

BY THE NUMBERS

by Dan Moser, Angus Genetics Inc.

Understanding Genomic Test Results

Get the facts on why you should be using genomic testing in your herd.

One of the most frequently asked questions of Angus Genetics Inc. (AGI) staff is, “What is the meaning and significance of genomic percentile rank values (genomic scores) provided to owners of animals with a genomic profile test?” To better understand these values, a review of their history may help.

History of GE-EPDs

While Angus was the first breed to provide genomic-enhanced expected progeny differences (GE-EPDs) a decade ago, genomic testing for several traits in beef cattle has been available since 2000. The first such tests tracked just a few markers, and the results were provided in a manner that labeled tested cattle as homozygous or heterozygous for the markers of interest.

As the tests improved from using a few markers to more than 100, a more useful reporting system was needed. Genomics companies used test results and phenotypic measurements to estimate marker effects on traits of interest. Those effects were summed into a single number for each trait, and were reported either in units of the trait like an EPD, or on a 1-to-100 percentile scale, listing the animal's ranking within the tested population. Since these values were not used in

EPD calculation, breeders could only informally weight genomic results with EPDs, in order to make use of all available information.

The AGI staff implemented a major advancement in beef cattle evaluation in 2009, when genomic values were combined with traditional EPDs to produce the first GE-EPDs. As more cattle were tested, updates to the DNA marker effects on traits, referred to as calibrations, were needed. AGI updated these values four times over the next seven years.

With each calibration, genomic scores and EPDs on most tested animals would change, reflecting the additional phenotypic data and genotypes added to the database. At this point genomic scores had lost most of their use in selection, as the EPDs fully incorporated genomic information. Simultaneously using GE-EPDs and genomic scores overemphasized genomics and underemphasized performance of the animal and its relatives.

In 2017, AGI implemented the single-step approach to genetic evaluation, already in use in most livestock species. This superior approach removed bias due to selective testing, and eliminated the need for recalibration of genomic effects on traits. Single-step builds

genomic relationships among tested animals, to more accurately connect animals to relatives' phenotypic data. In this way, estimation of DNA marker effects (calibration), the step that produced the genomic scores, was no longer needed. Still, based on member requests, AGI decided to calculate these genomic-only values annually.

Single-step v. multi-step

Since implementation of single-step, some breeders have observed that genomic scores and GE-EPDs don't align as closely as in the old multi-step approach. There are several reasons for this. One is that the genomic score calculations still include the bias due to testing of selected animals, even though single-step EPDs are not subject to this bias. While genomic scores are updated annually in late May or early June, any new DNA test results or phenotypes are not included until the next year's update.

In contrast, single-step EPDs released each Friday reflect the entire database of performance data and genotypes available that week. When a young sire's first progeny weights are submitted to the database, the GE-EPDs of those animals and their relatives incorporate that

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information immediately; but genomic scores will not change until the next summer update.

While breeders may find genomic scores interesting, there is no advantage to be gained in selection accuracy by using them — in some cases they may provide misleading information. When animals rank differently for GE-EPDs compared to genomic percentile rankings, the GE-EPDs are always the more correct and accurate estimate of the animal's genetic merit. **AJ**



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Editor's note: If you have questions, please contact the Performance Programs department at 816-383-5100.

Tips for successful DNA sampling:


1. Plan to complete DNA testing at least four weeks before sale book deadline.
2. Tissue Sampling Units (TSUs) or blood cards are the preferred methods for sample submission.
3. Saturate blood card thoroughly and fully dry in an open air, temperature-controlled room before shipping. Failing to do so results in DNA degradation and test failure.
4. TSUs or hair cards are *required* for twins.
5. If sampling young animals, TSUs or blood cards work best.
6. TSU orders must be accompanied by an electronic spreadsheet which includes tag number and barcode.
7. All DNA testing orders must be placed through AAA Login. Orders without proper documentation are subject to processing delays.
8. For results to be incorporated into an animal's expected progeny differences (EPDs) or used to confirm parentage, tests must be directly ordered through Angus Genetics Inc.


Check out www.angus.org/AGI/SubmittingSamples.aspx for more tips on submitting successful DNA samples.

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