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GENETIC MARKERS: A NEW TECHNOLOGY IN ANIMAL SELECTION

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For thousands of years farmers have selectively bred plants and animals to improve productivity. Since the introduction of artificial insemination (AI), the speed of animal improvement has significantly increased over the last seven decades. Adopting AI techniques provides producers the flexibility to select bulls based on both their pedigree information and measurable performance traits. In addition, the producer can change bulls more frequently as superior young sires are identified.

Traditionally, young sire selection was based only on animal pedigree information (predicted breeding values), which on average improved milk production and milk components in dairy cows. Comparing production of a dairy cow from the 1940's with the modern dairy cow shows milk yield per lactation has increased nearly five-fold.

Since 2004 when the bovine genotype was sequenced, researchers have developed accurate techniques to determine which genomic information predicts production and other traits. As a result, several genetic marker tests have become commercially available. These tests called "SNP arrays" generate information for more than 50,000 different genetic codes or single nucleotide polymorphisms (SNP). Superior animals for

specific traits are identified from these tests. This genetic information, incorporated into genetic merit predictions, is made available to producers to enhance selection of the next generation of dairy animals. The SNP array technology requires a blood, tissue, hair or semen sample to provide information that remains constant throughout the life of the animal.

This technology has been used widely in a highly advanced global system to compare breeding values for all dairy bulls worldwide. Animals with high genetic merit for productivity and improved health have been identified. For example, a group of researchers in Sweden studied the influence of genetic markers on incidence of mastitis, while researchers in the U.S. and Australia searched for genetic markers influencing feed efficiency.

Genomic evaluation has enhanced genetic improvement programs in livestock by selecting genes or genomic regions that affect traits of economic importance. The increased rate at which improvements in productivity and animal health are predicted to occur creates optimism for molecular genetics to rapidly advance industry breeding programs.

Dairy cattle breeders have readily adopted this new tool, replacing traditional methods of animal selection. Visit with your veterinarian or consultant about this new technology for herd improvement.