

Colour Genetics Testing

DNA test for identifying colour in alpacas to help breeders better predict breeding outcomes. This is of interest to alpaca breeders of all colours – while an alpaca may look like one colour, it might actually be something else! You can learn how to identify homozygous for the “white” allele and then breed to ensure progeny from white and fawn alpaca will be white.

Coat colour in alpacas is a complex trait, involving two main genes responsible for base coat colour (ASIP and MC1R), and as-yet unknown number involved with pattern. Alpaca fleece has 22 natural shades that range from black to white, grey, fawn to champagne. Breeding for a specific coat colour can be a complex process. The “classic grey” phenotype can be problematic in breeding due to its association with the blue eye white phenotype and associated possible health defects. “Classic grey” can be hidden or cryptic on white or light backgrounds.

With the release of the Alpaca Coat test, breeders have the opportunity to test their white or light fawn animals, those with uncertain patterns or mutations or animals they wish to determine the base coat colour to deduce common progeny colours. The test also identifies animals with ‘cryptic grey’ coat patterns that are generally too pale to see.

Example of Test Results

Breeders will receive a grey/non-grey status for tested animals, as well as a base coat phenotype for the following colours:

w	White	White fibre, Dark skin
PSW	Pink Skinned White	White Fibre, Pink skin
F	Fawn	Fawn Fibre, Dark skin
CF	Clear Fawn	Fawn fibre, Pink skin
BB	Bay/Brown	Red/Brown body fibre, Black fibre on extremities, Black skin
CH	Chestnut	Red/Brown fibre, Pink to Red/Brown
B	Black	Black fibre and skin

Disclaimer: This advice is of a general nature. Seek veterinary or expert advice for your circumstances.

Terms

Genotype – the genetic makeup of an individual.

Phenotype – what you see – combination of genotype and environment – different genotypes can give the same phenotype BUT the breeding outcomes can be very different. For colour in alpacas, the phenotype can be a very poor indicator of genotype.

Gene – unit of heredity - every individual has two copies of each gene, one inherited from each parent.

Alleles - different forms of the same gene.

Homozygous – both copies of a gene are the same allele.

Heterozygous – each copy of the gene is a different allele.

Dominant Allele – always expressed, even if heterozygous - usually written with a capital letter - M, E, A, Lp

Recessive Allele – only expressed in homozygous state – normally written with a small letter - m, e, a, lp

EE & Ee – same phenotype ee – recessive phenotype

All colour is from melanin pigment - melanin comes in two forms:-

Eumelanin –black in alpacas

Pheomelanin –yellow in alpacas

White is not a colour – it is a LACK of colour. There is NO true brown in alpacas.

ALL alpaca colours are made up of varying amounts of BLACK and YELLOW.

The production of melanin is controlled by 3 genes:-

ASiP – agouti signalling protein – commonly just called Agouti

MC1R – melanocortin-1-receptor – also called Extension (controls the expression of black)

α-MSH - α-melanocyte stimulating hormone

The protein products of these three genes and the interactions between them, control the relative amount, type and location of pigment that is produced – they control the base colour in alpacas. The two that are critical are **Agouti** and **Extension**.

Base Colour

white, fawn, brown, black (note that grey is NOT a base colour).

All other genes influencing colour are PATTERN genes, including ALL GREY/ROAN genes.

Base colour is the colour of the animal before any influences from pattern genes, including grey genes, come into effect. It is the combination of Agouti and Extension that controls the base colour and if any black is produced at all. Pattern genes then act on this base colour. Understanding the base colour of an animal allows much greater understanding of potential breeding outcomes.

Disclaimer: The advice given here is of a general nature. More detailed information for your area may be provided by an agronomist, veterinarian or other expert with local knowledge.

Australian Alpaca Association Ltd. • +61 2 6151 2073 • info@alpaca.asn.au • www.alpaca.asn.au