

## NAVAN VETERINARY SERVICES - JANUARY 2013 NEWSLETTER

### GENOMICS 101

The term genomics and genotype evaluation are not new in the dairy world today. Genomic values have been added to Canadian bull selection merits for approximately 3.5 years now.

By simple definition, the bovine genomic is all of its genetic information stored in 3 billion base pairs of DNA, organized into 30 chromosomes. Chromosomes are further organized into clumps called genes. Genes are expressed as specific traits.

In 2004 the entire bovine genomic sequence was determined and currently there are approximately 30,000 known "useful" genes.

Researchers were able to identify specific markers on SNP's (Single Nucleotide Polymorphisms) close to these identifiable genes. The discovery of these SNP's was critical because they were found to be identifiably different among some cattle. When these SNP's are part of or close to a gene of interest like fertility or butterfat for example, these traits were recognized as part of that cows individuality.

The science behind genomics testing evolved into a test introduced in 2010 by Holstein Canada and Semex Partners.

The Illumina 50K test recognizes greater than 50,000 SNP's and was traditionally reserved for A.I. Units and people wanting to market very high end genetic merit animals.

The phenotype expression of a gene (what we see as fat, fertility, udder strength, conformation etc) is a complex mechanism often requiring the expression of several genes at once, hence the reason for greater than 50,000 markers for 30,000 "useful traits".

The introduction of a lower cost version of the 50K Panel, the 3K and the 6K Panel brings this technology to the herd level.

The 3K and 6K test panel identifies approximately 3000 and 6000 SNP's respectively and is only slightly less accurate than their full version 50K test when tested on young animals. According to the Canadian Dairy Nutrition website, the 3K panel has been replaced by the 6K panel in Canada since Dec 2011 at the same cost.

The strength of genotypic testing includes the ability to identify traits of low heritability, which are often difficult to predict by the traditional methods of Parental Averages and EBV's.

Incorporating genomic testing at the farm level can have many benefits. Producers that have excess heifer inventory and sell off animals might rely on traditional means to determine which animals go, such as how their related animals perform or performed. Using genomics at a young age can preselect animals that will "definitely stay" or enter the potential cull list.

There are other producers that do not raise all heifer calves born on farm, keeping only those calves from top end cows. Genomic testing these calves would absolutely give a better picture of the genetic merit of the calves. This can substantially increase the rate of genetic improvement within a herd. We cannot forget however that environment plays a huge role in the full genetic expression of a gene. Cows with strong genetic merit for low scc having "less than ideal environment" for example can still become chronically infected, cows with high butterfat potential fed a poor ration will not likely be able to live up to that potential.

We will all be hearing a lot more about genomics and genomic evaluation in the years to come.

*Stay tuned as the focus of our Spring Meeting this year will likely include a discussion on genomics and its usefulness.*

