



MULEFOOT

Notice of recessive gene in the pedigree:

If the wording “Suspect MuleFoot” is written on the top right hand corner of the Registration Certificate. This means your animal has within its first 3 generations an ancestor that has tested positive for the genetic recessive Mulefoot.

Holstein Australia’s “Gene Alert” programme is aimed at providing dairy farmers with information regarding potential carriers of genetic recessives that have a negative impact on the breed. By advising of these animals at registration, owners are able to make decisions regarding their future breeding with the aim of eliminating and/or minimising the defective gene in their progeny.

What is a genetic recessive?

In an animal there are thousands of genes to complete its genetic makeup. For every gene there are two copies. One gene has come from its sire and one from its dam.

As an example, breeders might consider the more familiar gene for red colouration in black and white dairy cattle. The gene for red colouration is a recessive gene. This means that if a red gene comes from the sire and a black gene comes from the dam, the black gene, being the dominant gene, will result in an offspring that is black and white in colour. However, the animal is called a “Red Carrier” because it carries one copy of the red gene. For Holstein cattle, if one red gene comes each of the sire and dam then the offspring will have two red genes and will be red and white in colouration. This animal is called “affected”.

In regards to Mulefoot, carrier (heterozygous) animals may not show any symptoms of this disorder. This is because, like the red gene, the disorder is associated with a recessive gene. It is the affected animal with two copies of the gene that displays the symptoms of the disorder. However, a carrier animal, having only one copy of the recessive gene, still has the possibility of passing on the gene to its progeny.

The following table may help to explain this:

Normal Gene = N	Faulty Gene = F		
	Progeny:		Progeny:
	(Possible gene combinations)		(Possible gene combinations)
Sire (Carrier) = NF	NN	Sire (Carrier) = NF	NN
Dam (Normal) = NN	NF (Carrier)	Dam (Carrier) = NF	NF (Carrier)
	NF (Carrier)		FF (Affected-Lethal)
Sire (Carrier) = NF	NF (Carrier)	Sire (Normal) = NN	NF (Carrier)
Dam (Affected) = FF	NF (Carrier)	Dam (Affected) = NF	NF (Carrier)
	FF (Affected)		NF (Carrier)
	FF (Affected)		NF (Carrier)

Symptoms:

Mulefoot, also known as syndactylism, is the fusion of the two toes of the foot (resembling a thin mule's foot). It most often affects the front feet. Although Mulefoot is not a fatal condition, it can affect the mobility of the animal and this impacts on its performance.

It is the affected animal, with two copies of the gene that results in the above symptoms. An animal that is a "carrier" of the gene does not exhibit any symptoms.

The Test:

A laboratory test for MuleFoot is available at the option and expense of the owner of the animal. This test determines whether your animal carries the recessive gene for MuleFoot or not. If it is tested positive for Mulefoot, then the animal is a "carrier". If it is tested negative then it does not have the recessive gene for Mulefoot. The test is available via the Queensland University Laboratory. Hair samples can also be sent to Holstein Australia Office who will forward the sample for testing. Please contact Holstein Australia Office for more details (telephone: 03 9835 7600).

Code on Pedigree and how to read it:

Once Holstein Australia is notified of the test result, it is stored on the HA database. Whenever the animal's name is published (i.e. extended pedigrees etc), the test result should also be published. Currently, a carrier animal is labelled by the letters "MF", an affected animal is usually culled (it is ineligible for registration in Holstein Australia herdbook), while the animal which has been tested and found to be free of the condition is labelled as "TM". This TM label is very important, as it designates an animal that has been certified free of the condition, and assists in the control of the disease. Holstein Australia may even request the original Registration Certificate to be returned to the HA office for reissue with the test result printed on it free of charge.

Please Note: Genetic recessive carrier status of a sire or dam may not be known until after its progeny has been registered. In this case, the "Suspect" wording would not be listed on the Registration Certificate of the progeny. It is worthwhile to periodically examine an animal's pedigree for genetic recessive test results.

Methods of control through breeding:

Dairy farmers can avoid the spread of MuleFoot through controlled breeding. When mating suspect MuleFoot or "carrier" cows, use bulls that have been tested free of this genetic recessive (normal), or ensure that the bulls used do not have MuleFoot carriers in their pedigree. This will reduce the number of carrier progeny to a minimum.

Control of MuleFoot, and other significant genetic disorders in the dairy cattle population, depends entirely on self-regulation and cooperation between all those involved in the dairy breeding industry in Australia. Holstein Australia advocates the screening of all AI test sires as well as embryo donors, and the open disclosure and clear publication of MuleFoot status at sales and in all information, education and marketing material disseminated to dairy farmers. This stimulates awareness and allows farmers to make clearer breeding decisions.