



By the Numbers

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Why routine calibration?

On April 8, the fifth calibration for Angus genomic trait tests (GGP-LD, GGP-HD, Zoetis HD 50K and i50k) was released. Breeders often have questions on how it affects GE-EPDs and how Calibration 5 (Cal5) compares to the previous calibration.

Answering questions

What is the purpose of routine calibration?

Routine calibration is the process of updating the equations used to incorporate genomic test results into genomic-enhanced EPDs (GE-EPDs). This includes both re-estimating single-nucleotide polymorphism (SNP) marker effects, as well as the correlations between genomic results and phenotypic data (see Table 1).

Throughout the year, the Association receives new DNA test results, as well as new performance data on tested animals. Compared to Calibration 4 (Cal4), completed in September 2014, the number of animals used in the training population increased by 88%, from 57,550 animals in 2014 to 108,211 animals in 2016 (see Fig. 1, page 86).

Only animals with both phenotypic data and genomic results are utilized for the test population. Larger test populations provide stronger correlations between molecular breeding values (MBVs) and phenotypic data and explain a greater percentage of the genetic variation among traits. The new calibration increases the accuracy and the power of the GE-EPDs.

Why is this happening now?

Routine calibration is a significant undertaking in which AGI worked meticulously alongside research partner Zoetis to provide the most accurate genetic tools available. Work on this calibration began June 2015 and was released in April 2016. Once AGI staff had thoroughly reviewed the results

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of the calibration, the new information was incorporated as quickly as possible in order for Angus breeders to take full advantage of the genomic tools available to them.

How does it affect Angus EPDs?

For proven animals with large amounts of progeny data submitted, changes were fairly minimal. Lower-accuracy animals with little to no progeny or those with newly incorporated progeny information points were more apt to change. Because of the large number of animals in both Cal4 and Cal5, fluctuations or re-rankings of animals with GE-EPDs appeared minimal.

Heifer pregnancy (HP EPD) showed slightly more change than other traits in the AGI evaluation. This is due to the increased phenotypic data collected since the last calibration in 2014. Increased phenotypes on a specific trait shows us a broader distribution of the overall population. For this reason, AGI is better able to dissect the amount of variation individual markers explain for that trait and re-estimate these values accordingly. In all cases, new GE-EPDs are more accurate than the values they replace.

Do the percentile ranks for animals tested with genomics change?

Percentile ranks for animals tested with the Zoetis HD 50K and i50K or GeneSeek GGP-HD and GGP-LD tests will change. These changes reflect the larger pool of animals that have been tested since the last calibration. Animals tested prior to Cal5 will have their percentile ranks updated, so animals tested in the future can be directly compared to those tested previously.

Breeders are strongly encouraged to use GE-EPDs to make selection decisions because all available information on the animal (pedigree, their own performance, progeny data and genomics) are accounted for in this

Table 1: American Angus Association Calibration 5 for national cattle evaluation

Angus genetic correlations (r) between version five (V5) genomic predictions (n=108,211) and the American Angus Association phenotypic database (April 2016), standard errors (SE) and progeny equivalents (PE) for tested non-parents (based on verified pedigree and HD50K information)

Trait	Genomic V5	
	Correlations (SE)	Progeny equivalents
Calving Ease Direct (CED)	0.67 (0.07)	24
Birth Weight (BW)	0.69 (0.01)	13
Weaning Weight (WW)	0.56 (0.01)	19
Yearling Weight (YW)	0.68 (0.02)	24
Dry-matter Intake (DMI)	0.73 (0.02)	17
Yearling Height (YH)	0.75 (0.01)	12
Scrotal Circumference (SC)	0.80 (0.01)	16
Docility (Doc)	0.68 (0.03)	11
Heifer Pregnancy (HP)	0.62 (0.04)	22
Milk	0.37 (0.02)	14
Mature Weight (MW)	0.74 (0.01)	16
Mature Height (MH)	0.71 (0.01)	7
Carcass Weight (CW)	0.60 (0.02)	7
Marbling Score (Marb)	0.65 (0.02)	8
Ribeye Area (RE)	0.68 (0.03)	11
Fat Thickness (FAT)	0.65 (0.02)	12

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value. Relying on just one piece of information does not allow a breeder to take full advantage of the tools provided through the information they collect and report to the Association.

