By the Numbers

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EPD basics

Whether buying or selling Angus genetics, it's always good to review your understanding of these important values.

There probably isn't anyone reading this column who hasn't listened to an educational presentation on expected progeny differences, or EPDs. The technology used to calculate these genetic values dates back to the 1970s. While there have been many innovations in computing and data analysis, the meaning of the values and how they are used haven't really changed in the last 35 years. Still, as I speak to groups of Angus breeders or commercial cattle producers, I always find there are some misconceptions about the meaning of EPDs.

Comparison across environments

When EPDs were first published in the late 1970s, they truly revolutionized the beef genetics business. Prior to that time, selection for performance traits had to be based on adjusted weights or ratios. Such selection was biased and misleading, as environmental effects could increase or decrease the actual performance of an animal, and its ratio was highly dependent on the other animals it competed against in a contemporary group. An excellent calf might be below average in a truly elite group and ratio below 100, while the same animal in another group could be the highest-performing individual.

Only with the advent of EPDs were breeders able to fairly compare animals from different farms and ranches, or from different years, without bias. It's no wonder that for most traits, little genetic change was observed until EPDs became available.

By using the pedigree connections that exist within the Angus database, EPD calculations allow fair comparison of all Angus cattle. The significant amount of artificial insemination (AI) used by Angus breeders adds accuracy to Angus EPDs, because many contemporary groups from different breeders have one or more common sires.

Genetic improvement for calving ease using both BW and CED EPDs will result in less progress than selecting on CED EPD alone.

When a new sire first has progeny data submitted to the database, his progeny performance relative to other more proven sires helps determine whether his EPDs should change from what was previously estimated based on his pedigree and own performance record. I've received phone calls from breeders surprised that a bull whose progeny performed well above average actually declined in growth EPDs. In such cases, it's usually because the other sires in the contemporary groups were much lower for growth EPDs than the sire in question. While the sire's calves were the heaviest, they did not exceed the group average by as much as the previous EPDs would have predicted, and, accordingly, his growth EPDs declined, while those of the other sires in the group increased.

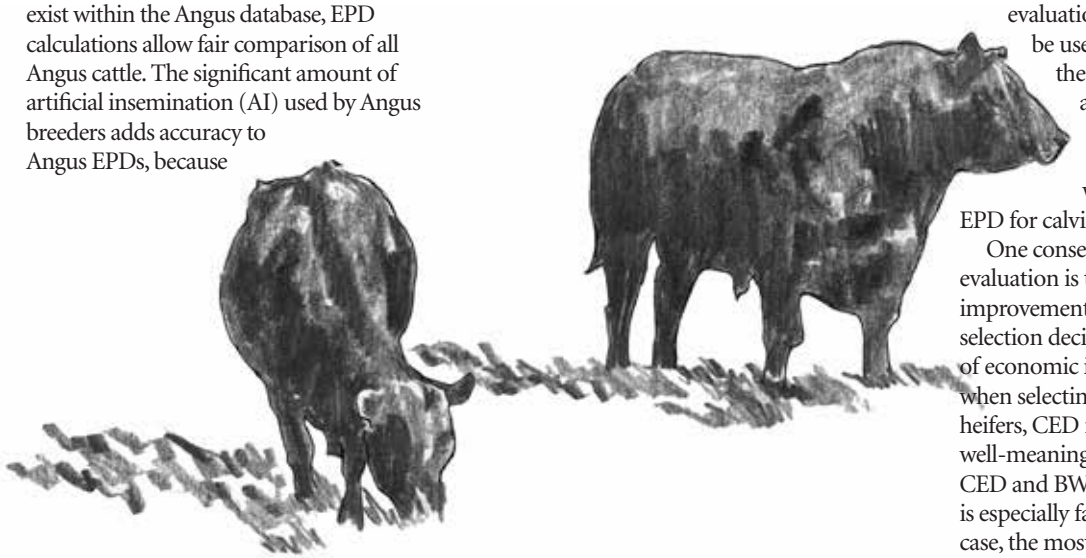
Unlike ratios, EPDs take into account the genetic contributions of the other parent when evaluating progeny of a young bull or cow. The pedigree information in the database allows the calculations to consider whether the other parent was high or low for a particular trait, and factor that into the estimation of genetic merit. If a young sire happened to be mated to a group of females that were below breed average for weaning weight, the models factor that in, and wouldn't expect the calves to have the same weaning weights as if he had been bred to higher-growth females.

