

# Arbovirus surveillance programme

The arbovirus surveillance programme was instigated in 1991 to provide assurance of New Zealand's freedom from arboviruses, particularly bluetongue virus, which affect sheep and cattle. Other arboviruses of veterinary concern include epizootic haemorrhagic disease virus and Akabane virus.

Arboviruses are taxonomically diverse but their general characteristics include infection of vertebrates. They replicate in and are spread by insect vectors in the biting midge genus *Culicoides* (Diptera: Ceratopogonidae) (Ryan *et al.*, 1991) (Figure 1). New Zealand is the only place in the world apart from Antarctica where this genus is not present. The vector species *C. brevitarsus* and *C. wadai* would be particularly problematic here, owing to their tolerance of colder environments (Ryan *et al.*, 1991). However, the likelihood is low that the route of introduction would be through windborne dispersal of the vector species *C. brevitarsus* from Australia, owing to its wider distribution, high abundance and documented dispersal capability (Burgin *et al.*, 2013).

The surveillance strategy has three components:

- an early warning system for reporting suspicious cases;
- herd testing; and
- vector surveillance.

## Early warning system

MPI maintains an exotic pest and disease hotline that enables early reporting of suspected new to New Zealand pests and diseases. This can be used to report suspicious cases of diseases in farm animals. Exotic terrestrial animal pest and disease investigations are managed by MPI's Investigation and Diagnostic Centres and Response (IDC&R) Directorate, Wallaceville.

## Herd testing

During 2016 blood was collected from 640 cattle on 32 farms in four districts that are considered to be most favourable for survival and establishment of *Culicoides* spp. These are the areas where cattle would most likely be infected if the vector was present. Blood samples were taken for serological testing after the possible period of virus transmission.

## Vector surveillance

Light traps for vector surveillance have been placed in areas around New Zealand where wind-blown dispersal and subsequent establishment are likely (Figure 2). The traps attract the winged adult midges as they fly during dawn and dusk. They also catch other insects that are of no consequence. Catches are examined under a microscope to confirm absence of *Culicoides* spp.

There were 12 light traps on cattle farms operating this season. The traps contained green light-emitting diodes to maximise trapping efficiency (Bishop *et al.*, 2004, 2006). Vector surveillance was undertaken from February to April inclusive, the period during which conditions are considered most favourable for midge activity. Ideal trapping nights are when the overnight temperature does not fall below 14°C. Traps are not deployed during weeks of the full moon, whose light would compete with the light attractant. The light traps are run on three consecutive nights of each selected week.



Figure 1: Blood-feeding *Culicoides* midges (from Wilson, Darpel & Mellor, 2008)

## Arbovirus - light trapping locations - 2016



Figure 2: Locations of light trapping in New Zealand

## Test results

The aim of herd testing is to detect serological evidence of exposure to bluetongue, epizootic haemorrhagic disease and Akabane viruses. All blood samples sent to the Animal Health Laboratory, Wallaceville, tested negative for antibodies to bluetongue virus and epizootic haemorrhagic disease virus by the agar-gel immunodiffusion test. These samples also tested negative to Akabane virus antibodies by enzyme-linked immunosorbent assay.

Insect samples were processed by the Plant Health and Environment Laboratories of IDC&R in Auckland and Christchurch. In total 442 153 insects were screened (**Figure 2**) but no *Culicoides* spp. were found. There were 4 752 native midges (Ceratopogonidae) trapped, which suggests that the traps ought to catch *Culicoides* spp. if these are present in New Zealand. This year the traps caught significantly more native Ceratopogonidae than in any previous season, which may reflect the warmer-than-average autumn temperatures.

## References

- Bishop AL, Worrall R, Spohr LR, McKenzie HJ, Barchia IM (2004). Response of *Culicoides* spp. (Diptera: Ceratopogonidae) to light-emitting diodes. *Australian Journal of Entomology* 43, 184–188.
- Bishop AL, Bellis GA, McKenzie HJ, Spohr LJ, Worrall RJ, Harris AM, Melville L (2006). Light trapping of biting midges *Culicoides* spp. (Diptera: Ceratopogonidae) with green light-emitting diodes. *Australian Journal of Entomology* 45, 202–205.
- Burgin L, Sanders C, Hartley A, Hort M, Carpenter S (2013). Identification of risk areas in New Zealand for *Culicoides* midges, which are the vector for bluetongue virus of livestock. UK Met Office. Internal Report. Ministry for Primary Industries, 104 pp.
- Ryan TJ, Frampton ER, Motha MXJ (1991). Arbovirus and arbovirus vector surveillance in New Zealand. *Surveillance* 18(5), 24–26.
- Wilson A, Darpel K, Mellor PS (2008) Where Does Bluetongue Virus Sleep in the Winter? *Plos Biology* 6(8): <http://dx.doi.org/10.1371/journal.pbio.0060210> Accessed 15 July 2016.

*Lora Peacock*  
Senior Adviser  
Surveillance Investigation and Incursion  
(Plants & Environment)  
Ministry for Primary Industries  
[Lora.Peacock@mpi.govt.nz](mailto:Lora.Peacock@mpi.govt.nz)

*Rudi Bueno*  
Scientist, Immunology  
Investigation & Diagnostic Centres &  
Response  
Ministry for Primary Industries  
[Rudolfo.Bueno@mpi.govt.nz](mailto:Rudolfo.Bueno@mpi.govt.nz)

*Olwyn Green*  
Senior Technician  
Plant Health & Environment Laboratory  
Investigation & Diagnostic Centres &  
Response  
Ministry for Primary Industries  
[Olwyn.Green@mpi.govt.nz](mailto:Olwyn.Green@mpi.govt.nz)

*Carol Muir*  
Senior Technician  
Plant Health & Environment Laboratory  
Investigation & Diagnostic Centres &  
Response  
Ministry for Primary Industries  
[Carol.Muir@mpi.govt.nz](mailto:Carol.Muir@mpi.govt.nz)

*Sherly George*  
Manager, Team B Entomology  
Plant Health & Environment Laboratory  
Investigation & Diagnostic Centres &  
Response  
Ministry for Primary Industries  
[Sherly.George@mpi.govt.nz](mailto:Sherly.George@mpi.govt.nz)