AnimalHealth AUSTRALIA
Australian Animal Health Council Ltd ACN 071 890 956

NAMP

2010–2011 REPORT

NATIONAL • ARBOVIRUS • MONITORING • PROGRAM

OBJECTIVES OF NAMP

NAMP has three specific objectives:

- **trade support —** to facilitate the export of live sheep, cattle and goats, and ruminant genetic material to countries with concerns about bluetongue, Akabane and BEF viruses by providing scientific information for developing animal health requirements and to meet export certification requirements
- **bluetongue early warning —** to detect incursions into Australia of exotic strains of bluetongue virus (BTV) and *Culicoides* midge species (the vectors of BTV in Australia) by surveillance of the northern BTV endemic area
- **risk management —** to detect changes in the seasonal distribution of endemic bluetongue, Akabane and BEF viruses and their vectors in Australia, in support of livestock exporters and producers.

The National Arbovirus Monitoring Program (NAMP) monitors the distribution of economically important arboviruses (insect-borne viruses) of livestock and their insect vectors in Australia. Important arboviruses include bluetongue, Akabane and bovine ephemeral fever (BEF) viruses. Clinical bluetongue disease has not been observed in commercial livestock flocks and herds in Australia.

Australia's economy benefits from the export of ruminants (for both slaughter and breeding) and their semen and embryos. This trade depends on a shared confidence between Australia and its trading partners that any risks to the animal health status of the importing country can be accurately assessed and properly managed. NAMP was established to provide credible data on the nature and distribution of important arboviral infections in Australia, for use by regulatory agencies in Australia and overseas, and by livestock exporters. The program enables the Australian Government to certify to trading partners that ruminants are sourced from areas free from important arboviruses. In addition, NAMP data assist overseas countries to develop animal health requirements for the importation of Australian livestock and livestock semen and embryos.

NAMP is jointly funded by its primary beneficiaries: the cattle, sheep and goat industries; the livestock export industry; and the state, territory and Australian governments.

OPERATION OF NAMP

NAMP data are gathered throughout Australia by serological monitoring of cattle in sentinel herds, strategic serological surveys of cattle herds and trapping of insect vectors. Blood samples from groups of young cattle that have not previously been exposed to arboviral infection are tested at regular intervals for evidence of new infection with bluetongue, Akabane and BEF viruses. The frequency of blood sampling relates to the probability of arbovirus transmission; that is, the greater the likelihood of virus transmission, the more frequent the sampling. Insect traps to detect *Culicoides* species are positioned near the monitored herds during the period of testing.

The number and locations of herds are selected to enable the distribution of important arboviruses to be determined. Hence, most sentinel sites are located either along the border between the zone where infection is expected and the zone where infection is not expected, or in areas where infection occurs sporadically. In addition, areas expected to be arbovirus free are monitored to verify their freedom, and known infected areas are sampled to assess the seasonal intensity of infection with each arbovirus. The location of monitoring sites in 2010–11 is shown in Figure 1.

To detect incursions of arboviruses from overseas, virus isolation tests (using culture) are routinely done on blood samples from one herd in the Northern Territory and four herds in northern Queensland. Virus isolation and molecular testing are also applied strategically in other herds in the Northern Territory, Queensland, Western Australia and New South Wales after seroconversions are detected. NAMP surveillance data relating to bluetongue early warning are supplemented by targeted surveillance activities conducted by the Northern Australia Quarantine Strategy of the Australian Government Department of Agriculture, Fisheries and Forestry in remote coastal regions of northern Australia, including the Torres Strait.

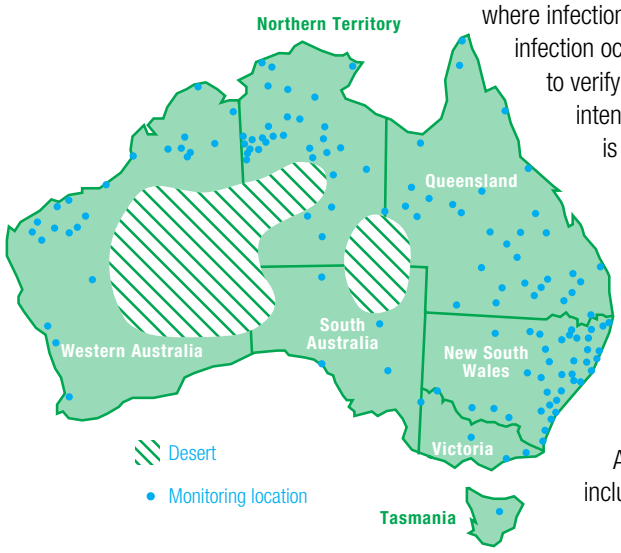

Figure 1 Location of NAMP monitoring sites in Australia, 2010–11

NAMP 2010–11

MONITORING DATA FOR 2010–11

This report describes the limits of vector and virus distribution, and the free areas for bluetongue, Akabane and BEF viruses in the 2010–11 arbovirus transmission season.

