

Frequently Asked Questions



High-Density 50,000-Marker Panel Basics

1. Q: What is the High-Density test?

A: The High-Density panel is made up of more than 50,000 single nucleotide polymorphisms (SNP) that have been identified in the bovine genome. The test utilizes SNP spaced evenly across the entire genome, providing High-Density genomic trait predictions to cover any trait of interest. In our initial product these include various economically important production, yield and quality traits.

2. Q: What is an MVP™?

A: The MVP, or molecular value prediction, is a numeric value derived from the overall sum of allelic effects in the animal's genotype for each specific trait of interest. It is expressed in units of the trait to help producers apply the information to breeding and management programs.

3. Q: How powerful is the High-Density 50K panel?

A: The High-Density panel provides MVPs with the highest level of reliability and precision to date for 13 traits and one multi-trait index. Reliability values for the traits average 52%, ranging from 33 to 63%, while the percentage of genetic variation explained averages 28%, with a range from 11 to 40%.

4. Q: What percent genetic variation would you anticipate being described as a result of the High-Density 50K platform?

A: When we are referring to the percentage of genetic variation explained we are describing how much of the variation observed in a population for a trait is due to underlying genes affecting the trait and contributing to the breeding value differences between animals. Dr. Mike Goddard, Professor in Animal Genetics within the School of Agriculture and Food Systems at the University of Melbourne, Australia, and one of the international authorities on livestock genomics, stated at a recent scientific symposium that describing a 10 to 25 percent

level of genetic variation should be possible using the 50K platform. Pfizer Animal Genetics has been able to achieve and exceed this benchmark on the core traits that it is presently offering commercially and is conducting ongoing research to enhance these estimates as more animals are evaluated.

5. Q: What traits are available in the first release of the High-Density 50K panel?

A: MVPs for 13 traits are available in the initial release of the 50K product. MVPs for the following traits will further enhance the evaluation of available performance data and EPDs: birth weight, weaning weight, weaning maternal (milk), calving ease direct, calving ease maternal, marbling, fat thickness, ribeye area and carcass weight. MVPs for tenderness, postweaning average daily gain, daily feed intake and feed efficiency (measured as net feed intake) will provide genomic estimates of an animal's value for these difficult to measure but profit-determining traits. In addition, a multi-trait feedlot performance index (\$MVP^{FL}) is included for use as a selection criterion.

6. Q: How were the High-Density panel predictions validated?

A: The High-Density panel predictions were developed from the evaluation of 5,400 genotyped Angus animals with phenotypes and genetic evaluation available for these traits. A proprietary strategy, developed by Pfizer Animal Genetics and reviewed by external scientific experts, was used to simultaneously develop the prediction equations from the High-Density panel and cross-validate on unrelated subsets of the animals. Additionally, high-accuracy Angus A.I. sires were used in the approach to allow determination of the reliability of the predictions for currently available EPD traits. Lastly, six strategic partners from across the U.S. who are progressive Angus producers are working closely with Pfizer Animal Genetics to demonstrate the use and value of the High-Density panel in concert with their performance recording programs.

7. Q: What is the difference between reliability and accuracy?

A: Reliability is the standard for assessing the predictive power of the MVP for a trait. It is based on the correlation between the MVP and the animal's genetic breeding value if all information were known and is also known as the genetic correlation between the MVP and the trait. The reliability values expressed from the MVPs are derived solely from an animal's genotype. Accuracy values, as associated with EPDs, are derived from performance data for the animal and its relatives and are expressed as what is known as BIF accuracy. An excellent description of the relationship between reliability and BIF accuracy can be found at: http://animalscience.ucdavis.edu/animalbiotech/Outreach/Marker_Assisted_Selection_in_Beef_Cattle.pdf

8. Q: Please explain the following terms: selection intensity, selection accuracy, generation interval.

A: *Selection intensity*: Answers the question "How picky are you in your mating decisions?" It is the level of emphasis placed on the selection of animals utilized for mating purposes and is measured as the number of standard deviations above the population average of the animals selected as parents for the next generation. The wider the range of MVPs available in the population, the greater the opportunity for more intensity of selection.

Selection accuracy: Defines the amount of confidence you may place in a mating decision. Animals with lower accuracy possess more range and opportunity for change as additional data accumulates in an animal's lifetime. The accuracy of selection is determined by how heritable the trait is in the population and how accurately the estimated breeding value of the animals selected as parents is evaluated. The higher the level of reliability of the MVP, the greater the selection accuracy.

Generation interval: The average age of parents when their offspring are born. Using MVPs in concert with EPDs and individual performance will help to shorten the generation interval.

9. Q: How will the new High-Density panel affect the ranking of animals versus the previous MVP data, based on 56 markers?

A: Because more than 50,000 markers are used to produce trait MVPs in the High-Density panel, significantly more information will be available on new traits, along with higher reliability, earlier in an animal's life. This may change how animals rank within the breed.

10. Q: The initial offering is designated to be targeted for black Angus populations. Does this mean that this product's application is best used only in purebred Angus cattle?

A: The High-Density panel is best utilized to provide results on black Angus cattle.

11. Q: What is the recommendation of Pfizer Animal Genetics on using the High-Density panel on other breeds or crossbreds?

A: Further research and validation is occurring on *Bos taurus* and *Bos indicus* cattle research populations to develop a High-Density product for application to these cattle types. In the interim Pfizer Animal Genetics recommends that utilization of the High-Density panel should only occur for black Angus cattle.

12. Q: Why should one consider a panel derived from more than 50,000 markers rather than a reduced panel of markers?

A: For most traits there are hundreds, even thousands, of markers which make a positive contribution to a molecular value prediction. Reducing the number of markers can significantly reduce the correlation between the prediction and actual animal performance—this has been shown by researchers in dairy genomics, and our own data also support this fact.

