

# CHAROLAIS

THE BRITISH CHAROLAIS CATTLE SOCIETY

## DNA TESTING



**WEATHERBYS**  
SCIENTIFIC

## WHEN IS DNA TESTING REQUIRED?

### CALVES & REGISTRATIONS TO THE HERD BOOK

All ET animals must be fully parentage verified upon registration

All animals with more than one possible sire must be at least sire verified upon registration

All randomly inspected calves must be fully parentage verified upon registration

Any animal subject to a Society inspection must be at least sire verified

All animals being registered late (over the age of six months) may be subject to an inspection, to include DNA testing and at least sire verification

All imported animals and semen must be DNA tested unless they have a valid SNP DNA profile prior to being entered into the herd book

### SOCIETY SALES

All animals entered into a Society sale must be at least sire verified.

All animals' samples must be either already being processed by the lab or have their DNA profile already completed at the time that they are entered into a Society sale

Furthermore, if the DNA profile, parentage verification and myostatin tests are not complete prior to the sale catalogue going to print (usually approximately three weeks before the sale) then the animal will not be permitted to attend

Having a pending sample stored at the Society office, will not count as the sample being processed at the lab, therefore it is the responsibility of the member to check that the animal's sample has been sent to the lab prior to entering the animal into a Society sale

All animals will have its parentage verification status displayed in the sale catalogue as either PV, SV or DV. In addition the parentage verification status will also be displayed on pen cards. This will be displayed in one of the following:

 Fully parentage verified

 Sire verified

 Dam verified

## PRIVATELY SOLD ANIMALS

All animals sold privately to pedigree herds must be tested and at least sire verified before they are transferred, at the vendors cost

## SIRES & DAMS

All animals (if not already tested) will be tested and at least sire verified upon the registration of their first calf

## TESTING REQUIREMENTS

All animals which are SNP DNA tested, will also be tested for the two Myostatin variants found within the breed: Q204X & F94L. If an animal is registered as polled, it will also be poll tested as standard when testing takes place.

DNA TESTING PRICES		
Test Type	Costs	
	Pending Sample	Full Price
SNP Parentage & Myostatin	£27.00 + VAT	£32.00 + VAT
SNP Parentage, Myostatin & Polled	£29.00 + VAT	£34.00 + VAT
Additional Sires & Dams	£4.00 + VAT	
Sire Search	£9.00 + VAT	
Profile Certificate	£3.50 + VAT	
Imported Animal Profile	£3.50 + VAT	

## WHAT IS A PENDING SAMPLE?

If you have submitted a pending sample to the office before the calf reaches 10 months of age for us to hold, the price you pay for the DNA test when it is conducted at a later date will be discounted.

Anyone wishing to DNA type their whole herd in order to learn their myostatin status' can request sample bags from the Society. These tests will also be charged at the reduced pending sample rate.

## WHY AM I BEING CHARGED FOR ADDITIONAL SIRE & DAM TESTS AND SIRE SEARCHES?

When we first send your sample for DNA testing we can submit up to three parents in total at this stage without incurring any extra charges. This may be the dam and two possible sires or three possible sires.

If there are more than three parents to test the additional fee will apply for each further sire or dam.

Any parents submitted at a later date, for example if there is a parentage exclusion, will be subject to the additional parentage charge.

In cases of sire exclusions, it may be necessary to conduct a sire search to determine the sire - this can only be done if the dam has been DNA tested.

## **WHAT ARE PROFILE CERTIFICATES & IMPORTED ANIMAL PROFILES?**

Profile certificates are sometimes required for BCMS or the ministry in the case of late registrations with them or if there is a dispute. They are also requested if an animal is exported or semen is being taken.

We request an imported animal profile when you import an animal which already has a SNP profile.

## **WHAT IS POLLED TESTING?**

There are two types of polled gene – polledness from Celtic origin and polledness from Friesian origin and each of these traits are reported separately.

As with myostatin each animal has up to two copies of each gene and therefore, they are either non carriers (have no copies and are not polled), heterozygous polled (have one copy) or homozygous polled (have two copies) of each or either type. This means that a tested animal may be heterozygous polled for each type of polledness, but this does not make them homozygous polled.

