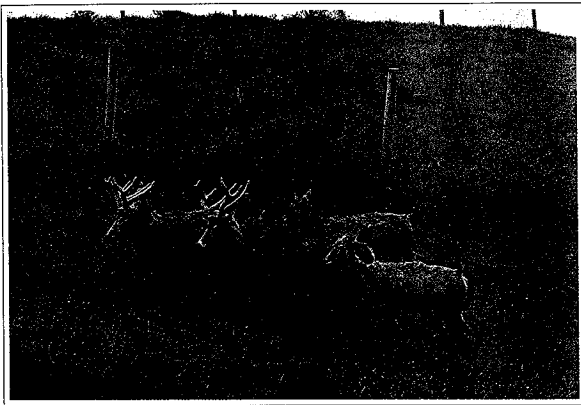


Right: Pere David deer
Worth its weight in genes

A world first in genetic research could see New Zealand deer farmers using a powerful, state-of-the-art breeding tool to predict stock performance.

Anne Lee
 reports on...



...performance mapping with DNA

WITHIN A few years a farmer could test an animal at an early age to see whether it had the genes to grow heavyweight velvet or to demonstrate rapid early growth.

Invermay AgResearch and scientists at the station's molecular biology unit at Otago University are drawing up a "map" to help identify the genes responsible for many deer characteristics.

The map will allow animals with

the potential for outstanding production to be identified and used to enhance breeding programmes.

Scientist Mike Tate is working with colleagues at Otago University to draw up the map using DNA from deer which are hybrids of Reds and the little-known Pere David deer.

The two species are genetically very different, and would not be expected to reproduce and create fer-

tile progeny. However, they are able to do so, and this gives scientists a rare and remarkable resource to use in identifying key genes and the traits or characteristics they produce.

Because they are so different in every way, genes belonging to a Pere David and those belonging to a Red are easily identifiable. The scientists are now working on identifying which gene is responsible for partic-

ular traits by firstly identifying "markers".

DNA strands are made up of a number of codes. The codes are grouped together to form the genes. As explained in May TDF, a marker is any bundle of codes which is easily identifiable and can be followed and identified again in the next generation.

During the cell division which occurs during reproduction the bundles of codes are reorganised or jumbled around. The closer a marker is to the gene responsible for a trait the more likely it is to be carried through to the next generation at a site close to the gene, and the more use it will be in drawing up a map.

Invermay scientists have crossed Reds with Pere Davids and then re-crossed the offspring back to Reds

to give quarter hybrid Pere Davids. They now have almost 300 such animals, which are being used to identify which genes create which characteristics.

In the quarter hybrid population some animals have more Pere David traits, while others have more Red traits. For instance Pere Davids have large tails and in the quarter hybrid population some exhibit this trait while others have a smaller Red type tail.

Scientists can compare genetic samples from both types back against the pure breeds to work out which gene is creating the large tail.

Although it sounds simple, locating and identifying the markers to help identify the genes is groundbreaking work in deer.

"It's at the leading edge of science.

It hasn't been done before so we have to work through every step," Tate says.

He predicts that the information being gained through the research will be used routinely by breeders within the next five to 10 years to accelerate their breeding programmes.

With this information New Zealand deer farmers would be the only ones in the world able to breed deer in a scientific, organised way, says Tate.

The New Zealand deer population also has a wide gene pool, which means that with the help of the information from this research farmers will be able to make huge genetic gains.

"It will put our farmers in a unique position." □

Pere David's priceless genes

THE PERE David deer is as different genetically from Red deer as humans are from apes or a horse as from a donkey.

These unusual-looking animals, *Elaphurus davidianus*, were initially brought into New Zealand in 1983 to help save what had almost become an endangered species. Scientifically, they were seen as a means to help alter farmed deer fawning dates.

As research scientists wanted to use the Pere David to bring the fawning date of farmed deer forward into October, to allow a closer match between feed demand and supply.

However, the Pere David gestation period is even longer than Red deer — up to 21 days longer in fact. This has cancelled out the earlier seasonality of the deer, but does not mean the work done so far on the species has been in vain.

Its most important use has been in making gene mapping possible; the species has also shown other interesting results when crossed with Reds.

Offspring from a first cross show significantly high-

er weaning weights, growth rates and yearling carcass yields than their Red counterparts.

The young hybrids grow rapidly in early spring, and studies on intake and growth rate responses have found that if animals are fed with high quality, high energy rations, growth rate gains in August-September will give earlier venison target weights and early velvet spiker growth.

Purebred Pere David deer are mainly susceptible to malignant catarrhal fever (MCF) and it has been suggested that one area of genetic research could be identifying genes for resistance or susceptibility to the disease.

When compared to a Red, Pere Davids look stockier, their antlers are quite a different shape, they are adapted to eating grass or grazing rather than browsing and their tails are large and long. Unlike Reds, females do not hide their fawns.

Although it is unlikely to be a significant farmed animal, the Pere David is becoming an extremely valuable tool in improving deer production. — Anne Lee