



WORLD HOLSTEIN FRIESIAN FEDERATION PRESS RELEASE

WHFF Standardisation of Genetic Trait Nomenclature

In today's evolving world, the pace and productivity of animal sciences and discoveries of new genetic traits and conditions continues at a rapid speed. Advances in genomic understanding and laboratory testing methods are leading to frequent discoveries. The importance of these discoveries can vary from a trait related to individual preference (an animal's coat color) to those with a significant impact on the health and welfare of our dairy population (cholesterol deficiency being the latest).

To make important breeding decisions, Holstein breeders must have available the most current information. They need a trusted source that they can turn to for the latest, up-to-date, genetic trait information. The World Holstein Friesian Federation (WHFF) understands this concept and has been working, for a long time, towards ensuring that all dairy breeders have the information they need. The WHFF works with the research community, keeps track of new discoveries, evaluates its impact on herd's health and coordinates a path forward so that the international breeding community can quickly and effectively put useful breeding information into the hands of our breeders. More formally, our goal is stated below.

Objectives of the World Holstein Friesian Federation (WHFF) are to improve and develop the Holstein breed in order to:

- **Harmonize** technical and administrative matters related to the improvement of the Holstein breed
- Represent the common interests of breeders worldwide in developing and promoting the Holstein breed
- **Exchange information** on important issues concerning the breed
- Assist emerging herdbook organizations
- Co-operate with animal science in general, as well as other recognized international organizations involved in animal improvement (i. e. ICAR; Interbull)

Within the WHFF, the Registration Working Group (WG) is specifically assigned the task to bring to the attention of the global community of Breed Associations and Herdbooks, those scientific research discoveries of Genetic Traits that are pertinent to the Holstein population. The term 'Genetic Trait' is used to describe a monogenetic inherited trait, i.e., one that is simply inherited. An important role in this effort is an open exchange of data and a harmonization of the terms involved in describing and communicating the results.



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The WG actively seeks out new research findings and provides a coordinated response on the dissemination of information on new genetic trait. The WG reviews the research data, along with the description of the gene or its primary function. Ideally the labelling of the new genetic trait is directly associated with its most notable characteristics. Standardized labelling for a new genetic trait is most effective, when it's intuitively associated with its name. In naming a new genetic condition, WHFF works most closely with the researcher or country that discovers the new genetic trait.

The full disclosure of named Genetic Traits in the Holstein population is very useful information when making breeding decisions on the farm. It allows the farmer to breed for the characteristics he wants, as well as, to minimize the harmful impact of any associated problem by breeding, through careful mating decisions and culling.

For the most part, genetic traits do not become 'Herdbook official' until the results of a direct genetic trait test for the causal variant are available. Today, we are also able to acquire genetic trait information from identified regions in the genome associated with a genetic trait, by indirect testing (e.g. via haplotypes). Labelling of these test types (direct and indirect) provides breeders with the information and opportunity to calculate the risk with mating decisions.

Direct Genetic Trait Test	Indirect Genetic Trait Testing
<ul style="list-style-type: none">• reliability: very close to 100%, excluding technical errors / issues• are marker-based tests• result from presence of mutated allele	<ul style="list-style-type: none">• reliability: very high, can be as high as 98%• risk of false positive or negative results• does not detect causal allele itself; detects proxy of causal allele

WHFF has adopted 2 Alpha characters for the Gene Name followed by the Expression Codes.

For many years, WHFF has adopted two (2) Alpha characters assigned for the monogenetic inherited trait. After the recommendation from their WG; WHFF proposes expression codes for direct and indirect gene tests to facilitate the differentiation between both testing types. The naming of 'indirect / haplotype discovered traits' relates to the name of the genetic condition (as known) and, in some cases, may change (e.g. missing haplotypes) when the specific phenotype or genetic information of the trait is discovered. Previously labelled traits will not be renamed, e.g. HH1. As this new area of research continues to expand we expect that the naming of traits will continue to evolve.



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Direct Tests preceded by (2) Alpha character name of trait		Indirect Tests preceded by (2) Alpha character name of trait	
F	Tested Free	0	Tested Free/non-carrier.
C	Tested Carrier / Heterozygous	1	Tested Carrier/Heterozygous/Confirmed with pedigree info.
S	Tested / Homozygous	2	Tested True/Homozygous/Confirmed on both sides of pedigree.
		3	Additional Characteristics e.g. suspect carrier origin could not be confirmed from pedigree.
		4	Additional Characteristics e.g. suspect homozygous origin could not be confirmed from pedigree.
		5	As required should an additional characteristic be identified.

Example of direct test coding:

Cholesterol Deficiency

CDF = tested non-carrier / free of cholesterol deficiency
CDC = tested carrier of cholesterol deficiency (heterozygous)
CDS = tested true carrier of cholesterol deficiency (homozygous)

When newly observed or previously unknown Genetic Traits are discovered, they should be reported to WHFF for the classification. When WHFF is advised by industry partners and/or laboratories of a newly discovered genetic trait, there will be a four week time period before delivery of the standardize label for coding.

Official Genetic traits are listed on the WHFF website for easy reference for all International Holstein Associations and their respective Herdbooks.
<http://www.whff.info>

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Note to Editors

The World Holstein Friesian Federation (WHFF) as an independent organisation representing the interests of the Holstein Breed and Breeders Internationally. Currently the Holstein Associations/Herdbooks within WHFF represent over 14 million Herdbook registered Holstein dairy cows and 250,000 members in 42 countries. WHFF organises a Holstein Conference every 4 years, the 2020 conference to be located in Switzerland. WHFF offers workshops on the Harmonisation of Type Assessment, defines genetic recessives and it also actively participates in the harmonisation of technical programs to assist in the international reciprocity of Herdbook information.