

Healthy inheritance

Invermay AgResearch scientist **Colin Mackintosh** discusses a study which aims to find out whether resistance to Tb is inherited.

THERE IS good evidence that resistance to tuberculosis may be genetic.

Studies have already shown there is a genetic component to resistance to tuberculosis in humans, cattle, rabbits and mice.

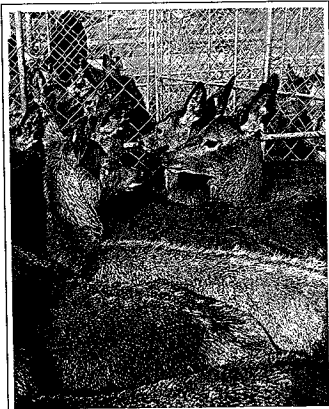
If the same can be found in deer, then there is potential for actively selecting breeding stags highly resistant to Tb, and culling hinds susceptible to Tb, or removing them from endemic areas.

In mice, natural resistance to infection from organisms such as *Mycobacterium bovis*, the bacterium responsible for Tb in deer and cattle, is controlled by a dominant gene called *Nramp* (formerly known as *Bcg*).

Recent studies indicate that this gene occurs in cattle and is responsible for the killing of organisms such as *Brucella* and *Mycobacteria*. There is also evidence that the *Nramp* gene is present in deer.

Invermay AgResearch recently carried out a trial to make use of these discoveries, selecting stags based on their resistance or susceptibility to an experimental *M.bovis* challenge.

The second phase of the study was to breed offspring from the three most resistant and three most susceptible stags, using artificial insemination of commercial Red hinds with semen collected before the chal-



Studying resistance to Tb may lead to development of a vaccine

lenge. In the third phase semen was collected from 39, 3-year old Red deer stags of wide genetic origin, and frozen.

The stags were then moved to the deer tuberculosis research farm at Milton, and in August were challenged with *M.bovis* organisms by placing a small number of organisms into the left tonsil.

The deer were monitored for the following six months with regular

blood tests for Tb (BTB), and had a final skin test just before slaughter. The stags were post-mortemed, and any lesions examined and cultures made. Lymph nodes were also sampled to search for evidence of Tb organisms.

Of the 30 deer with Tb lesions, 22 had head lesions, five had head and abdominal or chest lesions and three had lesions at all three sites.

The head lesions were typical of Tb infection. There was also a good correlation between BTB, skin test, culture and post-mortem results.

The three stags with the most serious lesions were designated susceptible and used in the second phase of the trial

Two of the five animals with no visible lesions were skin test negative and BTB negative.

The other three had low BTB and skin test results, although two had a slight rise in antibody levels 14 days after inoculation. Based on these results, three animals were designated resistant.

Semen from the three most resistant and susceptible stags was used in an A1 programme to inseminate 220 randomly selected commercial hinds.

Ultrasound scanning at 40 days post-A1 showed 109 were pregnant, with approximately even numbers

of fawns per sire. The hinds were due to calve in early December 1995.

It is planned to wean the female offspring of the resistant and susceptible sires in March and take them to Invermay's experimental Tb farm at Milton.

There they will be challenged with Tb in the same way as their sires.

Studies by Dr Alan Crawford and Dr Frank Griffin of the University of Otago be carried out to identify genetic and immunological markers for resistance.

As well as the possibility of identifying such indicators and using them to select or cull deer, the research may also provide us with the

information to develop vaccines.

Acknowledgements

I would like to thank staff at AgResearch Invermay, Deer Research Laboratory, AgResearch Otago Molecular Biology Unit and Invermay Animal Health Laboratory. □

Safety, ethics safeguarded

AGRESEARCH INVERMAY'S experimental Tb farm at Milton has the blessing of the Animal Health Board, on the grounds of the urgency of finding solutions to the Tb problem.

The property is protected as fiercely as the gold at Fort Knox, with possum-proof fencing and electric wires, while all wildlife within 3 km is controlled.

Invermay's Animal Ethics Committee has also approved of the practice of deliberately infecting deer with Tb. All infected animals are slaughtered before the disease takes hold.

VS on march in US

VESICULAR STOMATITIS (VS), which is similar to the dreaded foot and mouth disease, is reported to be well on the march through the western states of the US, according to the North American Deer Farmers Association December newsletter.

VS is a fast moving virus, capable of striking nearly all types of livestock including deer. Its characteristic signs mimic foot and mouth and lab tests have to be run to differentiate between the two viruses. In fact, in New Zealand an outbreak of VS has caused foot and mouth scares on two separate occasions.

Affected animals usually salivate heavily and blisters form in and around their mouths and tongues, and along the top of the hooves and teats. After the blisters break the skin sheds around the open lesions, leaving the animal with painful sores that take about two weeks to heal.

NADeFA says some states have introduced emergency notices regarding VS and may require additional information on health certificates of any animals entering the state.