Reading Pfizer Animal Genetics High-Density 50K Angus MVP Reports

Pfizer Animal Genetics is pleased to present HD 50K for Angus, the first commercially available Molecular Value Predictions (MVPs™) derived from a High-Density panel with more than 50,000 markers. The suite of 14 genomic trait predictions, including the beef industry's first DNA-based economic index, provides MVPs for some economically important traits not available as EPDs like average daily gain, dry matter intake, net feed intake and tenderness, as well as many traits that complement EPDs, as described below.

Animals are listed on the report in default sort order-alphabetically by breed (if other than purebred Angus) and sex-and in ascending order by tattoo, tag and registration number. Following is a brief explanation of elements of the HD 50K for Angus MVP Report:

Molecular Value Predictions (MVPs)*

	Calving		Growth		Efficiency		Maternal		Carcass			Quality		Index
	CED	BW	WW	ADG	DMI	NFI	CEM	MA	CW	FAT	REA	MS	TND	MVP^{FL}
MVP	4.7	0.1	26	0.33	-0.02	-0.21	3.1	16	21	0.00	0.16	0.42	-0.58	115
% Rank	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%

* MVP values associated with 50% Rank for each trait.

Molecular Value Predictions (MVPs) - Predicted genomic breeding values for animals are based on the sum of the effects of the associated markers from the HD 50K platform, and are expressed in units of measure for the trait. Similar to EPDs, MVPs are expressed as deviations from a set base-point and rank animals for genetic merit. To understand how to interpret MVPs, consider the following two sires and their weaning weight (WW) MVPs:

	WW MVP
Sire A	+20 lbs.
Sire B	0 lbs.
Difference	20 lbs.
1/2 of offspring	**10 lbs.**

If Sires A and B are bred to similar groups of cows, Sire A is expected to pass on genes to his calves which result in weights that average 10 lbs. more at weaning as compared to the average of calves sired by bull B, due to these transmitted marker effects.

% Rank - Percentile rankings are based on the animal's MVP for each trait as compared to the overall population of Angus animals with HD 50K MVPs in the Pfizer Animal Genetics database. Rank values indicate the "top" position of the animal in the population, with lower values indicating, higher and generally, more favorable rank for most traits. An abbreviated percentile ranking table is provided on the bottom of the next page.

HD 50K/Angus/01 - This notation designates the genotyping platform (HD 50K), breed (Angus), and version number (01) for the prediction equations applied to the markers used to compute the reported MVPs, percentile ranks and reliability values. As our database of HD 50K genotypes and performance information grows, more advanced versions of predictions are anticipated.

Animal Identification - Tattoo, tag and registration numbers, as well as animals' names, as provided on barcode sample submission forms from customers, and associated barcode on the sampler provided by Pfizer Animal Genetics.

Breed - Breed or breed cross of animal as reported by the customer.

Sex - The letter F is used for females and the letter M is used to identify males.

CED - Calving Ease Direct MVP (% probability of unassisted births, evaluated as a trait of the calf) communicates differences in genetic merit for the likelihood of unassisted births in first-calf heifers, with higher values preferred, especially when selecting sires for use on replacement heifers for easier calving.

BW - Birth Weight MVP (lbs.) indicates differences in breeding value for calf birth weight based on the marker effects, with moderate and lower values generally desired.

WW - Weaning Weight MVP (lbs.) measures differences in breeding value for weaning weight, with higher values generally preferred.

ADG - Average Daily Gain MVP (lbs./day) evaluates differences in breeding value for weaning weight, with higher values generally preferred.

DMI - Dry Matter Intake MVP (lbs./day) is an input trait that indicates genetic differences among animals in pounds of dry matter consumed per day, in the feed yard on finishing rations, and should be evaluated in relation to genetic merit for output traits, including MVPs for ADG and carcass weight (CW).

NFI - Net Feed Intake MVP (lbs. dry matter/day) indicates genetic variation in pounds of dry matter consumed per day as compared to the animal's expected feed consumption based on its body weight and growth rate. Lower values are preferred and point to breeding values for greater feed efficiency based on the marker effects.

CEM - Calving Ease Maternal (% probability of unassisted births, evaluated as a trait of the dam) quantifies genetic differences in the likelihood of unassisted births in first–calf heifers, with higher values preferred when selecting sires for daughters which are retained as replacements.

