Animal Health Australia
Australian Animal Health Council Ltd ACN 071 890 956

NAMP

2013–2014 REPORT

NATIONAL • ARBOVIRUS • MONITORING • PROGRAM

OBJECTIVES OF NAMP

NAMP has three specific objectives:

- **market access –** to facilitate the export of live cattle, sheep and goats, and ruminant genetic material to countries with concerns about bluetongue, Akabane and bovine ephemeral fever (BEF) viruses
- **bluetongue early warning –** to detect incursions of exotic strains of bluetongue virus (BTV) and vectors (*Culicoides* species – midges) into Australia by surveillance of the northern BTV endemic area
- **risk management –** to detect changes in the seasonal distribution in Australia of endemic bluetongue, Akabane and BEF viruses and their vectors, in support of livestock exporters and producers.

The National Arbovirus Monitoring Program (NAMP) monitors the distribution of economically important arboviruses (insect-borne viruses) of ruminant livestock and associated insect vectors in Australia. Arboviruses monitored by NAMP 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 ruminant livestock and their genetic material (semen and embryos). This trade depends on a shared confidence between Australia and its trading partners that risks to the animal health status of the importing country can be accurately assessed and properly managed. NAMP provides credible data on the nature and distribution of important, specific arboviral infections in Australia for use by the Australian Government and livestock exporters. NAMP enables the Australian Government to certify to trading partners that ruminants are sourced from areas that are free from these specified arboviruses. In addition, NAMP data are available for overseas countries to use when developing animal health requirements for the importation of Australian ruminant livestock and their genetic material.

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. This report covers the 2013–14 financial year.

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 or near herds where conditions are favourable for *Culicoides* survival. This increases the likelihood of detection.

The number and locations of herds are selected to enable the distribution of the specified 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 locations of monitoring sites in 2013–14 are shown in Figure 1.

Beatrice Hill in the Northern Territory is a focus for exotic bluetongue virus (BTV) surveillance – virus isolation is routinely undertaken on blood samples collected at this location. Serotyping, virus isolation and molecular testing are 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 in remote coastal regions of northern Australia, including Torres Strait.

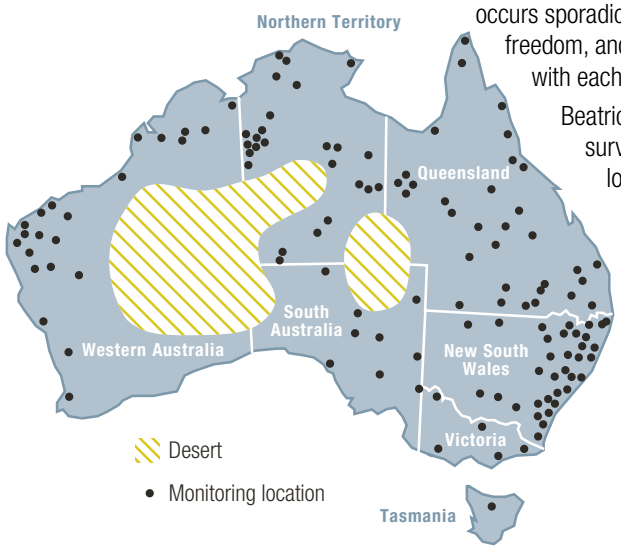

Figure 1 Locations of NAMP monitoring sites in Australia, 2013–14

The NAMP management, partners and coordinators would like to thank everyone who assisted in gathering the valuable surveillance data that underpins this report. This assistance is critical in maintaining and developing market access.

NAMP 2013–14

MONITORING DATA FOR 2013–14

This report describes the limits of vector and virus distribution, and the areas free from bluetongue, Akabane and BEF viruses in the 2013–14 arbovirus transmission season.

VECTOR DISTRIBUTION

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 and vectors prevent the viruses from becoming established 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. The important vector species in Australia feed on cattle, and research indicates that they all originally 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. A close relationship exists between the southern 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.

