



Possums and TB

Tuberculosis in cattle (bovine Tb) is caused by the bacterium *Mycobacterium bovis* that is related to the bacterium causing Tb in humans. Bovine Tb also infects humans but only rarely since compulsory pasteurisation of milk.

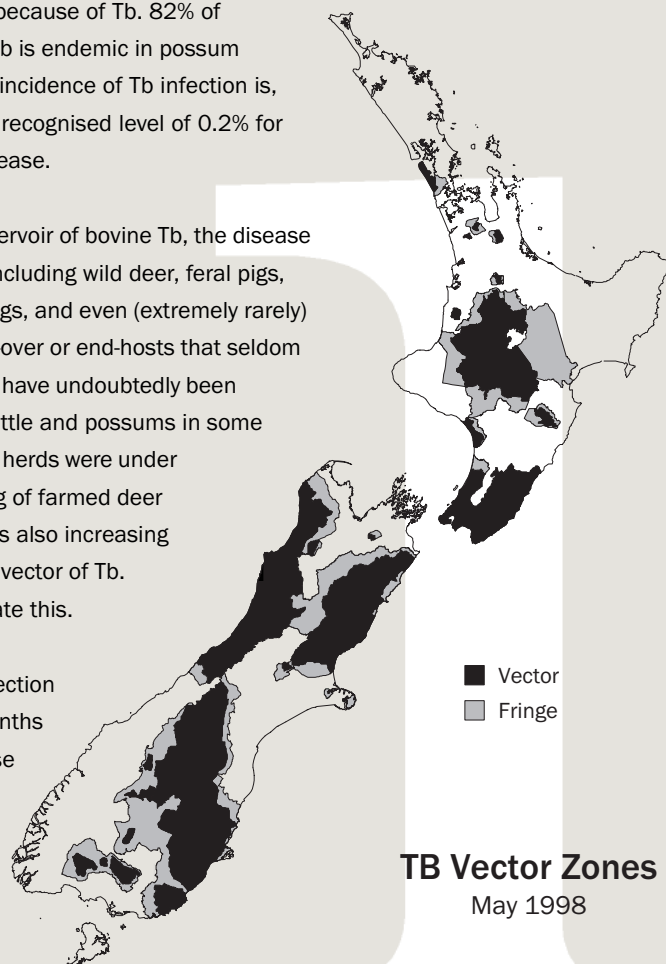
High levels of Tb infection in cattle, prevalent in New Zealand earlier this century, were gradually reduced after Tb testing was made compulsory for all dairy cattle in 1961 and for beef cattle in 1971. Cattle suspected of having Tb were slaughtered (as they are still) so that the disease was gradually eliminated from most herds.

However, in some parts of the country the gradual reduction of infected herds was not maintained, suggesting a source of infection other than diseased stock. In 1967, 20 out of 25 possums trapped just north of Westport were infected with bovine Tb, and within 5 years infected possums had been found in several areas of northern Westland, in the Wairarapa, and around the western bays of Lake Taupo. It appears the Tb must have entered possum populations during the early 1960's at the latest, and possibly much earlier during the 1950's. Today, possums are infected in areas of New Zealand covering approximately 6.24 million hectares or 23.5% of the nation's land area, from north of Auckland to the southeastern corner of the South Island.

In 1999/2000, about 4.8 million cows were Tuberculin-tested, and 1377 tuberculous cattle were subsequently identified. The number of infected herds has declined from over 1,200 in 1994 to 568 in 1999/2000. Throughout New Zealand, only 1.1% of all the herds were under movement control restrictions because of Tb. 82% of these infected herds were in areas where Tb is endemic in possum populations (Vector Risk Areas). This herd incidence of Tb infection is, however, still well above the internationally recognised level of 0.2% for a country to be considered "free" of the disease.

