

Scrapie freedom – the New Zealand story

New Zealand and Australia are internationally recognised as free from scrapie. How it came to be can never be proven, but examination of the records dealing with importations into both countries provides no evidence of scrapie in the 19th century.

However, in each country scrapie did occur in Suffolk sheep imported in 1950 from the United Kingdom. The occurrences were in 1952 and 1954 in New Zealand⁽¹⁾ (Haughey KG, personal communication), and in 1951 and 1952 in Australia⁽²⁾. In both instances the disease was eradicated and has never reappeared. In New Zealand scrapie was detected in imported sheep held in quarantine in 1976 but was eradicated by total slaughter of all imports and in-contacts.

Sheep farming was established in New Zealand in the 19th century, mostly with imports from UK and Australia⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁶⁾. The Australian imports were also from UK but also included Merino sheep from Germany, Spain and France.

By the mid-20th century, scrapie had been reported in many sheep-raising countries (Table 1), principally because of the importation of scrapie-infected Suffolk and Hampshire Down sheep from UK⁽⁷⁾.

There is no reference to scrapie-like disease in any of the sheep imported and bred in either New Zealand or Australia during the 19th or first half of the 20th century. At that time scrapie was well recognised in UK and other European countries⁽⁷⁾⁽⁸⁾⁽⁹⁾⁽¹⁰⁾⁽¹¹⁾.

Its absence in both countries is hard to explain. However, examination of historical records suggests some reasons why New Zealand and Australia remained scrapie-free.

Sheep importation from the early part of the 19th century until 1991 is summarised and reasons suggested for why scrapie was not introduced until two outbreaks in 1952 and 1954. Although eradicated it occurred again in 1976 and 1977 in quarantined sheep. New Zealand remains scrapie-free and subsequent importations have been subject to rigorous quarantine.

Sheep imports 1890s–1950s

During the latter half of the 19th century thousands of Merino sheep were imported from Australia⁽⁵⁾⁽¹²⁾⁽¹³⁾. These were mainly derived from Negretti and Paulars strains of Spanish Merinos, which Parry⁽⁷⁾ claims were scrapie-free.

While the Merino was the major breed imported and bred up to the 1890s, a number of other breeds were also imported⁽⁴⁾. These came almost entirely from UK and included the Southdown, English Leicester, Border Leicester, Cheviot, Romney Marsh, Lincoln, Shropshire, Scottish Blackface, Cotswold, Dartmoor, Wensleydale, Ryeland, Suffolk, Hampshire, Dorset Horn, Oxford Down, Roscommon and probably others. Some of these were not suited to their new environment and their breeding was discontinued (eg Scottish Blackface, Cotswold, Oxford Down, Roscommon, Dartmoor and Wensleydale).

From the 1850s to the 1880s the Merino was favoured for wool production. However, the start of exports of frozen mutton to UK in 1882 influenced the change to dual purpose breeds for wool and mutton, bringing the Romney, Corriedale and halfbred into

prominence. By 1892, 8 million sheep were being farmed in New Zealand, of which 6 million were Merinos. By 1911, the national flock reached 24 million, with 11 million in the South Island and 13 million in the North Island⁽⁵⁾⁽¹⁴⁾.

The Department of Agriculture Veterinary Division, established by John Gilruth in 1893, kept records of imports and inspections⁽⁴⁾⁽¹⁵⁾. These suggest that most imported sheep were carefully selected and inspected for the presence of disease before embarkation. On arrival they were held in one of three quarantine stations established early in the 1890s. These were Quail Island in Lyttelton Harbour, Somes Island in Wellington Harbour and Motuihe in Auckland

Table 1: Sheep imported to New Zealand 1893–1913¹

Breed	Number of rams	Number of ewes	Total
Bharal	4 sheep - sex not stated		4 (zoo animals)
Border Leicester	62	65	127
Cheviot	9	66	75
Dartmoor	2	5	7
Dorset Horn	7	22	29
English Leicester	36	44	80
Hampshire	4	-	4
Lincoln	47	15	62
Merino	304	-	304
Oxford Down	11	11	22
Romney Marsh	191	155	346
Roscommon	4	10	14
Ryeland	28	70	98
Scottish Blackface	2	4	6
Shropshire	89	83	172
Shropshire Down	4	4	8
Southdown	72	121	193
Suffolk	1	4	5
Tunis	2	6	8
Wensleydale	2	6	8
Total	881	691	1572

¹ From Quarantine Records - 1907 not available

Harbour. Sheep were quarantined for a month, the main concern being the exclusion of sheep scab and foot and mouth disease.

