"Cowboy Glossary" of Genetic Terms

The terms and jargon used in genetic research can be confusing and overwhelming. Below is a simple "cowboy glossary" of commonly used terms in the discussion of genomic-enhanced EPDs. This is not a comprehensive glossary and was purposely put in an order other than alphabetical to help aid in the understanding the genetic terms as they relate to one another.

Genetics – the division of science that studies genes, heredity and the relationships among living organisms

Genomics – a specific discipline in genetics that studies genomes

Genome – the total genetic material in an organism, encoded in DNA or RNA

DNA – deoxyribose nucleic acid, present in the nucleus of the cells in all living organisms and contains all the genetic information of the organism; a molecule of DNA is formed by a double strand of millions of nucleotides joined together

Base pairs – the backbone of DNA strands, the order of which along a DNA strand accounts for the genetic variation between animals, in both the function and differences of genes; the most common bases are always paired up in the same way: Adenine (A) bonds with Thymine (T); Cytosine (C) bonds with Guanine (G)

Genetic code – the sequence of bases within DNA, made up of triplets (a group of three bases)

Gene – the sequence of triplets (three bases) in the DNA molecule; one gene may contain a thousand or more bases

Genetic markers – pieces of DNA (information), either a single gene or a sequence of genes, identified on a specific location on a chromosome; the identified markers influence a specific trait or several traits

Chromosome – the organized structure of DNA and protein found in cells, containing many genes in a single piece of coiled DNA; cattle have 30 chromosomes

Allele – a pair or more of genes located on a specific position on a chromosome

Loci – the specific place on a chromosome where a gene is located

SNP – Single-nucleotide polymorphism (pronounced 'snip'), a specific DNA marker; a panel of critically selected SNPs for multiple traits identifies the approximate location of DNA sequences having a direct effect on a trait or series of traits

50K SNP – the bovine 50K chip which provides information on 50,000 locations (SNPs) throughout the genome; these 50,000 markers are used to create MBVs for genomic-enhanced EPDs.

Low Density Genomic Profile – a DNA test that uses 30,000 SNP markers; these 30K markers are then imputed up to 50K for GE-EPDs

High Density Genomic Profile – a DNA test that uses 150,000 SNP markers, providing more genomic information; GE-EPDs are created by extracting 50K of these markers

Genetic variance (GV) – variation in phenotypes due to the presence of different genotypes in a population

Genetic tests – tools that can be used to identify genetic markers, which lead to predicting an animal's performance potential

Molecular Breeding Value (MBV) – a prediction of value for a certain trait derived from genomes (information from SNPs)

Genomic-enhanced EPDs – combining DNA markers with individual animal, pedigree and progeny data into one EPD calculations; also referred to as marker-assisted EPDs (MA EPDs) or molecular breeding value EPDs (MBV EPDs)

Marker Assisted Selection (MAS) – the use of one or a few genetic markers to assist in the selection of desirable traits

National Cattle Evaluation – incorporating performance measures from individual animals, progeny, and pedigree relationships to generate a metric (expected progeny differences, EPDs) that can be to make selection decisions   **LW**