

Genomics to Change Dairy Industry

Genex Cooperative, Inc. is poised on the forefront as the industry prepares for the public release of genomic proofs in January 2009.

"This is truly an exciting time. The United States Department of Agriculture's discovery of the genotyping process and the subsequent incorporation of genomic information into sire summary evaluations will dramatically change this industry," Doug Wilson, Genex Chief Operating Officer, explains.

Genomic Utilizing elite animals in breeding programs can shorten the generation interval and increase the rate of genetic progress, especially in low heritability traits. This, in turn, can increase the profit potential of dairy herds.

Genetic

Comparisons

Properly identifying animals with elite genetics is the first step to success. Previously parent averages and phenotypic evaluations were the only ways to identify probable elite animals to keep in a herd or to identify sires to sample. The introduction of genomics has opened another avenue for discovering which animals will be most profitable.

For instance, Jell, Jill and Jull are three full sibling heifers within the Genex GENESIS herd. Since the heifers are full siblings, they have the same parents and share the exact same parent averages (PA). Their PA for Lifetime Net Merit (LNM), Productive Life and Type are shown in the table below. The last column is a score relating to a phenotypic visual observation conducted by Genex Dairy Genetics staff. One star indicates a less desirable phenotype, while five stars indicate an outstanding phenotype.

Table 1. **Comparison of full sibling heifers' parent averages.**

Name	Sire	PA LNM	PA Prod. Life	PA Type	Phenotype
Jell	Dison	\$374	3.3	1.5	**
Jill	Dison	\$374	3.3	1.5	*
Jull	Dison	\$374	3.3	1.5	****

Now, Genex has received genomic evaluations on each of the three heifers. Their genomic evaluation, along with the difference between their genomic evaluation and PA, is included in Table 2 below.

Table 2. **Comparison of heifers' genomic evaluation to their parent averages.**

Name	Sire	Genomic LNM	Change	Genomic Prod. Life	Change	Genomic Type	Change
Jell	Dison	\$539	+\$165	4.7	+1.4	1.1	-0.4
Jill	Dison	\$510	+\$136	4.2	+0.9	1.5	+0.0
Jull	Dison	\$329	-\$45	3.0	-0.3	1.0	-0.5

Close examination of the tables indicates there is indeed a difference between Jell, Jill and Jull even though they share the same PA. Both Jell and Jill have significantly higher LNM rankings than Jull. They also excel over Jull in Productive Life and Type. While

Jull scored higher phenotypically during visual observation, with the added knowledge of her genomic evaluations, she would probably not be the heifer to keep in the herd.

A second example further demonstrates the genetic difference between full siblings. Dee and Dotty, whose information is shown in Tables 3 and 4, are also members of the GENESIS herd.

Table 3. Comparison of full sibling heifers' parent averages.					
Name	Sire	PA LNM	PA Prod. Life	PA Type	Phenotype
Dee	Buckeye	\$436	1.9	2.1	***
Dotty	Buckeye	\$436	1.9	2.1	****

Table 4. Comparison of heifers' genomic evaluation to their parent averages.							
Name	Sire	Genomic LNM	Change	Genomic Prod. Life	Change	Genomic Type	Change
Dee	Buckeye	\$309	-\$127	3.5	+1.6	1.4	-0.7
Dotty	Buckeye	\$85	-\$351	-1.4	-3.3	1.0	-1.1

Again there are significant differences between full sisters Dee and Dotty when genomic evaluations are taken into consideration.

Genomic evaluations combined with parent averages give Genex a more reliable, more accurate understanding of the genetic levels of these heifers in the GENESIS program as well as bull calves for procurement.

The Cooperative's Approach to Genomics
 With confidence in the future of genomics, Genex has taken an aggressive approach and enhanced its programs to most effectively utilize this new information.

Currently all females within the GENESIS program have a genomic test completed. Therefore, the bull dams with the highest genetic value have been identified and are being used accordingly.

Genex has genomically tested over 1,200 sires. The genomic test results increase the reliability of the animal's genetic evaluation, as genomic predictions are significantly more reliable than merely the parent average alone for all 26 tested traits (five yield traits, five fitness traits, 16 linear traits and Lifetime Net Merit). In the future, a sire's trait reliabilities will continue to increase as the sire is sampled through the cooperative's Quantum™ sampling program and adds milking daughters to his proof.

"With the January sire summaries, semen from several new sires will be routinely available in the active lineup. These sires have been pre-selected based on their high-ranking DNA profile as a result of genomic testing," states Wilson.

Changes have also been implemented in the Genex sire procurement process to ensure top genetics are sourced for the future. All sampled bulls are tested, and all bull calves are being genomically tested prior to acquisition.

A New Era in the Dairy Industry

"Dairy producers across the world will soon experience the biggest change in the artificial insemination industry since the advent of frozen semen," remarks Wilson. "Genomic selection is going to positively impact our members and customers and will help to improve their bottom line."