



By the Numbers

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Genomic choices

The most frequently asked question of the month on the subject of genomics and expected progeny differences (EPDs), is “Which test do I pick?” Breeders hate the answer, “It depends,” but as of the date you read this article, that’s all we can say. Following are points to consider in your decision-making process. Ultimately, you will still be using EPDs to make the most informed selection decisions among animals. EPDs should be considered the genetic improvement tool of choice, since EPDs account for all the available information on an animal, such as individual measures, progeny data, pedigree and genomic results. The details that follow will help you gauge the areas where genomics are having the most impact by trait.

Point 1: Available traits that include genomic results

Not all the National Cattle Evaluation (NCE) traits include genomic results at this time. At the American Angus Association, we incorporate the genomic results into the trait evaluation when the research is completed and trait relationships to the genomic results are established.

Table 1 summarizes the traits impacted by

genomic results. Both company genomic results — Igenity® Profile for Angus and Pfizer HD 50K for Angus — are included in the calculations for growth, residual average daily gain (RADG), and carcass traits. Docility includes only Igenity results. Calving ease EPDs do not currently include genomic results, but a genomic-enhanced release is planned for this spring.

Point 2: Correlation between genomic results and trait

Through Association research, we take the genomic results received from the companies and compute a genetic relationship between the genomic result and the phenotypic data at the Association. Typically, there are two measures used to report the relationship of a genomic test and phenotype, genetic correlation or percent of additive genetic variance accounted for by the test. We typically report the genetic correlation to illustrate this relationship. These two measures are related and can be transformed equally. The genetic correlation is the square root of the percent additive genetic variance and, conversely, the percent additive genetic variance is the squared value of the genetic correlation.

For example, if the genetic correlation between the genomic result and the phenotypic measure is 0.60, then the genomic result explains 36% of the additive

Table 1: Weekly evaluation traits with genomic data

	Igenity	Pfizer
Calving ease (CED, CEM)		
Growth (BW, WW, YW, Milk)	✓	✓
Residual avg. daily gain (RADG)	✓	✓
Docility (DOC)	✓	
Carcass (CWT, MARB, RIB, FAT)	✓	✓

Source: American Angus Association. For the most current status of traits available with genomic information, visit www.angus.org/Nce/WeeklyEvalGenomicData.aspx.

Table 2: Genetic correlations for NCE traits by company

	Igenity	Pfizer
Carcass marbling	0.65	0.57
Carcass rib	0.58	0.60
Carcass fat	0.50	0.56
Carcass wt.	0.54	0.48
Birth wt.	0.57	0.51
Weaning wt.	0.45	0.52
Yearling wt.	0.34	0.64
Milk	0.24	0.32
Dry matter intake (component of RADG)	0.45	0.65
Docility	0.47	n/a

Source: American Angus Association.

Table 3: Establishing direction for Igenity Profile Scores and Pfizer Percentile Ranks

	Igenity Score 'Favorable'	Pfizer Percentile 'Favorable'
Calving ease direct (more unassisted)	10	1%
Calving ease maternal	10	1%
Birth wt. (lighter)	1	1%
Weaning wt.	10	1%
Yearling wt.	10	1%
ADG postweaning	10	1%
Milk (more maternal milk in daughter calves)	10	1%
Carcass marbling	10	1%
Carcass rib (larger)	10	1%
Carcass fat (leaner)	1	1%
Carcass wt. (heavier)	10	1%
Dry-matter intake (eat less)	1	1%
RFI (lower feed intake than predicted)	1	1%
Tenderness (more tender)	10	1%
Docility (more docile)	10	
Yearling ht. (more hip ht.)	10	
Scrotal (larger size)	10	
Mature wt. (larger cow wt.)	10	
Mature ht. (more cow ht.)	10	
Heifer pregnancy	10	

Source: American Angus Association.

genetic variance. Simply stated, the more genetic variance a test explains, the more impact it will have on your EPDs and accuracies for that trait.

Table 2 presents the genetic correlations by trait associated with calculating the Association's genomic-enhanced EPDs. From a practical standpoint, the companies are similar for many of the traits. Angus breeders must consider these relationships and then make the best choice for their breeding programs and traits of interest.

Additional considerations

EPDs — Profile Scores — Percentile

Ranks. Table 3 describes by trait the Igenity profile score and Pfizer percentile rank systems to assist in establishing direction of interest for each trait.

The Igenity Profile for Angus scores are presented as a 1-to-10 scale. The scores reflect the animal's genetic potential for that particular trait based on the combination of the DNA markers analyzed. The higher scores do not necessarily indicate that it is the most desirable, as illustrated in Table 3.

For the Pfizer HD 50K for Angus percentile rankings, a lower value indicates a more favorable ranking for the trait. Percentile ranking format, ranging from 1% to 100% in integer increments, is similar to that used in EPD percentile rankings. For example, a smaller numeric percentile ranking for the Pfizer result in birth weight and carcass fat indicates lighter calves and leaner carcasses as the expectation.

If you are making selection decisions for traits that have an EPD provided by the Association, then the EPDs should be considered the selection tool of choice. The EPD and accuracy account for all sources of information available on the animal of interest (e.g., pedigree, own record, weights/measures, genomic results). Using EPD and genomic scores separately leads to double counting information and will lessen selection efficiency.

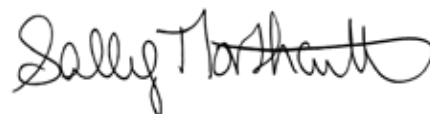
Weights and measures. Genomic results are used as indicator traits in the evaluations to compute EPDs. Genomics do not completely describe the variation in the traits of interest. Breeders sometimes ask if it is no longer necessary to collect weights and measures (e.g., weaning weights, scan data, carcass measures). On the contrary, phenotypic measures collected by Angus breeders continue to be an important part in further development of improved genomic panels and the refinement of this technology over time.

Conclusion

Angus breeders must consider the available genomic options and then make the best choice for their breeding programs to impact traits of interest. Genomic results are a way to enhance the current selection tools, to achieve more accuracy on predictions for younger animals, and to characterize genetics for traits where it is difficult to measure the phenotype.

Through the evolution of these technologies, we plan to keep breeders advised of progress in the development of genomic EPDs. These updates, when available, will be provided on www.angus.org.

For the most up-to-date list of traits with genomic data contributing to results, go to www.angus.org/Nce/WeeklyEvalGenomicData.aspx.



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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, the NCE, genetic selection, and relevant technology and industry issues.