

What test should I use?

Angus Genetics Inc. (AGI®), the genetic services provider of the American Angus Association®, partners with two labs to provide Angus producers the best service possible to fulfil DNA testing needs. Because Angus producers have a choice in which lab provider they do business with, many questions arise about which they should use.

Why Genomic Enhanced Expected Progeny Differences (GE-EPDs)?

- ✓ Best estimate of an animal's genetic worth as a parent
- ✓ Increases EPD accuracy on young animals
- ✓ Uses all information available:
Pedigree, performance data, progeny data & genomic results
- ✓ Characterizes genetics for difficult or expensive traits to measure
Feed intake, carcass traits in breeding stock or maternal traits in bulls
- ✓ Enhances predictability of current selection tools

Service Providers

GeneSeek and Zoetis both partner with AGI to provide Angus producers with the best service possible. Both are reputable suppliers of genotyping services. Each lab supplies breeders with both low- and high-density (LD or HD, respectively) genomic trait testing options. Additional testing (add-on tests) for simply-inherited traits like coat color or genetic conditions (AM/NH/CA/OS/DD) are available through each lab.

Comparing Service Providers		
	Similarities	Differences
Zoetis i50K HD50K	<ul style="list-style-type: none"> • HD50K/GGP-HD cost: \$75 • Impact EPDs is the same/data is included in the same way 	<ul style="list-style-type: none"> • Cost difference in LD tests: Zoetis i50K: \$37 GeneSeek GGP-LD: \$37
GeneSeek GGP-LD GGP-HD	<ul style="list-style-type: none"> • Include parent verification • Reduced testing cost for add-on tests when ordered at the same time 	<ul style="list-style-type: none"> • Testing turn-around time may vary • Additional services based on test: Zoetis enables GeneMax® Sire Match feature

What is the difference between HD and LD?

A test is defined as HD or LD based on the number of single nucleotide polymorphism (SNP) markers included on the panel. The number of markers utilized for genomic trait testing depends not only on the HD or LD status but varies between labs. The GeneSeek GGP-HD and Zoetis HD50K vary in the number of total SNP markers included, but only markers signaling for major allele effects in the Angus population are used to estimate GE-EPDs. The number of total SNP markers included on the panels does not affect the amount of accuracy added to the GE-EPDs. The same markers are used in prediction, regardless of the total number of SNP markers included in the panel. This is due to a process called imputation which allows for LD panels to be utilized in the same capacity as HD panels.

	Cost	Recommended Use
High-Density (HD) Zoetis HD50K GeneSeek GGP-HD	\$75 per test	Testing AI Sires or Donor Dams
Low-Density (LD) Zoetis i50K GeneSeek GGP-LD	\$37/\$37 per test	Testing deeper into herds (i.e. replacement females)

What is imputation?

Imputation is the process of using the large number of HD genotypes to train programs to read or interpret markers (letters) missing on LD tests. The HD genotypes include and read for all marker positions used for estimating GE-EPDs. Using the large number of available HD genotypes, algorithms are formulated to estimate the 'most-likely' marker allele for each position not read on the LD panel.

For example, think of your own reading ability.

H_re's an ex_mp_e of a s_nt_nce l_ke th_t.

Due to your lifetime experience with reading you were able to fill in the missing letters. Your brain is like an algorithm in imputation filling in the blanks of LD genotypes. Imputing LD genotypes is done with great accuracy. VanRaden et al. (2012) showed only a 0.4% increase in reliability of estimating marker effects of dairy bulls when using an 800,000 marker panel versus a 54,000 marker panel. Panels containing more than 50,000 markers show minimal increase in explained genetic variation. Imputation increases the efficiency of genomic trait testing without decreasing prediction accuracy while reducing overall costs to the producer.

Training the technology

AGI retains the right to retest animals on HD if full genotypes are needed to insure imputation accuracy. Some animals initially tested on LD may need to be re-tested on HD in order retain imputation accuracy with no additional cost to the producer.

Phenotypic performance data remains crucially important to collect weights and measures (e.g., weaning weights, carcass data, heifer breeding records) as they are an important component in EPD calculations. Additionally, phenotypic data plays a vital role in further development of improved genomic panels and the refinement of this technology over time. Remember, GE-EPDs are the best estimate of an animal's genetic worth because it incorporates ALL available information (pedigree, progeny, performance and genomic). Genomic technologies are only as good as the database that supports them. These tests should not be used in replace of performance testing, but rather to add value to the validity of the evaluation overall.

More information on the process of incorporating genomics into the Angus National Cattle Evaluation is available. <http://www.angus.org/AGI/GenomicEnhancedEPDs.pdf>