

# UNDERSTANDING HAPLOTYPES AND GENOTYPE-BASED GENETICS CONDITIONS

As registered and commercial dairy producers increase use of CLARIFIDE® to inform selection, management and mating decisions, many questions arise about available haplotypes. To properly manage haplotypes it's important to know what they are, their prevalence and strategies to reduce impact.

## HAPLOTYPES VS. GENOTYPES

Haplotypes are blocks of DNA inherited from the sire or dam spanning multiple genetic markers. In contrast, single nucleotide polymorphisms (SNP) characterize genetic variation at a very specific location in the genome. CLARIFIDE results include many haplotypes reported in the USDA-CDCB dairy genetic evaluation for a variety of genetic conditions! While some haplotypes are desirable, some are not favorable, and producers may choose to implement specific strategies based on haplotype data.

Haplotypes can be used to characterize coat color, polledness and genetic conditions in a variety of dairy breeds. Haplotypes also can affect fertility and may be associated with early-term abortions in most cases and stillborn calves in the most extreme. Haplotypes affecting fertility were identified when research revealed that abortions were occurring more commonly in high-risk matings among animals genotyped as homozygous for specific haplotypes. Evaluation of these haplotypes coupled with examination of associations with existing genomic predictors for fertility led to the conclusion that embryos possessing two copies of the unfavorable haplotype resulted in pregnancy termination.

## HOW PREVALENT ARE HAPLOTYPES AFFECTING FERTILITY?

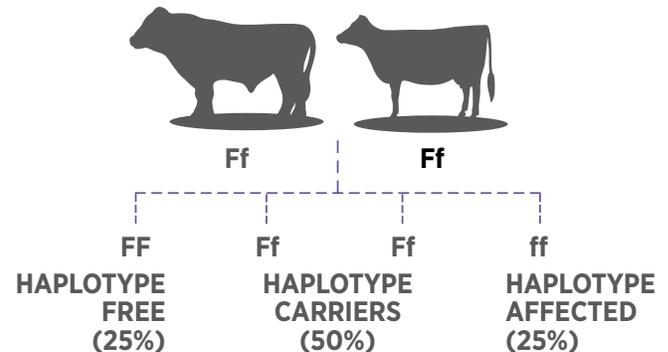
Haplotypes affecting fertility are present in each breed supported by CLARIFIDE. There are five Holstein haplotypes and two each in Brown Swiss and Jersey. Figure 1 lists the currently recognized haplotypes affecting fertility, their frequency and suspected effects.

## HOW TO MANAGE HAPLOTYPES

Mating carrier females to carrier males will result in a 25% chance that the resulting embryo will carry two copies of the haplotype. In addition, there is a 50% chance that the resulting offspring will be carriers. Therefore it is wise to avoid these risky matings.

Figure 1.

Breed	Name	Frequency	Suspected Preg. Loss
Holstein	HH1	4.5%	By Day 100
Holstein	HH2	4.6%	By Day 60
Holstein	HH3	4.7%	By Day 60
Holstein	HH4	0.7%	Not Known
Holstein	HH5	4.8%	By Day 60
Jersey	JH1	23%	By Day 60
Jersey	JH2	2.6%	By Day 60
Brown Swiss	BH1	14%	By Day 100
Brown Swiss	BH2	20%	Still or Late-Term Abortions



CLARIFIDE can detect animals carrying haplotypes affecting fertility and help you plan matings. Your CLARIFIDE results portfolio will include the status of each of your animals for the haplotypes affecting fertility. With this data you easily can identify the frequency of these haplotypes in your herd.

Once the haplotype carriers are identified, utilize the data to make more informed mating decisions. Carrier females should be mated to males that are tested negative for that haplotype. Occasionally, bulls that are carriers are also of high-genetic merit. With haplotype results from CLARIFIDE, these bulls still can be mated with non-carrier females. CLARIFIDE helps you still take advantage of these elite genetics without risking the undesirable effects of the haplotypes affecting fertility.

For registered breeders it may be desirable to completely eliminate these haplotypes from the herd. Commercial producers, while still advised to reduce the number of carrier animals, may choose a more conservative approach to the management of these genetic conditions. Importantly, haplotypes for genetic conditions do not identify the causative mutation. For many genetic conditions, direct tests are available and are the only results recognized as official by breed associations.

Future research will uncover more haplotypes. Continuing to use CLARIFIDE can help you manage through these haplotypes in a way that makes your herd more profitable.

For more information, visit [www.clarifide.com](http://www.clarifide.com).

1. Haplotype results generated by USDA-CDCB have not been validated by Zoetis. Zoetis expresses no opinion with respect to the use or accuracy of USDA-CDCB haplotype information until further validation is conducted. Zoetis shall not be liable for any loss arising from the use of USDA-CDCB results or from any actions taken in reliance thereon.

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