



Not Just the Bull

Female genomic testing is a powerful tool for registered herds.

by *Jamie T. Courter*

The use of genomics, or DNA, in genetic evaluations provides “genomic enhancement” to the expected progeny differences (EPDs) that producers already use. Like any new technology, advancement led to growing pains, but genomics proved to be influential.

Genetic evaluations characterize the genetic potential of registered cattle to ensure the correct animals are selected and propagated for key economically relevant traits. To do this, seedstock producers invest heavily into capturing data and characterizing their herd for key trait attributes. In the end, it is about more than producing the best cattle; it is about reputation.

Recording data combined with genomic testing strengthens the genetic evaluation and increases its accuracy. After all, an EPD is an “estimate” of an animal’s genetic merit for a trait. An increase in accuracy narrows the margin of error around that estimate. This is most important for traits such as calving ease maternal (CEM) and carcass numbers that are either difficult to measure or measured later in life.

Why the increase in accuracy?

Due to basic biology, officially termed Mendelian sampling, there are more than one quintillion possible combinations of DNA that full-sibling calves can inherit, no matter the sire. Traditionally, it takes several years of recording progeny phenotypes to characterize which calves inherited the “good” genes from their parents. Genomic testing is a tool to characterize the specific genetic merit an animal inherited at a younger age than it did from pedigree information and progeny records alone.

The specific increase in accuracy an animal receives for a given trait once genomically tested is provided in Table 1. For example, with the CEM EPD, genomically testing a calf provides insight equivalent to 17 progeny records and increases the accuracy by 0.09. Think about this – How old would a bull have to be to have 17 daughters with calving records reported to calculate his CEM EPD from a traditional, pedigree-based genetic evaluation?

What are you leaving on the table?

Selling bulls with genomic-enhanced EPDs (GE-EPDs) is great for your reputation with commercial customers, but have you thought about using that information to improve your registered cow herd?

Males provide offspring with 50% of their DNA, and the other half comes from the female. As a seedstock producer testing your bulls, you believe in the technology and the benefit it brings you and your customers. But, you are also focusing on cattle that walk off your operation and into your neighbor’s pasture. Now, it is time to think about using the technology to benefit the “other half” of the mating equation and the animals whose genetics affect your herd and bottom line.

The reasons and benefits to genomically test males are equally applicable to females. By

Table 1: Improvement in accuracy and EPNI* a Hereford animal receives, for a given trait, with GE-EPDs

American Hereford Association trait	Accuracy improvement	EPNI*
Calving ease direct (CE)	0.09	17
Birth weight (BW)	0.12	8
Weaning weight (WW)	0.14	12
Yearling weight (YW)	0.16	9
Scrotal circumference (SC)	0.17	6
Maternal milk (MM)	0.11	15
Calving ease maternal (CEM)	0.11	4
Mature cow weight (MCW)	0.12	4
Udder suspension (UDDR)	0.17	7
Teat size (TEAT)	0.17	7
Carcass weight (CW)	0.11	3
Rib fat (FAT)	0.08	2
Ribeye area (REA)	0.07	2
Marbling (MARB)	0.10	3

*EPNI (Effective progeny number increase) is the difference gained for genotyped animals versus nongenotyped animals.

testing replacement heifers, you learn more about inherited genes before making selection decisions, increasing the accuracy of their EPDs and ensuring you select females with the best genes from their sires.

Genomics are a tool for traits that are hard to measure or expressed late in life. When applying this concept to a trait like maternal milk (MM), with the progeny equivalents for the trait equaling 15, testing a replacement heifer provides more insight on her genetic potential than relying on an entire lifetime of production.

Although genomic testing directly affects seedstock breeders, they are not the only ones who benefit from the technology. By combining increased accuracy of selection to both sides of a mating, genetic gain within a herd and an entire breed can be attained at a more rapid rate. Genomic testing of an animal impacts all related individuals within a registry and, in some cases, those who are not related but share parts of their genome by chance. Adding genotypes on females will begin to provide evaluations with the full picture, increasing its ability to quantify their genetic potential. This helps strengthen the power and accuracy of the evaluation for all who participate and register cattle.

These benefits are the main motivation behind the American Hereford Association's Whole Cow Herd DNA Project launched in December 2017. This additional information will be most beneficial on traits where phenotypic records are difficult to measure or are measured late in life when selection decisions have already been made.

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The path to dramatically improve bull offerings requires the addition of genomic testing your replacement heifers. The increased accuracy from genomic testing leads to improved heifer selection that meets your operation's breeding objectives. Then, aligning sires to complement each female in your herd becomes an easier and more informed process. **HW**

Editor's Note: Jamie T. Courter, Ph.D., is a beef products manager for Neogen Genomics.



Genomic-enhanced expected progeny differences (GE-EPDs) allow commercial and seedstock producers to make more reliable selections and breeding decisions on younger animals. Each animal tested is recognized with the American Hereford Association GE-EPD logo when searching EPDs at Hereford.org.