EPDs: Back to Basics

Learn why EPDs are useful to the commercial cattleman.

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The U.S. beef herd is finally in expansion mode, and that means more heifers are being held back, and genetic selections may stay in your herd longer. Think about how you select cattle. Is it by visual appraisal alone? You may be losing out on some potential under the hide by ignoring an important selection tool.

Tonya Amen, genetic service director for Angus Genetics Inc. (AGI), says, "The seedstock business exists as a business to meet the needs of the commercial cattleman." Yes, seedstock producers aim to provide the genetics needed to improve commercial cattlemen's herds to achieve market premiums for their feeder cattle. However, leaving genetic decisions up to chance or visual appraisal alone doesn't do commercial cattlemen any favors. Expected progeny differences (EPDs) are one of several tools to help make selection decisions.

What are EPDs?

An animal's performance is due to two main factors — genetics and environment. The two are not independent of each other, says Amen, which is why visual appraisal alone generally misses at least part of the equation. Balance is necessary, she adds. Phenotype and genotype are equal parts of the equation, which is why members' submission of phenotypes (birth weights, weaning weights, docility scores, etc.) to Angus Herd Improvement Records (AHIR®) is an integral part of developing EPDs.

She explains that selection tools stem from this Angus database of performance records. As technology advances, our understanding of it increases, and so does our ability to harness it to aid selection decisions. Livestock measurements used as selection tools have evolved from actual measurements to within-herd ratios to EPDs to $Value indexes (which are bio-economic indexes that take into account biology and economic factors) to genomic-enhanced EPDs and indexes.

The Angus database is one of the major assets of the breed. Performance records have been submitted for millions of animals in the Angus breed, which add validity to genetic tests. Because of this large database, Angus EPDs are updated every week and have gone through four recalibrations to increase their accuracy. Amen says recalibrations increase accuracy because they are trained with a larger population of genomic and phenotypic records.

Why EPDs matter

An EPD is the best estimate of the genetic value of an animal as a parent, says Amen. She explains further that when you read an EPD, the numbers are meant to be a comparison of how an animal's progeny (calves) would perform compared to another animal's progeny when bred to similar mates in a similar environment.

Amen gives the example of Bull A and Bull B. Let's say Bull A has a weaning weight (WW) EPD of 60 and Bull B has a WW EPD of 40. This means that when bred to similar females in a similar environment, Bull A's calves will average 20 pounds (lb.) heavier at weaning than Bull B's calves.

Let's say each bull sires 30 calves. Bull A has 30 calves that average 570 lb.; Bull B has 30 calves that average 550 lb. At a conservative $1.60 per lb., Bull A's calves would garner $27,360. Over five years, his calves would earn $136,800. At the same price point, Bull B's calves would bring $26,400 that first year, and $132,000 over the course of five years. The difference in accumulated value between these two bulls' progeny would be $4,600.

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To contend with current high prices, Amen adjusts the numbers to show an even greater value difference. At a feeder-calf price of $2 per lb., Bull A's progeny would earn $34,200. Bull B's progeny would earn $33,000. In five years, Bull A's calves would garner $171,000, and Bull B's would garner $165,000, which results in a $6,000 difference.

Keep in mind that this example is not advocating for single-trait selection, but rather compares different bulls (or even females) for their genetic merit. To compare animals to others in the breed, the Angus database has a percentile breakdown. This table shows the percentile breakdowns of each EPD, so you can compare where potential herd bulls or replacement females rank compared to the rest of the breed.

You can find this EPD percentile breakdown on the Angus website and in each biannual *Sire Evaluation Report.* From the Angus homepage at *www.angus.org*, hover over the "Management" tab at the top left. Move your mouse down the drop-down column to "Calculators/Tables," and the "Percentiles" is in the middle of the next drop-down menu. Once on the Percentile Breakdown page, you can sort percentiles by current sires, current dams, non-parent bulls and non-parent cows.

Accuracy

Amen says she receives two major questions on EPDs from skeptics, "Why do the numbers change?" and "I had a calf out of that bull that didn't do what his numbers said they would. Why?"

The answer to both of these questions is accuracy. If you think back to high school math classes, you may remember standard deviations. These are the amount of change that can happen between the EPD and the "true" progeny difference, Amen explains. Logically, lower-accuracy EPDs would be expected to move more than a higher-accuracy EPD. Accuracies are listed from 0 to 1, with 1 being the highest accuracy. For a given accuracy, she says, about two-thirds of the time, or 68%, an animal should have a "true" progeny difference within the range of the EPD plus or minus one standard deviation.

To find out the accuracy ranges, visit *www.angus.org/Nce/Accuracy.aspx*.

We'll use the birth weight (BW) EPD as an example. Let's say the EPD for both bulls is listed as 1.8. Bull A has an accuracy of 0.05. By looking at the accuracy chart, we see that the standard deviation is 2.49. That means there is a two-thirds probability that his actual birth weight EPD will fall somewhere between -0.69 and 4.29 (1.8 ± 2.49).

Bull B has an accuracy of 0.80, which has a standard deviation of 0.53. This means, again, he has a two-thirds probability of his birth weight EPD falling somewhere between 1.27 and 2.33 (1.8 ± 0.53). Statistically, there is still a one-third chance of there being a greater deviation, but the range is much narrower due to his higher accuracy.

Dan Moser, president of AGI, notes, "There is no absolute that an animal's EPDs won't move, but it is less and less likely with higher accuracy. Everything we have is an indicator, but 68% of the time or more, the eventual high-accuracy EPD will be within the range."

He adds that most salebooks don't publish accuracy values, since most young animals have similar accuracy. However, animals with genomic-enhanced EPDs, generated through DNA testing, will have higher accuracies than non-tested animals. Accuracy values can be looked up using the animal's AAA registration number online or in the Angus Mobile app.

Genomic-enhanced EPDs

There is one step further in the use of EPDs, and the best part is that cattlemen don't have to do anything different to use the better selection tool. All EPDs from the American Angus Association are genomic-enhanced EPDs (GE-EPDs). What does this mean for cattlemen using them?

Classic EPDs have three major inputs — pedigree, performance and progeny. As stated earlier, Angus breeders have religiously submitted performance data. Amen illustrates that in 1963, the Association had 9,332 weaning weights in the database. In 2015, the Association has 8 million weaning weights. In the weekly evaluation released Feb. 10, 2015, alone, 5,458 weaning weights were added.

GE-EPDs have four major inputs — pedigree, performance, progeny and genomic testing. In addition to submitting performance records, Angus breeders are also quick adopters of genetic technology and have submitted more than 130,000 high-density genomic profiles.

"The reason our genomics work better than other breeds is because we have more data to increase the accuracy," says Moser.

By using genomic information, accuracy increases. With more genomic information being added to the database, recalibrations are done because there are more animals and more information available.

Amen shares data from Kent Andersen, Zoetis associate director of global services technical services for animal genetics. For maternal traits — heifer pregnancy, calving ease direct, birth weight, milk, docility, scrotal circumference — GE-EPD accuracy equals an average of 14 daughters' information. For growth and efficiency traits — weaning weight, yearling weight, dry-matter intake, yearling height and mature weight — GE-EPD accuracy equals an average of 17 progeny with performance data. Finally, for carcass traits — carcass weight, marbling, ribeye area and fat thickness — GE-EPD accuracy equals an average of 10 progeny with carcass data.

So next time you make a genetic decision about your herd, whether it is buying a new herd bull or keeping a replacement heifer, don't disregard those EPDs. Keeping those in mind in addition to environment and phenotype will help you make the most beneficial genetic change in your herd.