

Understanding Genetic Condition Status

Genetic condition status results are based on DNA samples provided by breeders. Speckle Park International makes no statements, representations or warranties about the accuracy or completeness of any information relating to the status of a particular animal: and disclaims all responsibility for information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages, and costs you may incur as a result of information being inaccurate or incomplete in any way for any reason.

Genetic condition status results are only displayed for animals that have been DNA tested for a particular genetic condition or in circumstances where sufficient DNA testing has been conducted on animals within the pedigree to make some assertions as to genetic condition status. In cases where the genetic condition status of an animal is unknown, no genetic condition status will display for the animal.

Code Explanation

(First two or four characters vary with the genetic condition – i.e. RG, NT821 (Myostatin))

--F	Indicates that the sample submitted for this animal has been tested and found to be free of the causative mutation responsible for the indicated genetic condition. This animal is homozygous free, meaning that it has two copies of the normal variant (or allele) of the gene.
--C	Indicates that the sample submitted for this animal has been tested and found to be a carrier of the causative mutation responsible for the indicated genetic condition. This animal is heterozygous for the mutation, meaning that it has one mutant allele and one normal allele. This animal could pass the mutation to approximately half of its progeny.
--A	Indicates that the sample submitted for this animal has been tested and found to possess two copies of the mutant variant of the gene. This animal is homozygous for the mutation responsible for the genetic condition and in the case of RG and NT821 (Myostatin), will be affected by the genetic condition. Please note that Speckle Park International does not register animals that are affected (i.e. red or double muscled).

Understanding Genetic Conditions

Further details regarding each genetic condition are provided below.

NT821 (Myostatin) – There are 9 myostatin mutations that have currently been identified in beef cattle. Of these, one, NT821, is known to exist in the Speckle Park breed. Animals with two copies of the myostatin mutation have extreme muscling and are often referred to as “double muscled” (in fact, these affected animals do not have double the number of muscles of an unaffected animal. Rather the normal muscles are much larger than in an unaffected animal). While double muscled animals typically having increased retail beef yield, they are also typically leaner (less fat/marbling) and may have increased incidence of heavier birth weights and associated calving problems. Carrier animals (one copy of the NT821 myostatin mutation) are likely to be better muscled than unaffected animals (no copies of the NT821 myostatin mutation), but less so than affected animals. As the NT821 myostatin mutation is recessive, affected (double muscled) calves will only occur when two carrier animals are mated together.

Red Gene – While there are several different genes that influence coat colour, all animals have one base coat colour, being either black or red. Other coat colours/patterns, including the Speckle Park patterns of speckled, leopard and white pointed, are caused by other genes acting on top of this base coat colour. The base coat colour is controlled by the melanocortin 1 receptor gene, where red is recessive to black. Therefore, animals with a black base coat colour can either be homozygous black (unaffected, no copies of the red gene) or heterozygous black (red carrier, one copy of the red gene). As red calves (affected, two copies of the red gene) will only occur when two red carrier animals are mated together, Speckle Park breeders should avoid mating two red gene carriers together.

Putting Undesirable Genetic Conditions into Perspective

All breeds of cattle, in fact all mammals including humans, have undesirable genetic conditions. Fortunately, advances in molecular genetics have facilitated the development of DNA tests for their management. Breed Societies are at the forefront of development of strategies to manage undesirable genetic conditions and seedstock members are leading the industry with their uptake of this technology.

How are the conditions inherited?

Both double-muscling and red coat colour are recessive conditions. This means that two copies of the undesirable gene need to be present before the condition is seen; in which case you may get an affected animal (i.e. double muscled calf or red calf).

Animals with only one copy of the undesirable gene (and one copy of the normal form of the gene), that appear normal, are known as “carriers”.

What happens when carriers are mated to other animals?

A carrier will, on average, pass the undesirable gene form to a random half (50%) of their progeny.

When a carrier bull and carrier cow are mated:

- There is a 25% chance that the progeny produced will have two normal genes and so will never pass on the undesirable gene.
- There is a 50% chance that the mating will produce a carrier.
- There is a 25% chance that the progeny will inherit two copies of the undesirable gene and hence be affected by the genetic condition.

When a carrier animal is mated to an animal tested free of the genetic condition:

- All progeny will appear normal and will be unaffected by the condition.
- There is a 50% chance that the mating will produce a carrier.
- There is a 50% chance that the progeny produced will have two normal genes and so will never pass on the undesirable gene.

Note that an animal that is tested free by DNA test of the genetic condition will not pass the genetic condition to its descendants, even if it has carriers in its own ancestry. Therefore, DNA-tested free animals can be used in your breeding program with confidence that they are not transmitting the unfavourable gene to subsequent generations.

How should genetic conditions be managed?

There are a range of educational resources that provide assistance in the management of genetic conditions available from the Southern Beef Technology Services (SBTS) website.

- A Technical Note titled “Managing Genetic Conditions” is available [here](#).
- A video presentation of a webinar that was delivered as part of the “Know Your Genes” webinar course is available [here](#).