VECTOR DISTRIBUTION AND CLIMATE

The distribution of bluetongue, Akabane and BEF viruses across the Australian continent is determined by the distribution of their insect vectors. Complex interactions with geography, climate, host animals and the viruses prevent the vectors from establishing in the southern and inland areas of Australia. Consequently, these areas are continuously free from these arboviruses. In the north, and in some of the eastern and western coastal areas, the distribution of arboviruses fluctuates from year to year, depending on the distribution of their insect vectors. The principal climatic factors influencing vector distribution are rainfall and temperature.

BTV is biologically transmitted by a limited number of species of *Culicoides* midges.[1] The important vector species in Australia feed on cattle and have all arrived in Australia on air currents from neighbouring countries. The biting midge *C. brevitarsis* is the main vector of BTV and Akabane virus in Australia. There is a close relationship between the southern Australian limits of *C. brevitarsis* and the distribution of the two viruses, although the viruses are less widely distributed than their vectors. Other vectors of BTV in Australia, which are less widely distributed, include *C. actoni, C. dumdumi, C. fulvus* and *C. wadai*. The main vector of BEF virus is believed to be the mosquito *Culex annulirostris*. This mosquito is less susceptible to climatic extremes than *C. brevitarsis* and often has a wider distribution.

In Western Australia, during the 2010–11 arbovirus season, rainfall was well-above average for most of the state except the south-west region, where the rainfall was well-below average. *Culicoides* trapping occurred throughout the state. Vector species were found only in the Kimberley region, except for a single specimen of *C. actoni* that was collected in the Pilbara region. This is an extension of the known distribution of *C. actoni*; it was significantly west of all previous NAMP records. The usual western boundary of *C. actoni* distribution is the centre of the Kimberley. DNA analysis showed that this specimen is likely to have come from the Kimberley rather than Indonesia. *C. actoni* was found in larger numbers in the Kimberley than during the previous year and in record numbers for the region at a new east Kimberley site. The other vectors collected were *C. brevitarsis, C. fulvus* and *C. wadai*, which were trapped in similar numbers and distribution to previous years.

In the Northern Territory, there was a very early start to the wet season and well-above average rainfall in the Darwin area, with continuing rain in the Alice Springs region. For the entire wet season, well-above average rainfall — exceeding records in some areas — was received throughout the Northern Territory. The number of *C. brevitarsis* specimens collected and the duration of the seasonal activity of *C. brevitarsis* were both similar to the previous year. This species was found at all the northern sites, including Garrithiya in east Arnhem Land (eastern Northern Territory) in most months. *C. actoni* was restricted to the northern sites where it was collected in lower numbers than usual and not in all months. *C. fulvus* and *C. wadai* were also restricted in distribution, being found only at the northern sites. No exotic species of *Culicoides* were found.

In Queensland, very heavy rainfall occurred over most of the state from August 2010 to February 2011, leading to flooding in some southern and central regions. Extreme cyclonic conditions were experienced in the north near Townsville during this period, followed by a cool and dry winter. The distribution of *C. brevitarsis* was more extensive than in most previous years — it extended well into south-western Queensland, where it is normally rare. The distributions of *C. actoni* and *C. wadai* followed the east coast, as in previous years. *C. dumdumi* was collected at Cooktown, and *C. fulvus* was identified from Weipa and Cooktown. This is the first record of *C. fulvus* in Queensland (specimens previously recorded in Queensland were reclassified as *C. dumdumi* in 2005), and its presence in two geographically separate sites suggests that this species is established in the state. A single female specimen of *C. flavipunctatus*, a species that is exotic to Australia, was detected on Saibai Island in the Torres Strait in November 2010. No further specimens were trapped at this location or on neighbouring islands, suggesting that this is not an established population. *C. oxystoma*, a vector of Akabane virus, was collected for the first time at Cooktown. This species has been established in the Northern Territory for many years and has previously been collected elsewhere on Cape York Peninsula, suggesting it is now established in Queensland.

