American Milking Shorthorn Society

"Breeding for Tomorrow"
AMSS
AMERICAN MILKING SHORTHORN SOCIETY

P.O. Box 21, Beloit, WI 53511
Phone: (608) 365-3332 Fax: (608) 365-6644
www.milkingshorthorn.com
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Haplotype Cholesterol Deficiency (HCD) is a genetic mutation identified in July 2015 directly linked to the Holstein bull Maughlin Storm, which causes calves to be born lacking cholesterol in their cells. Without the required fat-producing cholesterol in its system an animal cannot convert energy to fat, which is needed to carry out basic physiological functions. Symptoms (chronic diarrhea and severe weight loss) show up soon after birth and most calves will die within six months. Animals from suspect genetic lines can be tested and results are normal, carrier (heterozygous) or affected (homozygous). Animals considered heterozygous (carriers) for HCD appear normal and will likely lead a healthy productive life. If a carrier is mated to another carrier, it is expected that one in every four progeny would inherit the haplotype from both the sire and dam.
This calf would be considered homozygous (affected) and would have a fatal diagnosis. Since this is a genetic recessive trait, you can successfully mate a carrier and non-carrier (normal) with little risk.

Complex Vertebral Malformation (CVM) is a recessive genetic defect that results in embryonic death and stillborn or deformed calves. It has been known in the Holstein population for over 20 years, originating with the bull Carlin-M Ivanhoe Bell. The spine is the majorly impacted region, with the neck and chest appearing shortened because of badly formed or fused vertebrae. Other associated problems include abnormal ribs, contracted carpal joints, and contracted and rotated fetlocks. Heart defects, such as the major blood vessels being in the wrong place are seen in around 50% of cases. Most calves are either aborted early or stillborn. Some do survive birth but die very soon after. Animals from suspect genetic lines can be tested and results are normal or carrier (heterozygous). Animals considered heterozygous (carriers) for CVM appear normal and will likely lead a healthy life, although research indicates a 25% reduction in fertility. If a carrier is mated to another carrier, it is expected that one in every four progeny would inherit the haplotype from both the sire and dam. This calf would be considered homozygous (affected) and would likely not be alive for testing.

This information is another piece of data to consider when planning matings. Being aware of known carriers will strengthen the sire offering without limiting the profitable traits these bulls have to offer. Be sure to know which sires carry genetic recessive traits to properly create matings that will ensure profitability and genetic advancement within the Milking Shorthorn breed.

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AMSS Policy (December 2017): Male or female offspring of known or suspect haplotype/recessive/genetic condition carriers are eligible to be a parent of an animal in the herdbook of the AMSS. For official registration to be completed in the AMSS herdbook, any male offspring of known or suspect haplotype/recessive/genetic condition carriers must be tested for the known or suspect haplotype/recessive/genetic condition before registration is complete. It is strongly suggested that any female offspring of known or suspect haplotype/recessive/genetic condition carriers also be tested.

As the industry increases the use of genomic testing there will be more animals discovered to be carriers of these, and other, genetic mutations. The AMSS will continue to work diligently to record these animals in the database with the appropriate suffixes as listed below, noting that animals tested to be affected (homozygous) will not be registered as they are considered fatal.

Recessive	**Normal (tested free)**	**Carrier (heterozygous)**
Haplotype Cholesterol Deficiency (HCD)	*TC	*CD
Complex Vertebral Malformation (CVM)	*TV	*CV

Additional Resources:
https://www.progressivedairy.com/topics/calves-heifers/hcd-how-to-identify-and-overcome-cholesterol-deficiency
https://www.holsteinusa.com/pedigree_info/cvm.html#:~:text=CVM%20is%20recognized%20as%20an%20undesirable%20genetic%20recessive&text=Most%20of%20the%20affected%20calves%20to%20the%20expected%20calving%20date