VECTOR TRAPPING

Vectors in Western Australia were only collected in the Kimberley region. Specimens of *C. brevitarsis* were collected from the central and northern Kimberley throughout the year. Specimens of *C. wadai*, *C. fulvus* and *C. actoni* were occasionally collected, and the distribution of these species was limited to sites north of the Leopold Ranges in the Kimberley.

In the Northern Territory during the first quarter of the sampling year (July–September), specimens of the vectors *C. brevitarsis* and *C. actoni* were collected in low numbers – *C. brevitarsis* at Berrimah, Beatrice Hill, Douglas Daly and Katherine; and *C. actoni* at Beatrice Hill and Berrimah. In the October–December quarter, *C. brevitarsis* specimens were collected at all northern sentinel sites, and *C. actoni* was found only at Beatrice Hill. No collections of *C. fulvus* and *C. wadai* were made during these two periods. During the January–March quarter, *C. actoni* and *C. wadai* were found in low numbers at Beatrice Hill and Douglas Daly, and a single specimen of *C. actoni* was trapped at Victoria River. *C. fulvus* was collected in low numbers at Beatrice Hill.

In Queensland, the distribution of *C. brevitarsis* was extensive across all regions during 2013–14. Collections of *C. brevitarsis* occurred at both coastal sites (Seisia, Cooktown, Normanton, Innisfail, Townsville and Maryborough) and inland sites (Clermont, Dalby, Roma, Moonie, Chinchilla, Allora and Alpha). *C. wadai* was also detected during 2013–14, but only at Innisfail, Townsville and Maryborough. *C. actoni* and *C. oxystoma* – the less common species – were collected at Cooktown in the April–June quarter. *C. fulvus* and *C. dumdumi* were not detected at any site in Queensland during the sampling year. Ongoing drought conditions affected submissions at several sites in central and western Queensland.

In New South Wales, the 2013–14 season commenced in December with *C. brevitarsis* being detected on the far North and North Coast, and North West Slopes (Moree), and a single specimen trapped at the southernmost coastal site of Bodalla. By January, *C. brevitarsis* had spread; high numbers were detected south to Taree on the Mid North Coast, and low numbers were detected south to Berry. Vectors were present at these sites until April 2014. *C. brevitarsis* was detected in the Sydney and Hunter Valley regions from January to April, on the Great Dividing Range at the Northern Tablelands in February and at Armidale in April. Inland, the vector distribution spread to Boomi, Moree, Lightning Ridge, Coonamble and further south to Boggabri (North West Slopes), where *C. brevitarsis* was detected from March to May. *C. brevitarsis* was also detected at Mudgee in April. *C. wadai* was not detected during 2013–14.

No competent vector species were detected in South Australia, Tasmania or Victoria in 2013–14.

VIRAL DISTRIBUTION AND CLIMATE

Bluetongue virus distribution

Clinical bluetongue disease has not been observed in commercial flocks or herds of any susceptible species in Australia. The limits of BTV transmission in Australia are shown on the interactive BTV zone map,[1] which defines areas in which no viral transmission[2] has been detected for the past two years.

Seroconversions occurred in the central and northern areas of the Kimberley in Western Australia. Between July and December 2013, two detections in the surveillance zone resulted in the expansion of the BTV zone in the central and southern Kimberley. Daily maximum and minimum temperatures were above average in July–September 2013. In April–June 2014, a further zone extension occurred in the central and eastern Kimberley down to the Great Sandy Desert. In the north, the wet season began with heavy rainfall in November. Inland Western Australia received significant rainfall in summer, which continued until May for the Kimberley and large areas of the Pilbara. Serotypes BTV-1, BTV-20 and BTV-21 were detected in the Kimberley.

[1] www.animalhealthaustralia.com.au/programs/disease-surveillance/national-arbovirus-monitoring-program

[2] Viral transmission is defined as detection or evidence of viral infection based on serological monitoring of sentinel cattle.

In the Northern Territory, seroconversions were widespread in northern areas. Monitoring showed that serotype BTV-1 was recorded at all sentinel sites during 2013–14, including Victoria River, where seroconversions occurred only during October–December 2013, and again in April 2014. In October–December 2013, rainfall was average over the north and west of the territory, but below average in the south. However, temperatures were above average for the whole of the territory. From October 2013 to June 2014, BTV-1 and BTV-20 were isolated from Beatrice Hill, while BTV-1 was isolated at Berrimah, Douglas Daly and Katherine.