MA - Milking Ability (lbs. of weaning weight from daughters) evaluates differences in breeding value for the maternal component of weaning weight and is expressed as pounds of calf weaning weight, primarily due to the genes for milking ability possessed by the dam. The genetic potential for MA should be matched to available feed resources.

CW - Carcass Weight (lbs.) measures genetic variation in pounds of carcass weight at a constant level of outside fat thickness. Higher values indicate genes for more carcass weight.

FAT - Fat Thickness (in.) communicates differences in breeding value for fat thickness measured adjacent to the ribeye between the 12th and 13th rib, at a constant carcass weight, higher values adversely affect USDA yield grade, but may be desired for maternal adaptability.

REA - Ribeye Area (in^2.) indicates differences in genetic merit for muscularity as measured by square inches of ribeye area between the 12th and 13th rib, at a constant fat thickness.

MS - Marbling Score (USDA units) quantifies genetic variation in USDA marbling scores at a constant fat thickness, with higher values indicating genetics for more marbling and generally more desirable quality grade.

TND - Tenderness (lbs.) indicates differences in genetic merit for tenderness based on the amount of shear force required for slicing cooked steak samples. Lower values are desired.

$MVP^{FL} - Molecular Value Prediction - Feedlot (dollars) is an index which gives an estimate of differences in the profitability of animals based on genetic merit (MVPs) to produce valuable carcasses when sold on a Certified Angus Beef (CAB) grid, in relation to how much feed the animal is likely to consume. The value of the animal is based on an estimate of carcass weight and grade after approximately 160 days on feed. MVPs for the following traits are included in the calculation: Weaning Weight (WW), average daily gain (ADG), dry matter intake (DMI), carcass weight (CW), rib eye area (REA), fat thickness (FAT) and marbling score (MS).

QG1, QG2, QG3, QG4 - Original GeneSTAR Quality Grade (QG) markers reported as 0,1 or 2 copies of the favored allele. Available for an additional fee.

T1, T2, T3 - Original GeneSTAR Tenderness (T) markers reported as 0,1 or 2 copies of the favored allele. Available for an additional fee.

Summary Benchmark Statistics - Average, minimum and maximum MVPs for Angus animals included in the Pfizer Animal Genetics database, benchmarked against Angus animals included in this job.

Reliability - Reliability is the standard for assessing the predictive power of the MVP for a trait. It is derived solely from an animal's genotype and is based on the correlation between the MVP and the animal's breeding value if all information were known. Reliability values range from zero to one, with higher values indicating a stronger association between the predicted and actual breeding value.

In addition to these current traits, animals with HD 50K genotypes qualify for ongoing access to future genetic predictions for unique traits related to animal health, reproduction and the healthfulness of beef-all of which are under development as part of the Pfizer Animal Genetics research pipeline.

For more information, a more detailed technical summary of HD 50K MVPs for Angus is available on our Web site at pfizeranimalgenetics.com, or you may contact your Pfizer Animal Genetics representative or call Customer Service team at 1-877-BEEF-DNA.

Molecular Value Predictions by Percent Ranking (based on 5,101 animals)

	CED	BW	WW	ADG	DMI	NFI	CEM	MA	CW	FAT	REA	MS	TND	$MVP^{FL}
Top 5%	12.3	-3.0	43	0.54	-0.71	-0.49	7.7	27	35	-0.04	0.48	0.83	-0.81	169
Top 10%	10.2	-2.2	39	0.47	-0.55	-0.41	6.3	25	32	-0.03	0.39	0.73	-0.75	154
Top 20%	8.0	-1.3	34	0.42	-0.38	-0.34	5.0	21	28	-0.02	0.30	0.62	-0.68	139
Top 30%	6.8	-0.7	31	0.38	-0.24	-0.29	4.2	19	25	-0.01	0.24	0.54	-0.64	129
Top 40%	5.7	-0.3	28	0.36	-0.13	-0.25	3.6	18	23	-0.01	0.20	0.48	-0.61	122
Top 50%	4.7	0.1	26	0.33	-0.02	-0.21	3.1	16	21	0.00	0.16	0.42	-0.58	115
Top 80%	1.7	1.4	20	0.26	0.38	-0.06	1.2	12	16	0.02	0.01	0.21	-0.46	90