Sheep scab, a disease with serious economic consequences, had been eliminated from New Zealand by 1894⁽³⁾⁽⁴⁾⁽⁵⁾. Because the clinical signs are similar to scrapie, its eradication meant that any scrapie present would have become apparent. No such emergence of scrapie was observed.

Between 1893 and 1913, about 1,572 sheep were imported for stud purposes. Most came from UK, although Merinos from Australia were apparently quarantined under the same conditions as the British sheep. Unfortunately the details of the breeds and the port of origin were not mentioned in the Departmental reports after the early 1920s. The importations of livestock from UK during wartime were restricted. Table 1 gives a picture of the numbers of the various breeds imported earlier in the 20th century.

In the late 1890s and into the earlier part of the 20th century, the Lincoln and English Leicester were used extensively in crossbreeding with Merinos to produce halfbred sheep that were dual purpose and preceded the later rapid expansion of the Romney. Any one of these breeds could potentially have been a scrapie carrier and, in hindsight, selecting sheep from so many sources was the most likely way to introduce the disease. But this did not happen until 1950, when it occurred in Suffolk sheep.

Scrapie in UK

Scrapie has probably existed in UK for more than 250 years; the earliest report of it by that name was in 1853 in Cheviot x Leicester sheep. Earlier reports (1799) described the disease as ‘rubs’ and the affected sheep as ‘rubbers’⁽⁷⁾⁽⁹⁾⁽¹⁰⁾.

Scrapie probably entered UK in Merinos imported from Spain or Saxony. This belief is based on accounts, a few years after the main introduction of the breed into England, of scrapie occurring in a flock into which Merinos had been introduced. Although scrapie may have been present in some flocks in the 1700s it does not appear to have been widespread. The pioneer livestock breeder Robert Bakewell (1725–1795), in his extensive breeding programmes, mainly with Leicester sheep, made no mention of scrapie. The diseases of chief concern at the time appear to have been liver fluke and footrot⁽¹⁶⁾. However, numerous reports suggest that by the beginning of the 19th century scrapie was well established. A flock owner in Cambridgeshire reported the loss of 240 of 500 sheep. The disease was also reported in Lincolnshire (1799), Yorkshire (1812), and in

Northumberland and the Borders. An important point that emerges from many of these reports is that the stockmen who noticed it were sure that this was a new disease. It was different from ‘sturdy’ (*Coenurus cerebralis* infestation) and was not scab, as the skins were described as ‘rubbed clean’ (little or no scab formation).

It appears that the incidence of overt disease dramatically declined in British sheep between 1800 and 1850 (a period when many of our earlier importations were made). This point is explained by Sir Stewart Stockman (1913) who claimed that at that time in many regions the production of mutton, with the consequent breeding for slaughter, led to the removal of many sheep before two years of age, before scrapie manifests⁽¹⁰⁾. It is also believed that, following the apparent decline in incidence of scrapie in some traditional sheep-raising areas, the majority of purebred flocks remained unaffected. However, the most likely reason that many breeds, such as the Romney Marsh or Kent sheep, remained free from scrapie is that their distribution was limited to particular localities and they were not involved in cross-breeding.

For New Zealand’s position, the latter point has real significance, since the Romney became the backbone of its sheep industry. It seems that none of the Romney sheep imported were scrapie carriers and, further, the purebred Kent sheep of that time, and even as late as 1977, were scrapie-free. It was only after exotic breeds (Finn, East Friesian and others) were introduced to the area that scrapie appeared (Ogle RG; Finlay; personal communications).

The last importations of Romneys into New Zealand were well before this time. In all probability those imported earlier were scrapie-free. The same is assumed for the other breeds, and so New Zealand remained free from scrapie until 1952. There is still an important point to be explained. Scrapie had been recognised in Suffolk sheep in UK for many years and this breed was responsible for the spread of scrapie to other countries (Table 2) and within the UK. Why, therefore, was scrapie not introduced into New Zealand with Suffolk sheep before 1952?