The results for poll testing are reported as follows:

<b>Result</b>	<b>Description</b>	<b>Translation</b>
Pc/Pc	Homozygous polled	two copies of the Celtic origin poll gene
Pf/Pf	Homozygous polled	two copies of the Friesian origin poll gene
N/Pc	Homozygous polled	one copy of the Celtic origin poll gene
N/Pf	Homozygous polled	one copy of the Friesian origin poll gene
N/N	Non-Carrier	Horned



**WEATHERBYS**  
SCIENTIFIC

## HAIR SAMPLING FOR DNA TESTING

**Please make sure that when taking hair samples, you pull them according to the Society instructions as we can no longer accept coat hair samples, and samples with no follicles do not contain suitable DNA.**

Tail hair root follicles are an excellent source of DNA for genomic and routine parentage testing. However, the performance of samples processed and the reliability of the genomic results are dependent upon sample quality.



Pull at least 60 hairs from the tail switch – we no longer accept samples of coat hair. DO NOT CUT the hair - if the sample is missing the follicle (root), it will not contain DNA. If you don't have enough hairs, there will not be enough DNA for genotyping.

Gather at least 60 hairs, and grasp them tightly as close to the skin as possible with hands or pliers. As an animal gets older, the hair roots become harder to remove, so the use of pliers often aids removal.

Pull the hair slowly and firmly away from the tail, making sure to get the roots.

Do not collect shed hair for sampling, as the follicles will carry degraded DNA.

Ensure the hair is completely dry, and as clean as possible, otherwise the DNA will degrade before extraction.

When more than one animal is sampled, take extreme care to avoid cross contamination of hair roots between animals. Only put the hair from one animal in each sample bag.

Be sure there's no substance on the sample, such as sprays, detergents or other cleaning agents.

Only take hair samples from live animals.



**Examples of poor hair samples which have failed to produce a result – insufficient hair and coat hair**



**Quality samples are the key to getting good DNA from your cattle – plenty of tail hair with strong follicles**

Please ensure that the DNA sampling bag is labelled with the correct animal details or, if we have not provided the pre-labelled bag, please write the animal's name and full UK tag number on the bag with permanent marker.

Once you have placed the hair in the bag, seal it tightly ready for return.

Avoid prolonged exposure to direct sunlight.

### **SEMEN SAMPLE INSTRUCTIONS**

If you wish to send a semen sample for testing, please contact the Society for a semen testing pack. Samples sent directly to the office will no longer be accepted.

### **TAG SAMPLE INSTRUCTIONS**

1. Check that vial is properly sealed, do not break the seal, if the liquid leaks out in transport the tissue contained inside will not be suitable for testing;
2. While you are still in possession of the samples prior to sending them to the Society, please make sure that you keep them cool, store them at room temperature or in a refrigerator (below 24C, but do not freeze them);
3. Send samples to us at the Society ASAP for testing to the laboratory using the padded addressed envelope that has been provided by your tag sample provider;
4. They must be received by the Society within seven days of the sample being taken, overdue samples cannot be tested.

