



By the Numbers

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What's up with recalibration?

In September the fourth calibration for genomic trait tests (GeneSeek GGP-HD and Zoetis HD50K) was released. During the ensuing weeks, we've received several questions about recalibration, ranging from why it is necessary to how it affected expected progeny differences (EPDs) and genomic test results. This column will be devoted to addressing some of those questions.

What is recalibration?

Recalibration is the process by which the algorithm that allows results from DNA tests to be incorporated into genomically enhanced EPDs (GE-EPDs) is updated. This involves re-estimating single-nucleotide polymorphism (SNP) marker effects for each trait, as well as reassessing the correlations between the genomic results and phenotypes in the American Angus Association database (see Table 1). The latest calibration was trained using genotypes on more than 57,500 registered-Angus animals

— a robust dataset made possible by the willingness of Angus breeders to adopt new technologies.

Also included in Table 1 is the average accuracy value that testing with Zoetis HD50K or GeneSeek GGP-HD allows non-parents to obtain in addition to approximate progeny equivalents. Progeny equivalents illustrate the approximate number of offspring with a phenotypic record for the associated trait that would be required to achieve the same level of accuracy provided by the genetic trait tests.



Why is recalibration necessary?

The new calibration increases the accuracy and power of GE-EPDs by ensuring more animals across a broader swath of the pedigree are included in training and also to adapt the genomic test as genetic change is

made over time. This genetic change is made as Angus breeders make their selection

and breeding decisions to make progress in their herds.

How does recalibration affect EPDs?

For highly proven animals (those with high accuracies associated with their EPDs), minimal change in EPDs is likely to be observed. For lower-accuracy animals, however, substantial change may be seen in EPDs for some traits.

Do percentile ranks change?

Yes. In order to ensure that animals tested in the future can be compared to those tested in the past, percentile ranks will be updated. These updated percentile ranks reflect not only the larger pool of animals that have been tested, but also changes in rank due to the updated marker effects.

It should be noted that breeders are strongly encouraged to use GE-EPDs as the selection and marketing tool of choice, because they account for all available information on an animal (pedigree, their own performance, progeny data and genomics).

Recalibration and GeneMax™ Advantage

In conjunction with release of the latest recalibration of the genomic trait tests for registered-Angus cattle, the genomic information underlying GeneMax Advantage Scores and SMART Outlier Reporting were also updated. [GeneMax Advantage offers three economic index scores (Cow Advantage, Feeder Advantage and Total Advantage) that encompass maternal, growth, efficiency and carcass traits. SMART Outlier Reporting identifies extremes (top and bottom) for cow costs, docility, tenderness and marbling.]

There are two components of the update to GeneMax Advantage scores and SMART Outliers:

Table 1: American Angus Association Calibration 4 for national cattle evaluation

Angus heritability (h^2) estimates, genetic correlations (r) between version four (V4) genomic predictions ($n = 57,550$) and the American Angus Association phenotypic database (September 2014), standard errors (SE), approximate accuracy (ACC) and progeny equivalents (PE) for tested non-parents (based on verified pedigree and HD50K information)

Trait	AGI h^2	Genomic V4 r (SE)	Genomic V4 ACC	Genomic V4 PE
Calving ease direct (CED)	0.20	0.62 (.09)	0.31	21
Birth wt. (BW)	0.42	0.68 (.02)	0.37	13
Weaning wt. (WW)	0.20	0.56 (.02)	0.29	19
Yearling wt. (YW)	0.20	0.66 (.02)	0.32	22
Residual avg. daily gain (RADG) ¹	0.31	0.74 (.03)	0.37	18
Yearling ht. (YH)	0.50	0.74 (.01)	0.38	11
Scrotal circumference (SC)	0.47	0.78 (.01)	0.41	14
Docility (Doc)	0.37	0.71 (.03)	0.33	12
Heifer pregnancy (HP)	0.13	0.45 (.05)	0.14	10
Milk	0.14	0.36 (.01)	0.19	14
Mature wt. (MW)	0.37	0.68 (.02)	0.34	13
Carcass wt. (CW)	0.38	0.60 (.03)	0.30	10
Marbling score (Marb)	0.45	0.67 (.03)	0.33	9
Ribeye area (RE)	0.33	0.69 (.03)	0.30	11
Fat thickness (FAT)	0.34	0.65 (.03)	0.31	12

¹Dry-matter intake component.

(1) use of Calibration 4 marker effects, which underlie the Advantage scores; and

(2) an expanded reference population of more than 14,000 commercial-Angus females now used for benchmarking. In order to make results for animals tested previously comparable to animals yet to be tested, all previously reported results have been updated.

No changes will be made to GeneMax Focus at this time, though updates are in the research pipeline for release at a later date.

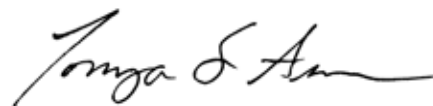
Final thoughts

Thanks to adoption by Angus breeders,

the number of animals with genotypes for use in GE-EPDs is likely to reach 100,000 sometime in early 2015. Genomic results are incorporated into all Association GE-EPDs, which allows increased dependability to not only the EPDs themselves, but also the dollar value indexes (\$Values) derived from those EPDs.

A feature of testing with HD50K or GGP-HD is parent verification, which ensures the integrity of Angus pedigrees and adds another layer of accuracy to EPDs (for which pedigree is an important component). This integration of genomics into GE-EPDs and Angus \$Values simplifies use of genetic

information across many traits for Angus breeders and their commercial customers.



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Editor's Note: *"By The Numbers" is a column by Association performance programs staff to share insights about data collection and interpretation, 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 the Association at 816-383-5100.*