Scientists Identify Limousin Muscling Gene

Researchers at Adelaide University led by Dr Wayne Pitchford and Dr Cynthia Bottema who are also part of the CRC for Beef Genetic Technologies research team have identified a new gene with a large effect on retail yield. .

The new gene is a modification of the myostatin gene which occurs in very high frequency in Limousin cattle but very low or zero frequencies in other breeds.

The frequency of the high yielding form of the gene is 83% in Limousin compared to 3% in Belgian Blues, 0.6% in Angus, 0% in Hereford and 0% in Jerseys.

The gene is a modified myostatin gene which has the name myostatin F94L. It explains quite a large proportion of the advantage in retail yield that the Limousin breed provides and could be called "the Limousin muscling gene".

It is not the same modification of the myostatin gene which causes double muscling in breeds such as the Belgian Blue breed which causes lowered fertility and very high levels of calving difficulty. The Belgian Blue form of the myostatin gene is an 11 base pair deletion which is much more severe than the Limousin form which is a transversion of a single base pair which substitutes leucine for phenylalanine in the inhibitory domain of the myostatin protein.

The F94L variation of the myostatin gene does not have any deleterious effects on birth weight or calving difficulty.

A frequency of 83% in Limousin means that 69% of Limousins are homozygous for the gene, having two copies of the favourable form of the gene, 28% are heterozygous having one copy of the favourable form of the gene and 3% do not carry any copies of the favourable form of the gene.

While it is not the only gene which influences retail beef yield, it does have a large effect with the homozygous animals having 13% larger eye muscle areas and a 4.4% increase in total yield of retail cuts.

The gene is slightly recessive which means that the heterozygote animal has slightly less than half the yield advantage compared to animals which are homozygous for the gene

The size of these effects was calculated by back crossing Limousin X Jersey bulls over pure Limousin and Jersey cows in Australia and New Zealand and has been published in the prestigious scientific journal, Animal Genetics.

General Manager of Limousin Australia, Alex McDonald said "This gene appears to explain a much larger proportion of the genetic variation of the trait than any of the currently available gene markers for of marbling, tenderness or feed efficiency.

"The discovery of what appears to be a major gene which can be used to increase retail beef yield in all breeds of cattle throughout the world an exciting breakthrough."

"It could be used to identify those pure Limousins which currently carry two, one or zero copies of the gene to increase the retail beef yield of the Limousin breed. He said

"It could also be used to increase the frequency of the gene in Lim-Flex cattle which will have much lower frequency of the gene due to the Angus influence. "Using the test it would be possible to breed high content Angus or Hereford cattle which carried two copies of the gene and therefore produced higher yields of retail beef than a first cross Limousin/Angus or Limousin/Hereford.

The test is being commercialized by the University of Qld Genetics Laboratory and may be commercialized by other laboratories around the world. The University of Qld Genetics Laboratory is currently testing 200 Limousin sires to establish the relative frequency of the gene in French Pure and Pure Limousins.

F94L Gene also Increases Tenderness

A paper soon to be published by the Adelaide University based scientists shows that meat from animals which are homozygous for the F94L gene is more tender.

Using the laboratory shear force test meat from animals with two copies of the F94L gene required 15.4% lower force to cut a sample of the eye round muscle compared to animals with no copies of the gene for tenderness of the eye round muscle.

Another laboratory test called a compression test also showed a 9.75% advantage to the animals with two copies of the F94L gene.

The increase in tenderness was attributed to a decrease in collagen which forms connective tissue rather than any change to muscle fibre diameter.

The scientists suggested that the F94L gene could be used as a tenderness marker to ensure the tenderness of beef.