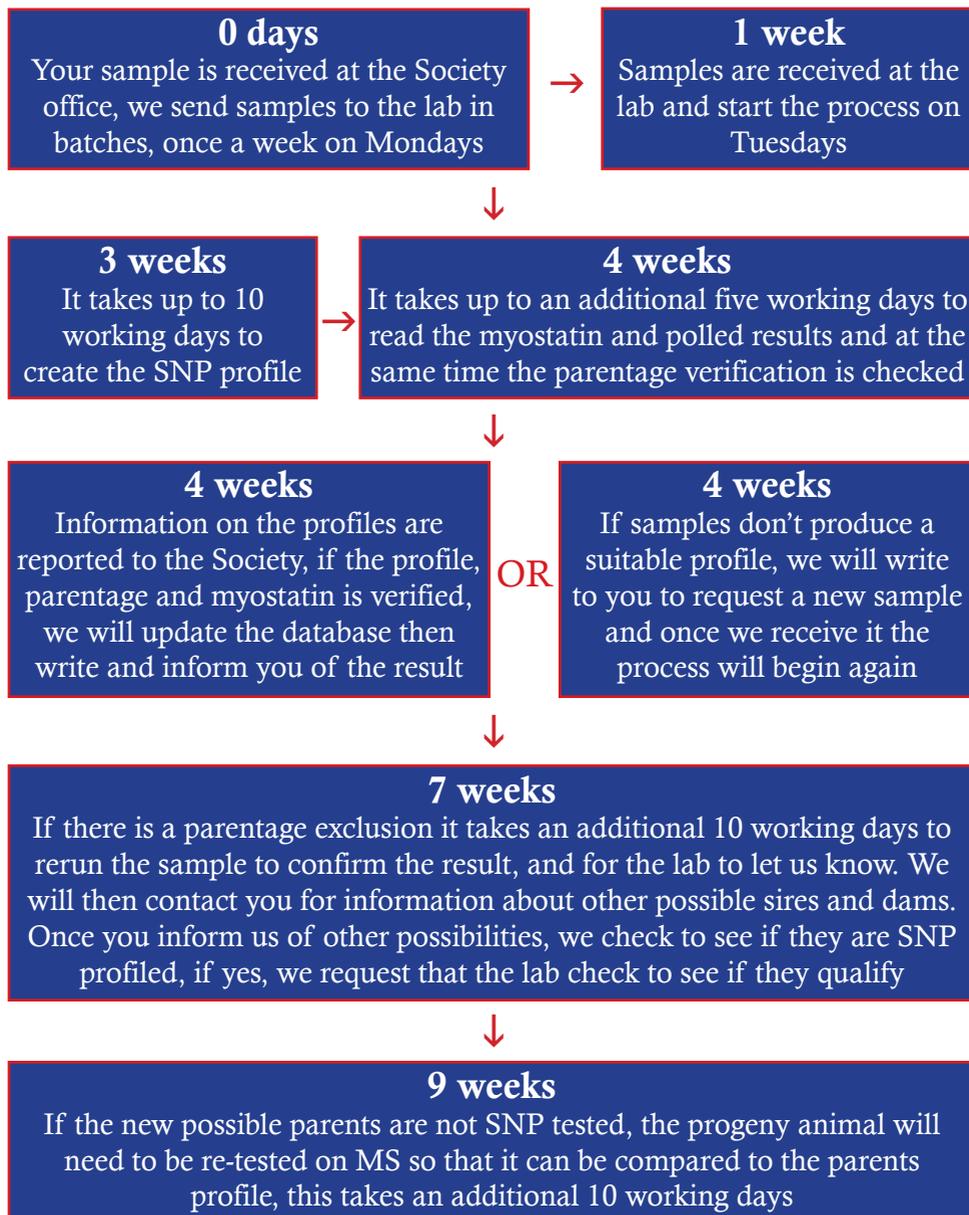
Keep all samples out of direct sunlight and send your samples to:

The British Charolais Cattle Society, Avenue M, Stoneleigh Park,  
Kenilworth, Warwickshire, CV8 2RG.

## TIMESCALES FOR TESTS

We send batches of samples on from the office to via courier to Weatherbys on Mondays, so that they reach the lab on Tuesday's, they then start the process.

### HOW THE PROCESS WORKS AT WEATHERBYS



# HAIR SAMPLING FOR DNA TESTING

## WHAT IS MYOSTATIN?

Myostatin is a gene that influences the production of proteins which control muscle development. When an animal is identified as having one of the mutations it means that they have inactive genes which do not control muscle growth as effectively, this can result in increased muscle mass. Currently in cattle, there are 19 known mutations of the gene and after extensive testing for the nine most common variants, we have concluded that the British Charolais cattle population only contains two - F94L & Q204X

## WHY ARE WE TESTING FOR MYOSTATIN?

Knowing the myostatin status of your animals will help you to select bulls with the most appropriate myostatin traits for your breeding programme. This will lead to better calving ease and help with the ever-present trend to improve carcass conformation and quality. However, it is just one tool which should be used in conjunction with the wider information available such as Estimated Breeding Values (EBV's) – which predict the performance of the animal based on its back pedigree, accurate measurements and the performance of its herd mates – and your own judgement on type and pedigree.

## HOW ARE THESE GENES INHERITED?

All reproducing species have two copies of each gene – called alleles. If your Charolais has one copy of the myostatin variant (one allele) it is classed as heterozygous, if it has two copies (two allele) it is classed as homozygous.

