Transmissible spongiform encephalopathies surveillance programme

Transmissible spongiform encephalopathies (TSEs) are a group of neurodegenerative diseases caused by the proliferation in the central nervous system of an altered form of a normal intracellular protein called a prion. The main TSEs of interest in New Zealand are bovine spongiform encephalopathy (BSE) affecting cattle, classical scrapie affecting sheep and goats, and chronic wasting disease (CWD) affecting deer and elk/wapiti. New Zealand is free from these diseases.

Aim of TSE surveillance

This programme is designed to ensure early detection of any TSE incursion, and to ensure early containment and successful eradication.

The TSE surveillance and risk management measures implemented in New Zealand have been described in previous annual reports (e.g. Watts, 2018). Surveillance for CWD is not mandated by the World Organisation for Animal Health (OIE), but is carried out to assure our trade partners that New Zealand is free from this disease.

As a country with a negligible BSE risk, New Zealand performs surveillance type B, as specified by Chapter 11.4 of the OIE Terrestrial Animal Health Code (OIE, 2018a). This relies on the passive surveillance scheme described below. BSE points have been accumulated since 2005 and New Zealand has consistently maintained well in excess of the required 150,000 points.

How the programme works

TSE surveillance combines passive and active surveillance activities. Passive surveillance is carried out for all three TSEs through a targeted scheme under which veterinary practitioners submit neurological material (brain and spinal cord) from animals showing clinical signs of neurological disease. Veterinarians and farmers are compensated for supplying the samples. Submissions to the programme occur year-round, with a seasonal increase in submissions from August to October.

Active surveillance for classical scrapie and CWD has been carried out since 2010, to complement the small numbers of submissions made to the passive scheme for sheep and deer. As part of this, medial retropharyngeal lymph nodes (MRLNs) are routinely collected for testing, from clinically healthy adult animals sent to meat processing plants across the country. The required sample size (320 sheep and 320 deer per year) is designed to detect disease at a low prevalence in the population. A maximum of two animals can be collected from any one farm, to help ensure that the sampled population is geographically representative.

Until 2019, brains collected under the passive surveillance scheme were histopathologically examined at accredited veterinary diagnostic laboratories to rule out TSE lesions, and to potentially provide an alternative diagnosis. If histopathology could not rule out TSE, confirmatory testing was performed at the MPI Animal Health Laboratory (AHL) (Wallaceville), using the EU-approved Herd Check BSE-scrapie ELISA (IDEXX Laboratories Inc., Westbrook, Maine, USA). Lymph nodes from deer and sheep collected under the active surveillance scheme are tested using the Herd Check BSE-scrapie ELISA rapid test at the AHL.

The TSE surveillance programme evolves over time to respond to changing risks and advances in sampling and diagnostic techniques, to ensure the programme remains effective and meets OIE guidelines and market needs.

Results

In total, 751 samples from all species were tested by both passive and active TSE surveillance in New Zealand in 2018. All tests were negative (**Table 1**).

The level of passive surveillance of the cattle population achieved in 2018 is eligible for 21,320 BSE points.

For active surveillance of scrapie and CWD through meat plants, the sampling distribution was widespread throughout New Zealand, thus reasonably representative of the population at risk (**Figure 1**).

Trends in TSE passive surveillance

The passive surveillance scheme for TSE is focused on submissions of clinically suspect animals (or fallen cattle) from veterinarians. Although these occur year-round, there is a clear seasonal trend, with a peak from August to October each year (**Figure 2**).

The numbers of samples submitted to this programme have declined since 2005. Specifically, the number of deer and cattle brain submissions declined sharply after 2008 after the imposition of a maximum of two submissions per farm per year (**Figure 3**).