Although possums are the main wildlife reservoir of bovine Tb, the disease is found in a wide range of other species, including wild deer, feral pigs, feral cats, wild ferrets, feral goats, hedgehogs, and even (extremely rarely) rabbits. Most of these are regarded as spill-over or end-hosts that seldom transmit Tb to other species. However, deer have undoubtedly been responsible for spreading the disease to cattle and possums in some places. In 1996/97 about 121 farmed deer herds were under movement control because of Tb. Tb testing of farmed deer herds became compulsory in 1990. There is also increasing evidence that ferrets may also be a wildlife vector of Tb. Research is currently underway to investigate this.

Most possums have little resistance to infection with bovine Tb and usually die about six months after developing clinical signs of the disease although some diseased possums may live for several years. Clinical disease is characterised by yellow or white lumps (lesions) in the lungs, and swollen



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lymph glands in the armpits or groin containing characteristic lime-green pus or caseous (cheese-like) material. The discharged pus may contain high numbers of bacteria—estimated at 5000 million per gram of tissue in one possum examined. Livestock can become infected by feeding on pasture or hay contaminated by infected possums, but it is more widely accepted that most are probably infected by licking and sniffing dying or recently dead possums.

However, Tb is not widespread in possums and is often difficult to find. On a broad scale, prevalence of infection is usually less than 2%. The problem is that the disease occurs in pockets where up to 40% of possums may be infected. The disease is probably spread into new areas by infected juveniles (particularly males) dispersing in search of places to settle.

Managing the possum Tb problem on a national scale is the responsibility of the Animal Health Board, who have proposed a new National Pest Management Strategy for the eradication of bovine Tb. The strategy aims to achieve Tb freedom in livestock by 2003, with eventual eradication from wildlife as the ultimate goal. The current possum management policy was originally based on mathematical models but increasingly relies on empirical data from possum control operations. The mathematical models predict the disease will die out in possum populations in 5–10 years if possum numbers can be reduced by about 70% and kept at that level, and immigration of infected possums can be prevented. Field observations suggest that eradication may occur sooner if control is more intense. Most large areas where the disease occurs in possums are now surrounded by a buffer zone in an attempt to control the outward spread of the disease. Possums in these zones are controlled by poisoning and/or trapping to reduce the risk of disease establishing in possums in these zones. Any Tb outbreaks outside these areas are closely investigated, and if it is suspected that wild animals are involved, the area around the outbreak is intensively controlled to try to eradicate the disease. Successful possum control operations combined with regular tuberculin testing of livestock quickly reduce the number of tuberculous livestock, but experience has shown that if possum control is not maintained, infection in cattle increases again within about 5–8 years.

Bovine Tb has never been found in free-living possums in their native Australia. This may be because possums are much less common in Australia and have less contact with cattle, reducing the chance of them catching and spreading the disease. Now that Tb has been eradicated from domestic livestock in Australia, it is highly unlikely that Australian possum populations will ever become infected with bovine Tb. Wild deer are also much less common in Australia compared with New Zealand, and it may be that wild deer provided the link for Tb to be transmitted from cattle to possum populations in New Zealand. Britain and Ireland also have a problem with wild animals spreading Tb, but in these countries the culprit is the badger, a protected species.

In New Zealand, a variety of research into controlling possums and limiting the spread of Tb is continuing. Methods of controlling possums are continually being improved by Landcare Research, along with improved understanding of how the disease cycles in wildlife and new ways of detecting where Tb persists. Eradicating Tb from possums may depend on the development of a means of biological control of possums or an effective vaccine to protect possums from Tb infection. Recent advances in molecular biology allow us to consider new ways of interfering with possum breeding, without affecting other species. However, achievement of Tb freedom in livestock by 2013 will necessitate having to rely on conventional trapping and poisoning methods. Hence the most urgent research need is to improve these.

Research

Landcare Research has teams of scientists working on all the issues and questions discussed here. The work is funded largely by the Foundation for Research, Science and Technology, the Animal Health Board, MAF Policy, and the Cooperative Research Centre for the Conservation and Management of Marsupials.

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