<b>2 Homozygous Parents</b>	<b>→</b>	<b>100% chance of Homozygous offspring</b>
<b>1 Homozygous Parent 1 Heterozygous Parent</b>	<b>→</b>	<b>50% chance of Homozygous offspring 50% chance of Heterozygous offspring</b>
<b>1 Homozygous Parent 1 Non-carrier Parent</b>	<b>→</b>	<b>100% chance of Heterozygous offspring</b>
<b>2 Heterozygous Parents</b>	<b>→</b>	<b>25% chance of Homozygous offspring 50% chance of Heterozygous offspring 25% chance of non-carrying offspring</b>
<b>1 Heterozygous Parent 1 Non-carrier Parent</b>	<b>→</b>	<b>50% chance of Heterozygous offspring 50% chance of non-carrying offspring</b>
<b>2 Non-carrier Parents</b>	<b>→</b>	<b>100% chance of non-carrying offspring</b>

## BRITISH CHAROLAIS MYOSTATIN VARIANTS

### F94L

Research conducted by Adelaide University in Australia concluded that the effect of the F94L mutation on birth and growth traits was not significant but was associated with an increase in meat weight and a reduction in fat depth. The results for the average effect of substituting a single copy of the variant F94L variant indicated an increase in silverside between 5.8 and 7.2% and meat weight of between 5.9 and 7.3%. There was also a reduction in P8 fat depth, intramuscular fat and carcass fat weight.

Calves used for this study, carrying 2 copies of the variant F94L marker, produced carcasses with approximately 12 to 15% more meat and 16 to 33% less fat compared with calves with no copies of the variant F94L allele, while single carriers produced approximately 3% more meat weight, while fat depth measured on live calves was 9.8% lower. Therefore, the F94L variant appears to have many positive effects without correlated negative effects of some other myostatin variants.

<sup>1</sup> A. K. Esmailzadeh, C. D. K. Bottema, G. S. Sellick, A. P. Verbyla, C. A. Morris, N. G. Cullen, W. S. Pitchford; *Effects of the myostatin F94L substitution on beef traits*, *Journal of Animal Science*, Volume 86, Issue 5, 1 May 2008, Pages 1038–1046, available at: <https://doi.org/10.2527/jas.2007-0589>

### Q204X

In a study published in the Oxford University Press *Journal of Science* on the effects of the Q204X gene in Charolais cattle, it was shown that the Q204X mutation leads to an increase in muscle mass. This creates a dramatic increase in saleable meat yield because of the improved dressing percentage, reduced carcass fatness, and fineness of the limb bones. In this study, animals with a single copy of a mutated allele were slightly heavier at birth, as a consequence of this calving difficulties also increased in heifers, but they found no effect with cows.

These animals showed consistently greater carcass yields, the thighs were thicker and the rib eye areas were larger. They were also markedly leaner, with less internal fat and less fat on the 6th rib. Therefore, the presence of even one copy of Q204X was shown to increase the beef value of these animals drastically. Regarding meat quality, trained taste panellists indicated that the meat of young heterozygous bulls was more tender. This better tenderness can be a consequence of a reduced collagen content and a smaller mean area of the muscle fibre section because both characteristics have been shown to be related to muscle tenderness.<sup>2</sup>

Below is a quick guide to the traits that are likely to be evident in homozygous and heterozygous calves born compared to calves with no myostatin:

	Increased Beef Yield %	Increased High Value Meat Area	Reduced Carcase Fat	Reduced Subcutaneous Fat Depth	Reduced Intramuscular Fat Depth	Increased Meat Tenderness	Increased Muscle Mass	Reduced Fertility in Females	Reduced Calf Viability	Reduced Calving Ease	Increased Birth Weight	Reduced Stress Tolerance
1 x F94L (Heterozygous)	■	■	■	■	■	■	■	□	□	□	□	□
2 x F94L (Homozygous)	■	■	■	■	■	■	■	□	□	□	□	□
1 x Q204X (Heterozygous)	■	■	■	■	■	■	■	□	□	□	■	□
2 x Q204X (Homozygous)	■	■	■	■	■	■	■	■	■	■	■	■
Key	<div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 10px;">Less</div> <div style="display: flex; gap: 5px;"> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: white;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: #c0c0c0;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: #808080;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: #404040;"></div> </div> <div style="margin-left: 10px;">More</div> </div>											