In New South Wales, during the first six months of the monitoring season, well-above average rainfall — the highest on record in some areas — was recorded across most of the state. During the second quarter of 2011, mean maximum temperatures were below average in southern New South Wales, and the lowest on record in the northern tablelands and central–northern New South Wales. The first frosts were recorded on the tablelands in April and were more widespread from May. Only *C. brevitarsis* and *C. wadai* have ever been found in New South Wales. *C. brevitarsis* extended further south than in recent years, with its southerly limit at Nowra on the coast. As in the previous year, *C. wadai* was not detected in New South Wales.

Victoria experienced its wettest summer since records began, preceded by high rainfall and unseasonably humid conditions during spring. South Australia experienced significant inflows of water from the Queensland channel country. No vectors of BTV were detected in Victoria, South Australia or Tasmania.

[1] AUSVETPLAN Disease strategy: Bluetongue (www.animalhealthaustralia.com.au/programs/emergency-animal-disease-preparedness/ausvetplan/disease-strategies)

BLUETONGUE VIRUS DISTRIBUTION

Clinical bluetongue disease has not been observed in commercial flocks and herds of any susceptible species in Australia. The limits of BTV transmission in Australia are shown on the interactive BTV zone map,[2] which defines areas in which no viral transmission[3] has been detected for the past two years.

Monitoring data showed that BTV continued to be endemic in far northern Australia, including the Kimberley region of Western Australia, where serotypes BTV-20 and BTV-21 were detected. BTV also occurred within its usual limits in the Northern Territory, Queensland and New South Wales (Figure 2).

In the Northern Territory, activity was widespread in the north. BTV was detected at Beatrice Hill in November 2010, at Katherine and Victoria River in October 2010, and in all northern sentinel herds between January and June 2011. Serotypes BTV-1, BTV-2, BTV-7 and BTV-20 were identified by isolation at Beatrice Hill, and BTV-1 was identified by serology (virus neutralisation testing) at all other sentinel sites. BTV-7 seropositives were also detected at two northern sites. The detection of BTV-1 activity in a serosurvey herd in the southern Victoria River district resulted in an extension of the BTV zone.

Most of the Queensland sites showed evidence of BTV transmission in March and April 2011. This included two herds in the south-west (Cunnamulla and Quilpie), which resulted in an expansion of the BTV surveillance zone in the south-west of the state. Only BTV-1 and BTV-21 were detected, by serology and virus isolation, in Queensland, with BTV-21 being more active. BTV-2 was not detected in Queensland from July 2010 to July 2011.

In New South Wales, BTV transmission was recorded from March to June 2011 and was limited to the far north coast at Casino. Only BTV-1 was found in New South Wales.

All regions in southern Australia and most pastoral regions in eastern Australia remain BTV free.

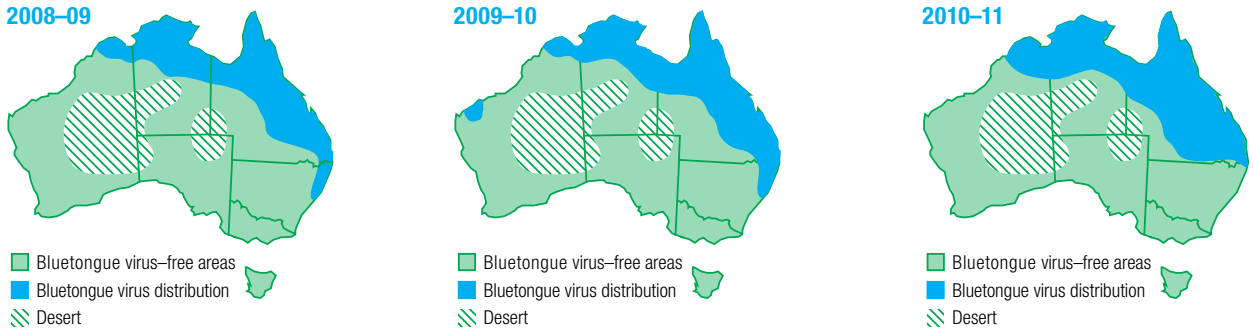

Figure 2 Distribution of bluetongue virus in Australia, 2008–09 to 2010–11

AKABANE VIRUS DISTRIBUTION

Monitoring data continued to show Akabane virus transmission in the Pilbara and Kimberley regions of Western Australia, throughout the north of the Northern Territory and throughout Queensland, where distribution of the virus was similar to that of BTV. The highest prevalence in Queensland was in herds in the central and south-eastern regions.