Trends in TSE active surveillance

In October 2009, the first detection of a case of atypical scrapie/Nor98 in a New Zealand-born sheep was confirmed (Kittelberger & McIntyre, 2009; Kittelberger et al., 2010). MPI strongly supports OIE's view that atypical scrapie is "clinically, pathologically, biochemically and epidemiologically unrelated to 'classical' scrapie, may not be contagious and may, in fact, be a spontaneous degenerative condition of older sheep". (OIE, 2018b). Accordingly,

Table 1: Number of samples tested in 2018 for TSE, by passive and active surveillance

Surveillance stream	Tissue	Test type	Species	Number
Passive	Brain	Histopathology	cattle	67
Passive	Brain	Histopathology	deer	4
Passive	Brain	Histopathology	sheep	1
Active	MRLN†	Rapid Test IDEXX	deer	320
Active	MRLN	Rapid Test IDEXX	sheep	359

†Medial retropharyngeal lymph node

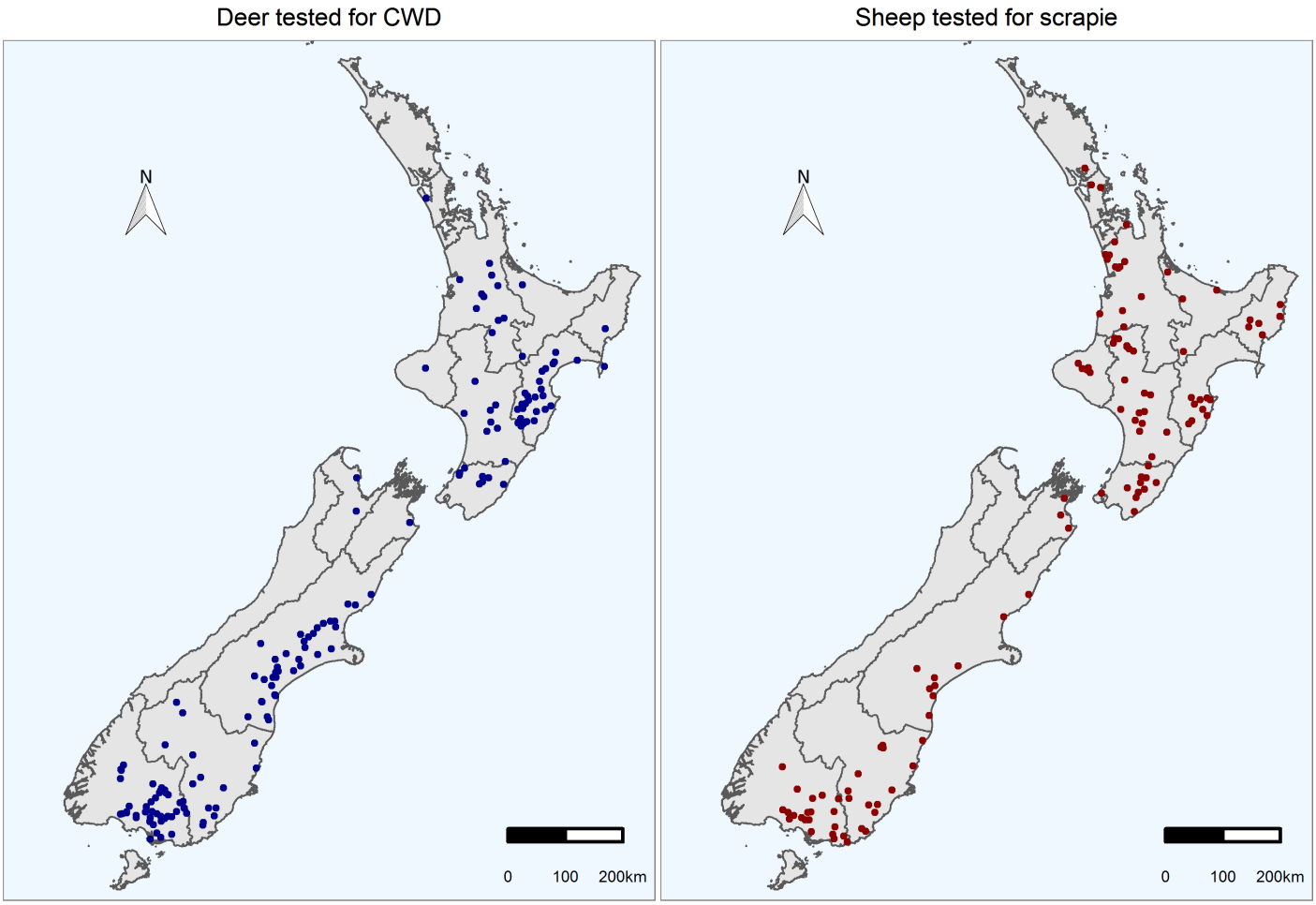

Figure 1: Locations of farms screened through active surveillance for CWD (left) and classical scrapie (right), 2018