13. Q: Why is your initial offering only available for black Angus?

A: The data available for discovery in our initial research was predominantly Angus and therefore the prediction equations developed were designed specifically for this breed. Our R&D team is evaluating High-Density panel data from other breeds with a view to releasing prediction equations for non-Angus cattle in the near future.

Customer Service Details

14. Q: How long will it take for me to get results back after I send in a sample?

A: Customers can expect a four-week turnaround once the sample and completed order form are received by Customer Service.

15. Q: How will results for the High-Density panel be reported?

A: Similar to the 56-marker panel results will be reported as Molecular Value Predictions (MVPs) in +/- units of the trait, but now they will be a deviation from zero.

16. Q: What types of DNA samples are recommend for High-Density testing?

A: Semen, whole blood, blood cards or hair samples will be accepted for High-Density testing. The following table lists the amounts needed for each sample type for testing:

Sample type	Amount required
Semen	One straw
Blood	3 ml in purple-top tubes, refrigerated
Blood cards	2 cards, not oversaturated
Hair	Two hair collectors with at least 20 to 30 visible hair bulbs

17. Q: At what age can animals be sampled?

A: Blood and blood card samples may be drawn at any time after birth. In cases where the animal is a twin, blood should be drawn after the animal is six months of age. Hair samples can be taken after the animal has reached six months of age as well. Semen samples can be taken once the animal is old enough to produce a viable sample.

18. Q: How frequently will Pfizer Animal Genetics refresh the MVPs that are the outcome of the High-Density 50K panel?

A: Following launch in January 2010, PAG plans to refresh the accuracy of its MVPs on a quarterly basis (April, July, October) free of charge to the owner on record with us.

19. Q: How much will it cost to test my animals when new traits are available?

A: An animal's 50K genotyping profile from a one-time sample submission provides the opportunity for ongoing access to MVP upgrades for future unique traits and technology advancements from Pfizer Animal Genetics. The price to access those upgrades will be established as new offerings become available.

20. Q: I've tested an animal using the 56-marker panel, but I want to utilize the HD 50K product. What is the cost to upgrade?

A: Provided there is an adequate amount of sample material available to perform the High-Density panel test, the cost to upgrade to the High-Density product will vary by quantity ordered. At launch, specific pricing details will be available at www.pfizeranimalgenetics.com. If there is not enough sample material in our laboratory, you will be asked to provide an additional sample.

Now through March 31, 2010, our introductory upgrade offer is as follows:

1 – 24 Samples per order: \$79.00 per animal
25+ Samples per order: \$69.00 per animal



Additional Questions

21. Q: What are Pfizer Animal Genetics' plans for developing marker-assisted EPDs?

A: In the future it is the full intent of Pfizer Animal Genetics to facilitate the incorporation of the MVPs from the High-Density panel into genetic evaluation programs to result in MA-EPDs.

22. Q: In the interim, will Pfizer Animal Genetics display outcomes as MVPs only or also as marker-assisted EPDs?

A: Pfizer Animal Genetics will make every effort to work with breed associations to share and utilize MVP data at the request of the producer submitting data. In addition, Pfizer will provide results to our customers in a format that best enables the data to be used to support breeding and management decisions. Initially, results will be represented as MVP values. We are aggressively exploring how to quickly incorporate MVP results in MA-EPD evaluations with breed associations and key stakeholders globally.

23. Q: Explain the difference between MVPs derived from the High-Density panel and the MVPs I've received that are based on the current 56-marker offering?

A: The MVP values are expressed in the same trait units, but now as a deviation from zero. Because significantly more markers are used to predict traits, reranking may occur. Within the first quarter of 2010, all MVPs provided to customers from either the HD 50K or 56-marker panel will use the same "zero" base for comparable traits.

24. Q: Will the High-Density 50K product include analysis of single allele traits?

A: Customers who purchase the High-Density 50K Angus offering or our 56-marker GeneSTAR® offering may also order and receive single allele information for the traits of quality grade and/or tenderness. Please refer to our Order Form at www.pfizeranimalgenetics.com for terms and pricing.

25. As an Angus Producer, why should I consider testing with PAG's HD 50K offering at this time?

Q: What benefits would one receive by using this tool over and above just using EPDs?

A: Genomic profiles, such as MVPs, are a way to enhance a producer's selection tools to achieve more accuracy on predictions for younger animals, particularly high potential sires and/or females in question. Also, since there are several traits with MVPs that are not available from EPDs at present due to the difficulty and expense of measuring the phenotypes, this allows for the incorporation of these economically important production traits into genetic improvement programs.

Q: What kind of return on investment should one expect from the HD 50K?

A: Simulation studies of selection of herd sires in a typical seedstock Angus herd using the HD 50K MVPs in addition to EPD information have on average found a return on investment of 3:1. This measures the expected cumulative added return of the progeny of sires selected by use of the HD 50K in the commercial herds of customers subsequently purchasing the improved genetics.

Q: I hear that there is an even larger chip than the 50K becoming available soon. Should I wait to use that?

A. The genomic predictions from the 50K chip represent the most powerful tools available yet for the cattle industry. A next generation SNP chip for cattle containing over 500,000 markers has been developed by a consortium including Pfizer Animal Genetics and will be made available for use in research and development programs in 2010. However, it will take some time before it generates commercializable information. This chip contains all of the markers that are on the 50K chip, so product continuity will be easily achievable. Pfizer Animal Genetics will continue to develop, extend and refine the 50K platform for the foreseeable future—therefore, cattle producers can adopt it with confidence.

