Australian Innovation Company Ltd
(A controlled entity of Sheep CRC Ltd - ACN: 125 726 847)
ABN: 36 610 827 800

Parentage Test Report

Information on major gene effects

Please indicate on the order form if you would like to receive a report for these markers.

Scrapie resistance

Breeds – Border Leicester, Poll Dorset, White Suffolk, White Dorper, Merino, Dohne

Scrapie is a fatal, degenerative disease that affects the nervous systems of sheep and goats. Scrapie occurs in Europe and North America, but to date, Australia and New Zealand are scrapie-free. Information on resistance to Scrapie could be *of* interest for breeders exporting rams and/or semen to countries where scrapie is present.

A specific gene in the sheep's DNA determines if the sheep will be resistant or susceptible to scrapie. The location of this gene has been labeled codon 171. There are two different genes or sequences that can be found at codon 171. These have been labeled Q and R. Each sheep has two codon 171's, one from its dam and one from its sire. Therefore the only possible genotypes are QQ, QR or RR.

Remember this is a test for genetic susceptibility to scrapie not presence of infection.

The presence of at least one copy of the R gene (RR or QR animals) will result in a sheep that is resistant to scrapie.

The presence of QQ means that the sheep is susceptible to becoming infected with scrapie if it is exposed.

If requested results from the parentage test will be reported as:

QQ - susceptible to scrapie
QR: resistant to scrapie (not all offspring will be passed on the resistant allele, only 50%)
RR: resistant to scrapie (all offspring will be passed on the resistant allele)

Myostatin

Breeds – White Suffolk, Merino, Dohne

Double muscling occurs frequently in the Texel breed. This double muscling (DM) phenotype shows increased muscle growth especially in the hindquarters and can increase lean meat yield. The mutation for DM is located in the *myostatin* (MSTN) or growth and differentiation factor 8 (*GDF8*) gene.

Lean meat yield is negatively correlated with eating quality traits, such as intra-muscular fat and shear force. Double muscling is reported to slightly reduce eating quality traits (Hope et al, 2013), however more research is required.

Selection on Myostatin will not add a lot of accuracy to ASBVs. *Using ASBVs to increase lean meat yield will be more effective than selecting on Myostatin alone.*

If requested results from the parentage test will be reported as:

Blank – no copies of the allele Carrier – one copy of the allele (not all offspring will be passed on the allele, only 50%) Affected – two copies of the allele (all offspring will be passed on the allele)

Carwell

Breeds - Border Leicester, Poll Dorset, White Suffolk, Merino, Dohne

One of the muscling phenotypes that has been reported in the Poll Dorset breed of sheep is *Carwell* (from the Carwell Stud, NSW (Nicoll et al. 1998)). Increased rib-eye muscling is observed in animals carrying this locus with no other muscle group or fatness measure affected. For this reason it has provisionally been named the Rib-eye muscling (REM) locus, with its allele being named *Carwell*. *Carwell* has been shown to increase eye muscle area by approximately 10 percent. The inheritance of the *Carwell* appears to be dominant and so both carriers and affected animals show a 10% increase in eye muscle area. The effect on tenderness and its mode of inheritance have not been reported.

If requested results from the parentage test will be reported as:

Blank – no copies of the allele Carrier - one copy of the allele (not all offspring will be passed on the positive effect, only 50%) Affected – two copies of the allele (all offspring will be passed on the positive effect)

Information on Genetic Defects

If a carrier is identified breeders will be contacted

Callipyge
An abnormal increase in muscular tissue caused entirely by enlargement of existing cells (in contrast to muscular hyperplasia, in which the abnormal increase in muscular tissue is due to the formation and growth of new, normal muscle cells).

Hairy Lamb
Ectodermal Dysplasia.

Inverdale
This X-linked fecundity gene was discovered in offspring from a prolific Romney ewe. Heterozygous (1 copy of the gene) ewes ovulate approximately one extra egg, and give birth to approximately 0.6 extra lambs. Unfortunately, homozygous ewes (2 copies of the gene) have underdeveloped, non-functional, ovaries. Males with this gene have normal fertility.

Microphthalmia
Abnormal smallness in all dimensions of one or both eyes.

OPP/TMEM
Resistance/susceptibility to Visna/Maedi virus (VMV); Resistance/susceptibility to ovine progressive pneumonia virus (OPPV).

SpiderLamb
This recessive skeletal disorder occurs in several black-faced breeds in the USA, and in Suffolks in Australia, New Zealand and Canada.

Texel Chondro
Disproportionate dwarfism, a stocky appearance with shortened neck and limbs, bilateral deformities of the forelimbs.

Yellow Fat
The presence of three xanthophylls in sheep fat, presumably due to the inability to oxidise xanthophylls. Inherited as a single-locus autosomal recessive trait.