MPI considers atypical scrapie to be a negligible biosecurity risk (Vink & McIntyre, 2014). The sensitivity of detection of the prion causing classical scrapie is higher in lymphoid tissue than in brain tissue, and the atypical scrapie/Nor98 prion is not detected in lymphoid tissue (Meloni et al., 2012). Research at the AHL (Wallaceville) has shown that testing of MRLN tissue from sheep and goats with the IDEXX TSE test has high diagnostic sensitivity and specificity towards classical scrapie (Kittelberger et al., 2014). This is the basis for currently using MRLN for active surveillance in sheep and deer.

References

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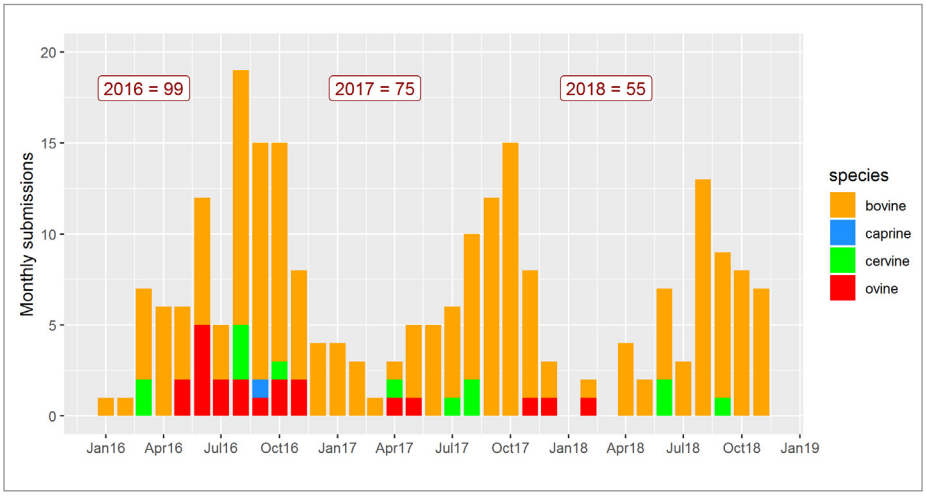

Figure 2: Passive surveillance through the incentivised scheme: monthly numbers collected, 2016–2018 (Total numbers tested each year are shown at top).

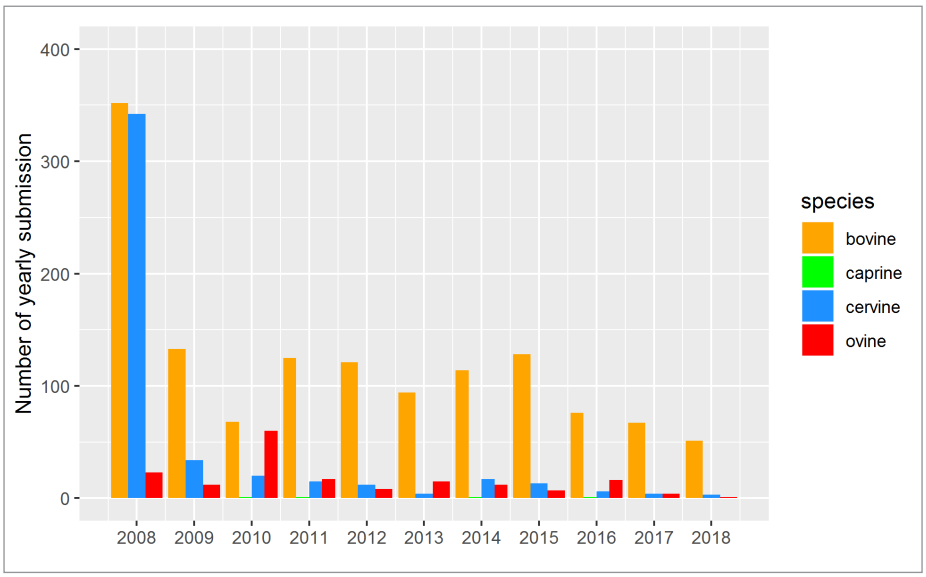

Figure 3: Annual number of brain samples tested for TSEs under the incentivised passive surveillance scheme, 2008–2018