DNA — The evolution

Production agriculture has seen tremendous technological advancements throughout history. From the days of the single-bottom horse-drawn plow to today's huge four-wheel drive tractors that can top 500 horsepower, technology has increased our production and efficiency like nowhere else on Earth.

Genetics Revolutionize Corn Production

In 1930, the average national corn yield was 30 bushels per acre; in 1970, it was 70 bushels; and in 2009, it grew to 164.7 bushels per acre. That is a steady increase of 1.6 bushels per acre per year since 1930. Some elite producers have realized yields of more than 350 bushels per acre! The National Corn Growers Association attributes this increase primarily to improved genetics and production technology. Over time, we have significantly increased corn production and quality.

Progress in Cattle Production

In 1982, our national cow herd showed 50 million cows producing 22 billion pounds of beef, for an average total production of 445 pounds per cow. Compare that with our cow herd in 2009 of 41 million cows producing nearly 26 billion pounds by carcass weight, for an average production of 632 pounds per cow. We have increased production, increased safety and increased quality primarily through genetics and production technology.

Some officials feel that our national average corn yield may someday reach 300 bushels per acre. Can a national average production per cow of 900 pounds be far behind?

For hundreds of years, visual appraisal was the only means of predicting production. In the last century, we utilized continued objective phenotypic observations and weight recording as ways to describe differences in animals. Estimated Breeding Values (EBVs) followed and ultimately evolved into our current National Cattle Evaluation expected progeny differences (EPD) system that today is the best description available for all factors explaining the potential production and quality in beef cattle.

Critical to previous EPD calculations was the need to group cattle in sizeable, equal-opportunity contemporary groups in order to show differences in individuals, hopefully with similar management and environmental inputs. Although the best evaluation at the time, it was still dependent on parental contribution, and maintaining large groups of like-managed animals.

Most Accurate, Dependable Information

Livestock evaluation and EPDs have finally evolved to include the use of DNA as the most accurate, dependable information to predict the actual merit for quality and production of an individual. Today these are known as genomic-enhanced, or GE-EPDs.

Pfizer Animal Genetics has formed a partnership with Angus Genetics, Inc.® (AGI), a wholly owned subsidiary of the American Angus Association® (AAA). Bill Bowman, AGI president and AAA chief operating officer, says, "This is part of our efforts to provide the most accurate, most rapid genetic feedback available in the beef cattle industry."

Angus GE-EPDs powered by High-Density 50K (HD 50K) from Pfizer Animal Genetics have been proven to show a significant increase in accuracy and dependability, especially in young animals. Depending on the trait, the information from HD 50K may provide as much predictive effect on an individual's EPD as an animal with up to 20 progeny records. (See Table 1.) This means that just one HD 50K DNA test, when applied to EPD calculations by AGI, provides as much genetic information as more than a lifetime of production from a typical cow, all before that individual is even weaned.

DNA Finds the Differences

We now have the ability to more objectively compare animals that come from different management, environments or small contemporary groups.

"We continue to work toward utilizing genomic data in additional EPDs to benefit our members and their commercial customers, regardless of herd size," says Sally Northcutt, director of genetic research, AGI. "We are excited to make the Pfizer technology available to the industry as part of our selection tools, and we encourage breeders to visit our website for more information."

# of livestock evaluation

In the last two decades we have moved from identification of half a dozen DNA markers to a few hundred, and finally an in-depth analysis of more than 50,000 markers across the genetic spectrum. This high-density analysis provides a greater view into the real genetics, and true potential, that different animals possess and can transmit to their offspring.

More Certainty in Your Decisions

Now you can make purchasing decisions with greater certainty, thanks to GE-EPDs powered by the HD 50K. This unique offering combines the industry-leading AAA National Cattle Evaluation EPDs with the industry's first and only 54,000-marker DNA panel from Pfizer Animal Genetics.

What are GE-EPDs?

- GE-EPDs combine pedigree information and performance data from the animal, its relatives and progeny with HD 50K genomic information.
- GE-EPDs are expressed in units of the trait and more dependably rank animals for less risky and more profitable selection decisions.

What are HD 50K percentile ranks?

- Percentile ranks are associated with each animal's molecular breeding values and are benchmarked against a database of nearly 8,000 HD 50K-tested Angus animals.
- The percentile ranks range from 1 to 100, with lower values generally indicating more favorable ranks.

How can this make a difference in your buying decisions?

Now you can more dependably identify animals that are:

- Superior for transmitting genetics for expressed progeny performance
- More likely to excel in traits related to your breeding objectives
- Superior in genetic merit for traits not measured by EPDs

Table 1. GE-EPDs and Approximate Progeny Equivalents

Birth Weight *A GE-EPD powered by HD 50K for **Birth Weight** has the same accuracy as having **8** progeny weights turned in on your bull.*	8
Weaning Weight *A GE-EPD powered by HD 50K for **Weaning Weight** has the same accuracy as having **16** progeny weaning weights turned in on your bull.*	16
Residual Average Daily Gain[1] *A GE-EPD powered by HD 50K for **Residual Average Daily Gain** has the same accuracy as having **13** progeny evaluated for Gain Efficiency.*	13
Yearling Weight[2] *A GE-EPD powered by HD 50K for **Yearling Weight** has the same accuracy as having **20** progeny yearling weights turned in on your bull.*	20
Milking Ability *A GE-EPD powered by HD 50K for **Milking Ability** has the same accuracy as having **12** daughters in production from your bull.*	12
Carcass Weight *A GE-EPD powered by HD 50K for **Carcass Weight** has the same accuracy as having **7** hanging carcasses weighed from your bull.*	7
Fat Thickness[3] *A GE-EPD powered by HD 50K for **Fat Thickness** has the same accuracy as having **11** hanging carcasses scored from your bull.*	11
Ribeye Area[3] *A GE-EPD powered by HD 50K for **Ribeye Area** has the same accuracy as having **9** hanging carcasses measured between the 12th and 13th rib.*	9
Marbling Score[3] *A GE-EPD powered by HD 50K for **Marbling Score** has the same accuracy as having **12** hanging carcasses graded from your bull.*	12

[1] Dry matter intake
[2] Post-weaning ADG
[3] Carcass progeny records — equivalent to more than 30 scanned progeny records

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HD 50K