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Australia

Pfizer Animal Genetics Releases an Expanded DNA-marker Panel

DNA-marker technology continues to evolve at breakneck speed, and the latest advance is a more reliable genetic test for beef producers who are looking to make more informed management decisions. Pfizer Animal Genetics recently released GeneSTAR[®] Molecular Value Predictions (MVPs[™]), based on an expanded panel of 56 DNA markers, that identify traits for feed efficiency, marbling and tenderness and improve the reliability and value of GeneSTAR as a decision-making tool.

GeneSTAR MVP technology provides:

- A measure of molecular breeding value expressed in units of the trait, similar to estimated breeding values (EBVs).
- Average MVP reliability values for the herd.
- A state-of-the-art molecular tool which, when combined with traditional genetic principles, can promote accelerated rates of genetic improvement.

GeneSTAR MVPs are a result of Pfizer Animal Genetics' significant investment in research, development and independent validation of new genomic technologies in cattle.

"As new discoveries in molecular genetics become available, beef

producers must be able to trust that these innovations will benefit their operations," says Pfizer Animal Genetics Senior Director of Global Technical Services Dr Ronnie Green. "For this reason, it is crucial that each new technology is rigorously and independently validated."

DNA-marker Technology Validation

The process from discovery to validation includes four steps:

- 1) Discovery. Markers, or panels of markers, are identified that are significantly correlated with expression of a commercially relevant trait in one or more accurately phenotyped cattle populations. These panels are developed from a variety of sources and combine markers and detailed predictions across multiple cattle groups.
- 2) Development of statistical methodology for calculating MVPs from the marker panels.
- 3) Internal evaluation and validation. Once a marker panel for a trait is identified, it is evaluated in populations that were not included in the discovery cattle groups.
- 4) Independent validation. In Australia, the CRC for Beef Genetic Technologies and their partner, Animal Genetics and Breeding Unit (AGBU), conducted the independent analysis and

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Dr Hans Graser

ON INDEPENDENT MARKER VALIDATION



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From the Expert

DR RONNIE GREEN
PFIZER ANIMAL GENETICS



What are GeneSTAR MVPs?

GeneSTAR MVPs are by definition a "molecular breeding value" based on the effects of the specific markers in the current panel. Thus, they represent a portion of the expected underlying genes affecting the traits. By definition, an MVP is similar to an estimated breeding value (EBV) from a genetic evaluation in how it is expressed. The difference is that an EBV is based on phenotypic records of the animal and its relatives, whereas an MVP is derived from an animal's genotype only.

Understanding the New GeneSTAR Reporting System

The release of GeneSTAR® MVP™ makes available more genetic information than ever before about economically relevant traits. In order to provide beef producers with the best representation of the true genetic value of an individual animal, this new system has been developed to deliver more relevant and reliable information about an animal's genetic potential.

Understanding the new report

GeneSTAR results were previously reported as a number of stars based on the total number of favourable alleles—or alternate forms of a gene—affecting the trait, with a maximum of eight stars per trait. GeneSTAR MVPs are based on many more markers, which do not necessarily have equal effects, and that may affect more than one trait simultaneously. When moving to a larger number of markers, the more appropriate method to capture the greatest value from DNA testing is to move to an MVP format. GeneSTAR MVPs are produced for each trait to appropriately account for the sum total of the marker effects on that trait.

New GeneSTAR MVPs account for a 56 DNA-marker panel which includes the previous 12 and an additional 44 newly identified markers. MVPs are produced for feed efficiency, marbling and tenderness.

A single MVP is calculated on each animal and is expressed in units of the trait. Also provided is a reliability value, which is the standard for assessing the accuracy and predictive power of the MVP for a trait. Reliability is based on the correlation between the MVP and the animal's genetic breeding value if all information were known.

The reliability value is expressed as a percentage of the maximum

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**GENESTAR CUSTOMER JOB RESULTS
FINAL REPORT**

Job Number: 12345	Customer ID: BovineCattle
Date Requested: 12/11/2007	Password: sstocker
Customer name: Bovine Cattle Company	Contact: Sammy Stocker
Customer phone: 5555 555 555	Customer fax: 5555 555 556
Customer address: 123 Anywhere St Yourtown AAA 123 AUSTRALIA	

Molecular Value Prediction

	FE	Marb	Tend	
Name: Amazing Bull Wonder 1536 Ear Tag:	MVP	-0.13	-0.25	-0.45
Barcode: 752 000040922684 Breed: Angus	% Rank	20%	90%	10%
An. ID: B202 Publish to Website: <input type="checkbox"/>				
Gender: M Reg #:				

accuracy attainable and is a useful indication of how much additional information may be added in the future as greater numbers of markers are added to the panels used to calculate the MVP.

**The GeneSTAR MVP
produces more
information on an
individual animal
than the previous
GeneSTAR test.**

Producers will receive individual animal GeneSTAR MVP information in a format similar to the example shown. In addition, overall breed distribution, average herd reliability values and individual animal percentile rankings are also reported.