Why did the indices like \$W and \$B change?

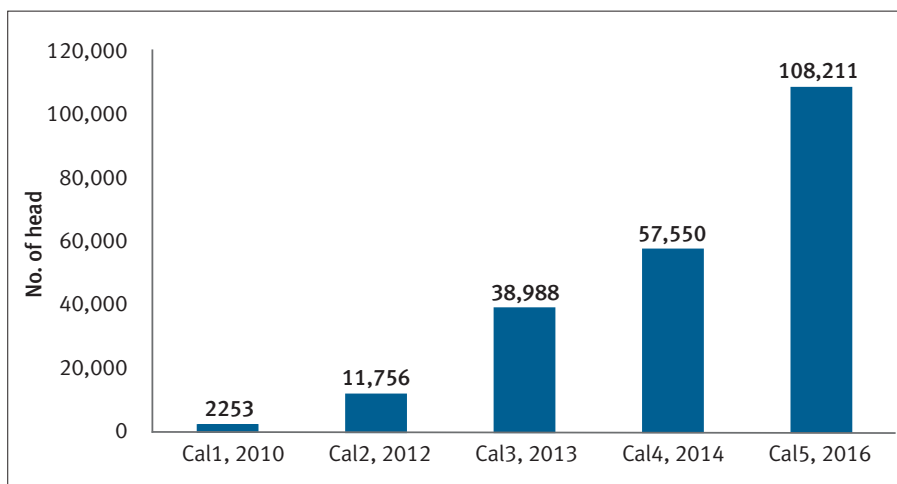
Dollar value indexes (\$Values), like \$W and \$B, are calculated from an animal's EPDs, so as the EPDs change, \$Values will change as well. For example, if an animal has a significant change in carcass weight (CW) EPD, an animal could change in their \$B values, as CW has substantial effect on \$B. However, large changes in EPD values were not seen in Cal5, so in return, \$Values experienced far less change than with previous calibrations.

The economic assumptions for creating these dollar value indexes did not change in April 2016. Economic assumptions, such as carcass grid prices and annual cow costs, will be updated in early July and will be annually updated at this time moving forward.

Calibration and GeneMax tests

Even though GeneMax® Advantage™ scores are calculated using information

Fig. 1: Increase in number of animals in the training population over five calibrations



from calibration, values from Cal4 will continue to be used for GeneMax Advantage for now. The GeneMax family of tests are undergoing some exciting updates to be unveiled mid-summer and early fall. Once these updates are ready for release, results from Cal5 will be incorporated in the calculation of GeneMax scores and indexes. At this time, animals will be re-assigned

percentile rankings to allow for animals that have been tested on GeneMax Advantage in the previous year to be compared to newly tested animals.

In closing

While dramatic changes were not seen between Cal4 and Cal5, it is important genomic technology is periodically checked in order for AGI to provide the most reliable selection tools possible. Thanks to adoption by Angus breeders and the release of low-density testing options by both GeneSeek (GGP-LD) and Zoetis (i50K), the number of animals with genotypes for GE-EPDs is likely to far exceed any previously set level. Incorporating genomic results into all EPDs and \$Values provided through the Association increases the dependability of these predictions. It is another additional piece of information breeders and their customers can use in making mating and selection decisions.

Another feature when testing on any of the low- or high-density testing options is the parentage-verification tool. Any animal tested with one of these options that has parents on file with markers will be automatically verified back to the sire and/or dam available. This furthers the integrity of the Angus database by correctly identifying pedigree relationships, adding to EPD accuracy. Incorporating genomic information directly into GE-EPD and \$Values greatly simplifies the use of genetic information for both the Angus breeder and their commercial customers.

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