Table 2: Recorded occurrences of natural scrapie outside Europe, 1930-1980¹

Region	Date	Breeds affected
North America		
Canada Ontario	1938	Suffolk, imported from UK
USA Michigan	1947	Suffolk, from UK and Canada
California	1952	Suffolk, imported
Ohio	1952	Suffolk, imported from Canada
Many states	1960	Mainly Suffolk, also Cheviot, Hampshire and Montadale
South America		
Colombia	1968-1971	Hampshire and Dorset Down, imported from UK
Brazil	1977	Hampshire Down (same flock of origin as in Colombia)
South Africa	1964-1972	Hampshire Down, imported from UK
East Africa		
Kenya	1970	Hampshire Down, imported from UK
Australia	1952	Suffolk, imported from UK
New Zealand	1952-1954	Suffolk, imported from UK
India		
Himalayan foothills	c 1940	Local mountain breed, with imported Rambouillet stock

¹ Modified after Parry⁽⁷⁾

The first Suffolk sheep were imported into Auckland in 1903⁽⁴⁾. However, there is no record of their fate. The next importation was in 1913 into Canterbury where use of the breed remained limited until the 1970s when it became popular as a terminal sire. The Suffolk had seldom been used as a terminal sire in the first half of the 20th century because the main export lamb trade was based on a small, 10 kg–12 kg, carcass. These were mainly produced by crossing the Southdown rams with Romney, halfbred or other wool-producing breeds. This changed when the meat industry began to demand heavier and leaner carcasses. By 1940 there were only nine small registered Suffolk flocks and further importations ceased for more than 10 years because of war. The first appearance of scrapie in New Zealand was in 1952 in a Suffolk ram imported in 1950⁽¹⁾ (Haughey KG, personal communication). The slow acceptance of the Suffolk breed was probably the main reason that scrapie did not occur before that time.

Eradication 1952–1954

Scrapie was diagnosed in Suffolk sheep imported into New Zealand and Australia at about the same time but in both countries the disease was stamped out and no more sheep were imported into either country until 1973. On 26 January 1950, a Suffolk ram and five ewes from the UK were released from quarantine and moved to a farm in Canterbury. Brash described the subsequent appearance of scrapie in the ram and two of the ewes in 1952⁽¹⁾. The entire breeding flock was slaughtered⁽¹⁾⁽⁴⁾ but Southdown-Suffolk lambs that had been grazed with Suffolk lambs during winter were not.

A further problem of control was presented by the fact that 45 Suffolks sold in 1952, and distributed to ten separate farms, had been grazed with the imported sheep. Most of these sheep had been born in 1950 and included five ewes and six rams that were progeny of the infected ram. All sheep sold in 1952 were traced and slaughtered in July, but no other sheep in the flocks that had purchased Suffolk sheep from the infected flock were slaughtered.

A second outbreak was diagnosed on a farm in Southland in July 1954. There were four definite cases and two suspects, all ewes. This incident was traceable to the first outbreak in Canterbury in 1952.

The affected farm in Southland, the farm in Canterbury where the original outbreak had occurred, and all farms to which any sheep from either of these two farms had been taken, were quarantined. All sheep or goats that had been exposed to scrapie were destroyed. This involved all sheep on the two outbreak farms, and those that had left these farms – a total of 4,399. One hundred and ninety one (191) farms mostly in Southland and South Canterbury were quarantined for three years. Sheep were permitted to move to slaughter only, and vehicles used were disinfected before use by other stock. At the end of the three-year quarantine period, all sheep and goats were subject to veterinary examination before restrictions were lifted. Farms on which scrapie had occurred were permitted to restock three months after all sheep and goats had been slaughtered.

The 1956 Report of the Department of Agriculture noted that no further cases of scrapie had been reported, although animals showing suspicious signs had been investigated on five different farms. There were still five farms in Canterbury, 42 in Southland and one in the Wairarapa under the three-year scrapie quarantine restrictions.

More than 40 years later there have been no cases of scrapie in New Zealand other than in quarantine in 1976.

Scrapie in quarantine 1976–1977

In 1969 animal production scientists and some sheep farmers proposed the importation of sheep with desirable production traits to increase production significantly. On the basis of performance information gathered from overseas, the Maximum Security Quarantine Advisory Committee⁽¹⁷⁾ recommended the importation of Finnish Landrace, East Friesian, Texel, German Whiteheaded Mutton, Bleu du Maine, and Oxford Down sheep.

In December 1972 more than 100 sheep of exotic breeds, including Finnish Landrace, East Friesian, German Whiteheaded Mutton and Oxford Down, arrived on Somes Island to begin a breeding programme involving a five-year quarantine. Other quarantine farms were established on Mana Island and Crater Block at Rotorua. These were designated high security stations and measures were taken to minimise the risk of disease transmission to the national flock. As crossbreeding was developed on Mana Island and Crater Block, the programme ultimately involved about 5,000 sheep.

The importation had been criticised by some sheep breeders and veterinarians⁽¹⁸⁾⁽¹⁹⁾⁽²⁰⁾. Unease had arisen because the sheep had been obtained from a number of farms in the UK where scrapie was endemic and some believed that assurances about the scrapie-free status of source flocks were inadequate.