Queensland experienced very dry conditions from September 2013 to June 2014, which led to several temperature and rainfall records being broken during the sampling year. The dry conditions resulted in destocking of animals from properties and/or the sale of properties, which interfered with sample collection in all regions. Sampling showed that seroconversions occurred in the northern and central regions from July to September 2013, which coincided with areas of above-average rainfall north of Townsville, and above-average maximum temperatures and near-normal minimums. Virus activity in the north continued from October 2013 to June 2014 at Cooktown, Seisia, Weipa and Dajarra. In January, a rain depression associated with ex-tropical cyclone Dylan brought locally heavy falls to the interior, but, in May, large areas of inland Queensland had less than one-third of average rainfall. The southern region recorded activity at Chinchilla from January to March, and no seroconversions were detected at sites in the central region in the April–June quarter. BTV-1 occurred in all regions during the year.

BTV seroconversions in New South Wales were first recorded during January 2014 on the North Coast. Seroconversions then progressed down the coastal region to Paterson in February, Scone (Hunter Valley) in March, the Sydney Basin in April, and Nowra and Milton on the South Coast in June and July, respectively. Activity was also detected on the far North Coast from March. Between April and July, seroconversions were detected on the eastern ranges (near Armidale and Yarrowitch), the Northern Tablelands (Inverell and Glen Innes) and North West Slopes (Moree and Warialda). BTV-1 was detected at all sites, except on the far North Coast at Lismore and Casino, where BTV-21 was detected (BTV-1 was also detected at Casino). The limited frost activity on the eastern ranges and coastal plain towards the end of June 2013 preceded the extensive BTV transmission that started in early 2014. Rainfall over the 12-month period from July 2013 was 'below average' to 'lowest on record' across the region where BTV activity was detected. At the end of the 2014 transmission season, frost activity was first recorded in early May 2014 on the Northern Tablelands but was then infrequent until mid-June. Generally, mild temperatures (minimum temperature up to 2–4 °C above average) were recorded along the entire coastal plain until the last week of June 2014.

In South Australia, minimum temperatures were generally around average during 2013–14, and rainfall ranged from average to above average from January to June. Tasmania was generally warm, and summer was relatively dry in most parts of the state. Throughout spring and early summer, Victoria experienced very much below-average rainfall across the north and northwest of the state, with contrasting above-average rainfall in southern areas. Victorian temperatures were above average during most of the sampling year, except in winter. However, no BTV activity was detected in South Australia, Tasmania or Victoria (Figure 2).

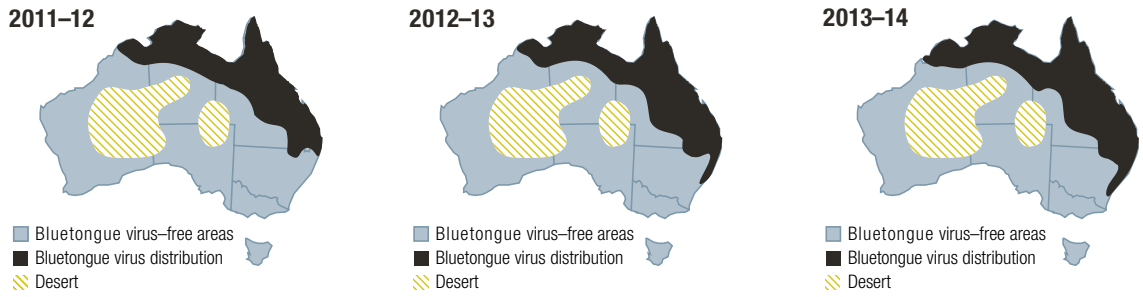

Figure 2 Distribution of bluetongue virus in Australia, 2011–12 to 2013–14

Akabane virus distribution

Evidence of Akabane seroconversions commenced in the July–September 2013 quarter in northern Western Australia, the Northern Territory and Queensland. Since Akabane virus is endemic in the Northern Territory, testing was not conducted. For Queensland, detections occurred as far south as Chinchilla, Allora and Quilpie (southern region).