Multiple-trait evaluation

Calculation of EPDs also takes advantage of traits that are genetically related, or correlated. Many of the same genes that make weaning weight increase have a similar effect on yearling weight. By using both growth traits together in a multiple-trait evaluation, accuracy of both EPDs increases.

In the calving-ease evaluation, birth weight (BW) is used as a correlated trait. Since the incidence of calving difficulty in Angus cows is extremely low, only calving ease scores from first-calf heifers are used in the evaluation. Some bulls might initially be used only on mature cows, but if the birth weights from those calves are lower than expected, the sire's BW EPD would decrease. In addition, the lower birth weights will also increase his EPD for calving ease direct (CED).

One consequence of multiple-trait evaluation is that for maximum genetic improvement, breeders should focus their selection decisions on the EPDs for the traits of economic importance. For example, when selecting bulls for use on first-calf heifers, CED is an important trait. Some well-meaning breeders might look at both CED and BW EPDs, searching for a sire that is especially favorable for both EPDs. In this case, the most effective method to improve



Because performance traits are always influenced by environment effects, EPDs cannot predict actual performance.

calving ease is to select on CED EPD alone, and ignore the BW EPD. All the information used to calculate BW EPD was also used in calculation of CED EPD. If a breeder selects for both, they place more emphasis than optimal on birth weight data and less on calving-ease scores.

Genetic improvement for calving ease using both BW and CED EPDs will result in less progress than selecting on CED EPD alone.

Using the values

When comparing a sire with a weaning weight (WW) EPD of 60 to another sire with a WW EPD of 40, it's the difference in EPDs that matters. In this case, the first sire exceeds the second by 20 pounds (lb.). If those two bulls were mated to similar cows, and the calves were raised in similar environments, you would expect the first sire's calves to average 20 lb. heavier than those of the second sire.

Nonetheless, the actual weights are partially determined by the production environment. On one farm, the weaning weights might average 460 lb. vs. 440 lb. for the two sire groups. In another situation, because of differences in climate, season, cow herd genetics and management, the difference might be 680 lb. vs. 660 lb. Because performance traits are always influenced by environmental effects, EPDs cannot predict actual performance.

If a specific performance level is a producer's goal, past experience can be used as a guide. I'm often asked what Angus BW EPD will result in 75-lb. calves at birth. There is no one EPD level that will produce the same calf performance in all environments when mated to all types of cows.

My advice in this situation is to ask the producer about the EPDs of the bulls they've used in the past and whether the level of calving ease was acceptable. In situations where calving difficulty has been a problem in the past, more stringent selection on CED EPD is warranted, but if little dystocia has been observed previously, there is little incentive to place additional selection pressure on this trait.

Finally, it is important to remember that while the EPDs from the Angus genetic evaluation are directly comparable, EPDs from other breeds are not comparable to Angus or other-breed EPDs. Each breed association has a unique method for setting the base for EPD calculations, and breed-average EPDs vary widely across breeds.

The U.S. Meat Animal Research Center (USMARC) in Clay Center, Neb., calculates across-breed EPD adjustment factors each year. These adjustment factors can be used to put EPDs for bulls of other breeds on an Angus base. For more information about using these values, refer to "Adjustment Factors to Estimate Across-breed EPDs" on page 383 of the February 2016 *Angus Journal* or find the article on the Angus website, at *www.angus.org/Nce/AcrossBreedEpdAdjFactors.aspx.*

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