemporary group (see "Points of reference").

Pedigree contributions are complex in a genetic evaluation. Typically, three to four generations of pedigree are used to tie or connect the animals together in the breed for the performance trait. In contrast, an interim EPD includes just the sire and dam contributions to the EPD.

Progeny performance is the finishing touch on data to contribute to the EPDs. As parents accumulate progeny data for NCE EPDs, the accuracy levels increase and possible change decreases. For example, as sires accumulate hundreds of progeny, this source of information becomes a driving force in their EPDs. Their EPDs are not expected to change much when future evaluations are run.

What's not used in NCE EPDs

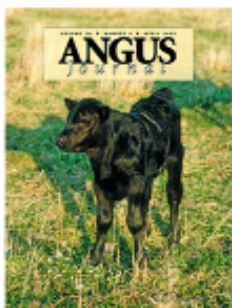
There's a misconception that the ratios you see on your Beef Improvement Records [BIR, including Angus Herd Improvement Records (AHIR) and Beef Record Service (BRS)] reports and online summaries are used to calculate EPDs. This is not so, as the ratio results are just to give you an indication of how an animal ranks relative to its contemporaries managed alike for a particular process date/lot identification (ID).

In the calculation of NCE EPDs, the animal's own record (a weight or measure) is used relative to the contemporary group's average performance. For example, the performance file for an NCE run includes adjusted weaning weights and adjusted yearling weights in pounds. The numerical ratios (106, 89, 90, 102) are not entered into the computations.

As a refresher, here's an example of how ratios are calculated: Let's assume our contemporary group of 10 bull calves at weaning weighed an average of 600 pounds (lb.). One calf weighed 630 lb., so he is 5% above the average of his contemporaries. His ratio is 105.

$$\text{Ratio} = (630 \div 600) \times 100 = 105$$

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Points of reference

For more information about specific topics, refer to these resources.

► Contemporary grouping

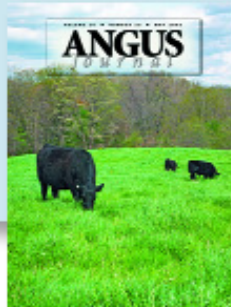
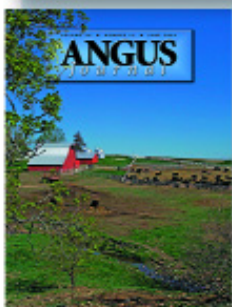
www.angus.org/performance/documents/contemporary_grp.html
See "By the Numbers" in the May 2005 *Angus Journal*.

► Interim EPDs

www.angus.org/performance/documents/interim_epd.html
See "By the Numbers" in the April 2005 *Angus Journal*.

► Accuracy and possible change values

www.angus.org/sireeval/accuracy.htm
See "By the Numbers" in the June 2005 *Angus Journal*.



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Another calf weighed 570 lb., which is 5% below the contemporary group average of 600 lb. His ratio is 95.

$$\text{Ratio} = (570 \div 600) \times 100 = 95$$

Ratios can be a within-group tool; however, the use of more advanced selection tools, like EPDs, provides comparisons among all animals in the breed with greater accuracy.

Levels of complexity

If we summarize by complexity, the pedigree is the least complex description of your animal. This is followed by weights and measures that you take in a proper contemporary group. Once the contemporary group average or mean is known, then a ratio can be computed by division. Progeny summary data begins to build a database for each animal to better describe its value as a parent. And, that is really what we are working toward — to describe the value of an animal as a parent as completely as possible.

If there's no other take-home message,

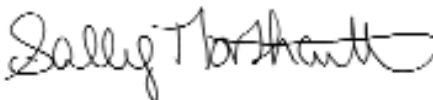
remember that ratios are simple division. Ratio values are a snapshot of an animal's relative ranking in its group — no more. There are no adjustments for pedigree, performance of close relatives or the merit of mates.

Next in the order are interims. Interim EPDs are good, and they have some complex equations behind them to include the animal's own record relative to contemporaries and parental influences. Keep in mind that interim EPDs do not have four generations of pedigrees behind them and are typically geared toward a nonparent prediction of breeding value.

Finally, the NCE EPDs are the most complex and a big math problem to work through, but the end result is the most accurate prediction of genetic merit with the most genetic contributions involved. The biannual evaluation captures the Association's database for a trait, contemporary grouping, progeny data and generations of pedigree, and relative importance through the relationship matrix. The more complex NCE EPDs may also include multi-trait models, as seen in calving ease, weaning and yearling weights, and ultrasound.

Expect EPDs to change

Since the interim EPD has fewer pieces contributing to it than the NCE EPD, it is only logical that the EPD would change numerically from the interim stage to the NCE run. If EPDs did not change, we would never need to run an evaluation. New records enter the system; new animals come into the database; new pedigree relationships develop. EPDs are expected to change.



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