In New South Wales, Akabane virus was detected over a similar range to 2009–10 — within the known endemic range but with extension west to Collarenebri along the Queensland border. Transmission was detected along the coastal plain as far south as Paterson by April, extending west onto the ranges and into the Hunter Valley.

Akabane virus was not detected in the southern states of South Australia, Victoria or Tasmania (Figure 3).

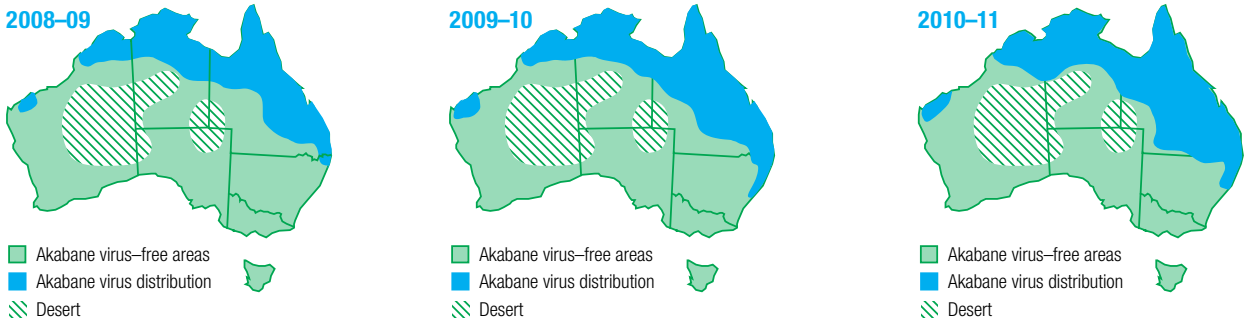

Figure 3 Distribution of Akabane virus in Australia, 2008–09 to 2010–11

[2] www.animalhealthaustralia.com.au/programs/disease-surveillance/national-arbovirus-monitoring-program
[3] Viral transmission is defined as detection or evidence of viral infection based on serological monitoring of sentinel cattle.

BOVINE EPHEMERAL FEVER VIRUS DISTRIBUTION

BEF virus was widespread throughout the Northern Territory and Queensland (as in previous years) and was detected at two sites in Western Australia — in the Kimberley and Pilbara regions. The distribution of BEF virus was very limited in New South Wales; transmission was detected at single sites in both central and northern New South Wales.

During February to April 2011, clinical cases of BEF were reported in central and southern regions of Queensland, on the northern tablelands of New South Wales adjacent to the Queensland border, and on the north coast of New South Wales.

BEF virus was not detected in the southern states of Tasmania, Victoria and South Australia (Figure 4).

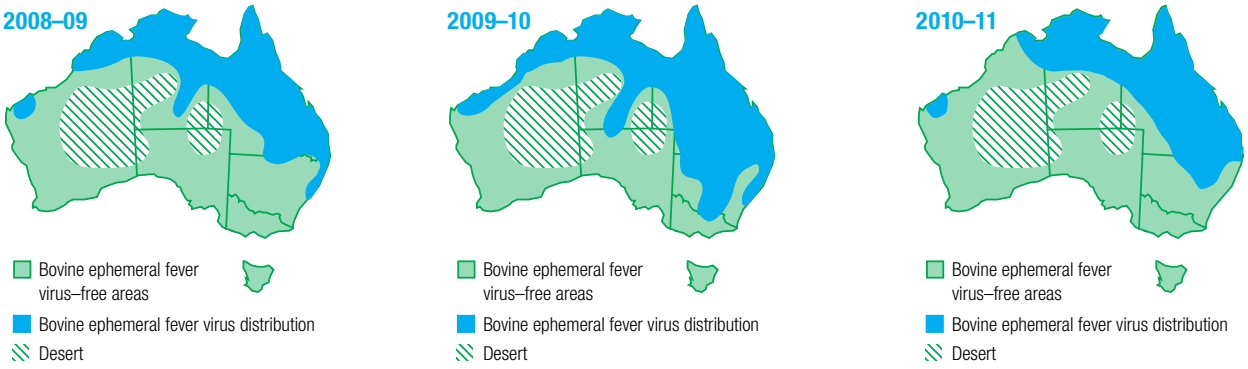

Figure 4 Distribution of bovine ephemeral fever virus in Australia, 2008–09 to 2010–11

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Further information, including the current bluetongue zoning map and previous annual reports, is available on the NAMP page of the Animal Health Australia website:

WWW.ANIMALHEALTHAUSTRALIA.COM.AU/PROGRAMS/ADSP/NAMP/NAMP_HOME.CFM

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