Applying the new GeneSTAR information

As a full-service genomics provider, Pfizer Animal Genetics offers consultative technical services to ensure that maximal value can be achieved from the application of results in your production-marketing system. This includes working with you to understand and apply the test information results to your own management and marketing programmes.

Those samples stored at our laboratory since December 2007 that were used for the GeneSTAR seedstock test have been retested with the upgraded 56-marker panel. These results will be reported free of charge to customers. To upgrade any animals previously GeneSTAR tested that do not fall into this time frame, please contact us on 1300 768 400 or visit our Web site, www.pfizeranimalgenetics.com.au.

DNA Marker-assisted Tenderness EBV Launched

Australian beef producers are set to reap the benefits of a million-dollar project to marry two key genetic tools—genetic markers and estimated breeding values (EBVs).

Two years' work on SmartGene for Beef has culminated in the release of the first DNA-marker-assisted EBVs. The BREEDPLAN® Trial Tenderness EBV^M for *Bos Indicus* was launched at the Annual General Meeting of the Australian Brahman Breeders Association in Rockhampton on October 5, 2008.

"This is a significant development for the industry. It will be a real driver for improvement in our beef herd that can lead to increased demand because of the high rating consumers give to the tenderness of a steak," says SmartGene for Beef Project Manager Don Nicol.

GeneSTAR Tenderness results along with an animal's pedigree, carcass shear force measurements and flight time are used to produce a single, accurate EBV indicator for meat tenderness.

- Shear force is an objective laboratory tenderness test which measures the resistance of a meat sample to a mechanical blade passing through it—the lower the shear force, the more tender the meat. The new Trial Tenderness EBV^M is expressed in kgs shear force. It is expressed as a single figure, the lower the number the more favourable.
- Flight time is the time taken for an animal to travel 1.7 to 2 metres after exiting from a race or crush. A light beam measures the flight time. Slower flight time is an indication of cattle with a better temperament that has been shown to influence beef tenderness.

"The SmartGene project has shown that the GeneSTAR DNA markers for tenderness have sufficient

predictive power to be used to produce a marker-assisted EBV," says Mr Nicol. "The Trial Tenderness EBV^M would be particularly helpful for northern beef producers in a harsh environment with a high percentage of *Bos Indicus* blood in their herds."

Through careful selection of breeding animals with the Trial Tenderness EBV^M, beef producers can more precisely produce progeny with more tender beef. Combining the proven EBVs with DNA-marker results provides more accurate information for beef producers to make accurate breeding decisions. "It will be particularly helpful to predict the performance of young animals that don't have progeny recorded yet," Mr Nicol said.

"It's fitting the event was held during Brahman Week, as the breed was the first to offer the new EBV," says Mr Nicol. "Other breeds will follow in making this enhanced performance measurement tool widely available to beef producers."

**With the Trial
Tenderness EBV^M, beef
producers can more
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tender beef.**

The SmartGene for Beef project was a collaborative effort between Pfizer Animal Genetics (formerly Catapult Genetics), the CRC for Beef Genetic Technologies, the Animal Genetics and Breeding Unit, the Agricultural Business Research Institute and Cornell University in



the United States. The objective was to integrate marker information into BREEDPLAN to enable calculation of marker-assisted EBVs (MA-EBVs). The new EBV incorporates the pioneering DNA work done by Pfizer Animal Genetics (then Catapult Genetics and its predecessor Genetic Solutions), which launched the world's first GeneSTAR tenderness test in 2002. Major funding for the project was provided by the Queensland Government and Meat and Livestock Australia, with co-funding from Catapult Genetics and the Beef CRC.

The SmartGene project will act as a baseline to continue beyond the marker-assisted Tenderness EBV^M with MA-EBVs for more production and quality traits. Marker-assisted selection provides more opportunities for improved management of cattle where little other genetic information is available. For example, marker-assisted selection has tremendous application in the long-fed cattle market, which must identify the most feed-efficient and highest marbling animals in order to produce high-value carcasses. This is important in challenging economic times when profit margins continue to tighten.




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validation for GeneSTAR MVPs. In the U.S. the National Beef Cattle Evaluation Consortium (NBCEC) receives federal funding to act as an independent agency validating DNA-marker technology.

More markers and increased reliability make GeneSTAR MVPs powerful tools for seedstock and commercial cow-calf operations, as well as feedlot operations. For cow-calf operators, GeneSTAR MVPs provide more genetic profile information to improve bull selection and improve the selection of replacement females. In feedlot systems, producers can sort animals into feeding regimens to more consistently and efficiently achieve end-product specifications. Additionally, tenderness and marbling MVPs have high values within supply chains seeking to differentiate product based on eating quality. Simply put, GeneSTAR MVPs enable precision animal management for seedstock and commercial beef producers.



**Customers whose
animals were GeneSTAR
tested since 2007
can expect to receive
upgrades of those tests to
GeneSTAR MVPs shortly.**