In New South Wales, Akabane virus activity was detected on the far North Coast from December 2013, extending along the coastal plain south to Bodalla (South Coast) by April 2014. Seroconversions were also detected on the Northern Tablelands, on the North West Slopes and in the Hunter Valley. The incidence of seroconversions was low at all sites. Cases of Akabane virus–affected calves have not been reported. South Australia, Victoria and Tasmania continued to show no evidence of Akabane virus transmission (Figure 3).

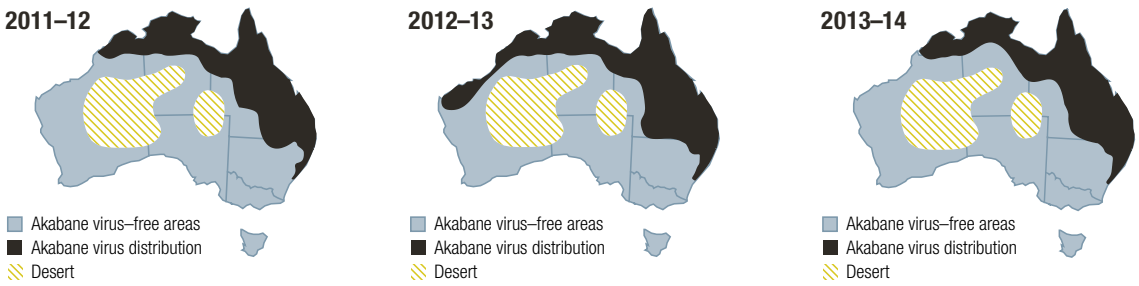

Figure 3 Distribution of Akabane virus in Australia, 2011–12 to 2013–14

Bovine ephemeral fever virus distribution

Monitoring data showed that BEF seroconversions in Western Australia sporadically occurred in the Kimberley, with one report in the Pilbara. In the Northern Territory, BEF seroconversions were widespread during the monitoring year (Beatrice Hill, Berrimah, Douglas Daly, Victoria River, Katherine and Garrithyia) and were often associated with clinical disease. Seroconversions were also widespread throughout the year in the northern, central and southern regions of Queensland.

In New South Wales, BEF virus transmission was limited to the far North Coast in the Casino and Grafton regions during April and May 2014, and near Warialda on the North West Slopes during April 2014. Cases of BEF were confirmed by real-time PCR or seroconversions. The cases of BEF recorded are most likely due to suitable conditions for mosquito breeding after the rainfall recorded across New South Wales during March 2014.

No virus activity was detected in South Australia, Victoria or Tasmania during the year (Figure 4).

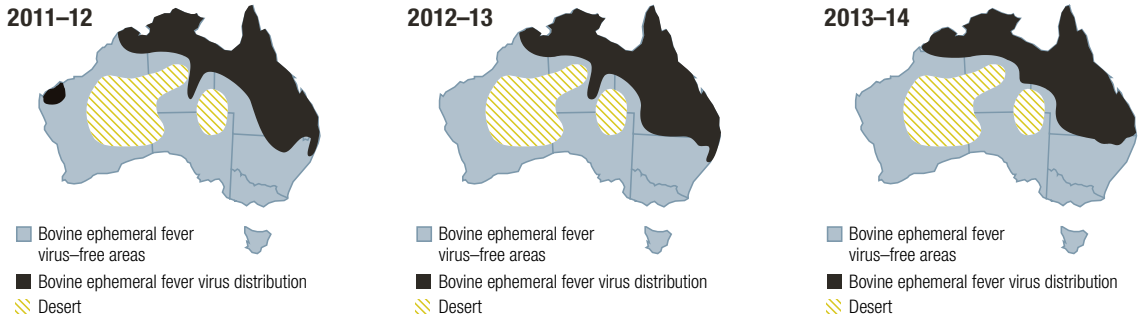

Figure 4 Distribution of bovine ephemeral fever virus in Australia, 2011–12 to 2013–14

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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/disease-surveillance/national-arbovirus-monitoring-program

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