Hindsight reveals another weakness in the safeguards. The Maximum Security Quarantine Advisory Committee was persuaded that selecting sheep over 42 months of age, which would have been at least seven years old at the time their progeny were released, would almost entirely eliminate the risk of scrapie. It believed that absence of clinical signs or postmortem evidence of scrapie in sheep of that age could be accepted as proof that they were not infected. In fact, it is now known that clinical signs of scrapie may miss a generation but reappear in subsequent progeny.

On 30 September 1976, an East Friesian ewe on Mana Island quarantine showed signs of irritation and incoordination. Clinical examination confirmed signs consistent with an infectious chronic neurosis, which included an exaggerated scratch reflex. The ewe was in poor condition and died on 15 October 1976. Brain tissue showed the neurological vacuolation and status spongiosus typical of scrapie.

So, scrapie occurred for the second time in New Zealand. Following this event there was debate over salvaging some of the imported

sheep. Some parties pressed for destruction of all sheep, while others believed that destruction of 'in contact' animals would be sufficient. Initially only 300 sheep on Mana Island and 391 sheep at Crater Block were destroyed and the cross-breeding experiments continued into 1977, when a further case of scrapie was diagnosed in a Finnish Landrace ewe and the entire programme was terminated⁽¹⁸⁾⁽¹⁹⁾⁽²⁰⁾⁽²¹⁾⁽²²⁾.

For all the anguish caused by the 1970s experience the over-riding fact is that New Zealand is still scrapie-free. Mana Island is being restored as a nature reserve and Crater Block has been planted with trees. In hindsight the 1970s experience has had its positive effects and key points about scrapie exclusion have been more clearly recognised, so that the importations of exotic breeds in the 1980s and '90s were successful. The Ministry of Agriculture had gained more experience and was in a better position to avoid the mistakes of the 1950s and 1970s⁽²⁰⁾⁽²³⁾⁽²⁴⁾.

Finnish and Danish importations 1985–1991

Early in the 1980s, arguments similar to those raised in the late 1960s were raised again by animal production scientists⁽²⁵⁾. The main objective was to import Finn sheep because of their high fertility. For years the lambing performance of the national flock had seldom exceeded 100%. It was believed that, to maintain the economic viability of the sheep industry, the national lambing percentage must be raised and that this could be achieved by crossbreeding, with the Finn in particular. A more highly muscled carcass sheep with less fat was also recognised as desirable and the Texel was considered valuable in this respect.

The Director of the Animal Health Division undertook an extensive search for the desired breeds from a reliably scrapie-free source. Eventually it was found that the small flocks of Denmark and Finland had been scrapie-free for nearly a hundred years. A rigorous importation and quarantine programme was developed⁽²⁴⁾ and two separate groups of animals were imported; one by the Ministry of Agriculture and Fisheries and the other by a private company that was later taken over by the New Zealand Dairy Board and called LambXL.

These were the largest importations and proliferation of exotic sheep since the earlier part of the 20th century. All the imported animals were kept in high security quarantine, and embryos and semen were transferred to secondary quarantine farms for breeding up in donor sheep. The quarantine was for five years from the arrival of the original sheep. All sheep that died during quarantine were autopsied and their brain tissue examined histopathologically. Before release of the progeny, the original imports were slaughtered and their brains examined.

As a result of this programme, the Finn, German Whiteheaded Mutton, Texel, Gotland and Oxford Down were added to the breeding potential of the New Zealand sheep industry. In the years

since these breeds were released from quarantine, there have been no cases of scrapie in their descendants.

Conclusion

New Zealand remained free of scrapie until the 1950s, when minor outbreaks occurred in Suffolk sheep imported from UK. The most likely reason for the scrapie-free development of the sheep industry is that the source animals were purebreds from flocks that had not yet become infected. Most evidence for the international spread of scrapie in the 20th century suggests that it was Suffolk, and to a lesser extent the Hampshire Down, breeds that were responsible.

Although Gajdusek in 1976⁽²⁶⁾ was able to transfer the scrapie agent to several species of higher primates, the belief that scrapie was a human health risk was largely discounted by veterinary and medical opinion. However, with the first report of BSE in 1986⁽²⁷⁾⁽²⁸⁾, the position changed and scientists and regulators are once again concerned that scrapie might have an association with human conditions such as variant Creutzfeldt-Jakob disease. Both New Zealand and Australia have sheep with scrapie-susceptible genotypes, which would develop obvious clinical scrapie were the agent to be introduced again. The fact we have such susceptible sheep but no overt evidence of the disease strengthens our case for scrapie freedom. New Zealand conducts both active and passive surveillance for scrapie and other transmissible spongiform encephalopathies.

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