Holstein Haplotype for Cholesterol Deficiency (HCD)

Haplotype for Cholesterol Deficiency (HCD) is a new genetic defect in Holstein dairy cattle that was recently discovered by German researchers. This haplotype causes young calves to die if homozygous for HCD. Heterozygous (carrier) animals may have reduced cholesterol levels, but homozygotes have no cholesterol and survive only a few months after birth. HCD results are provided by the Council on Dairy Cattle Breeding (CDCB).

HCD carrier animals will be indicated with a 1. This is a recently discovered defect, so some animals are suspect carriers, but have not been confirmed. These suspect carriers are indicated with a 3. If two animals that carry the haplotype are mated, then there is a 25% chance that the resulting calves will be homozygous for HCD and die before reaching maturity. Calves that are carriers (heterozygous) do not appear to be negatively impacted.

Unfortunately, the discovery of the haplotype carrying the defect is very recent and there is no genetic test to be used for confirmation. We expect that a test will be developed in the near future. Once a test is available, some of the bulls identified as a 3 (suspect carrier) may be found free of HCD and others will be identified as carriers.

We should expect more haplotypes to be found in the future as genomic research advances. This is one of the reasons why using a mating program like World Wide Mating Service (WMS) is so important: the computer manages the tracking of genetic defects for us and will not allow carriers to be mated to each other. Bu utilizing WMS we can still use the carrier bulls, and farms that use WMS correctly will not have any resulting homozygous animals.

More information about HCD can be found on the CDCB website:
https://www.cdcb.us/reference/changes/HCD_inheritance.pdf

What is a haplotype?

A **haplotype** is a stretch of chromosome or DNA that is transmitted as a unit from one generation to the next. In this case, we are talking about a set of single-nucleotide polymorphisms (SNPs) on a single chromosome that are inherited together. We often think about genes or SNPs as individual units, but SNPs that are located next to each other on an individual chromosome are almost always inherited together.

What do the terms homozygous and heterozygous mean?

Cattle have two versions of each chromosome. One chromosome was inherited from the sire and one was inherited from the dam. The words **homozygous** and **heterozygous** are used to describe the DNA, genes or SNPs at specific points along the chromosome. Homozygous describes the situation when the DNA on each chromosome is identical. Heterozygous means the DNA on each chromosome is different at a specific site. In the case of HCD, a homozygous animal would have inherited the HCD haplotype from both parents, whereas a heterozygous animal would have inherited the HCD haplotype from only one parent and not the other.

World Wide Sires recommends WMS!

Utilization of WMS lowers the risk of HCD negatively impacting a herd. WMS is an excellent tool for managing HCD and all other genetic defects. By using the WMS program, herds with at least one generation of pedigree information on their females can use carrier bulls, with less than 1% chance of having affected calves.