Key facts

• The Met Office’s atmospheric dispersion model NAME has been used as the basis for an early warning system for bluetongue virus since 2007.

• Daily advice is provided to Defra on the likelihood of a wind-borne incursion of midges which act as vectors for bluetongue virus.

• The system was used operationally to identify both the timing and area of spread during the incursion of bluetongue virus into the UK in 2007, helping policy makers to reduce the impact of the disease on the UK livestock industry.

• Results from NAME were integral in the design of the targeted vaccine program in the UK in 2008 that eventually led to the eradication of the virus.

Find out more

The bluetongue service is provided in conjunction with expert advice from the Institute for Animal Health.

If you would like more information about the service please contact the Met Office Customer Centre by using the phone number(s) or email address given below.

Tel: 0870 900 0100 or 01392 885680
Email: enquiries@metoffice.gov.uk

Key customer(s)
Department for Environment, Food and Rural Affairs (Defra)

References


Acknowledgements

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Case study of an outbreak of bluetongue virus in Suffolk, 2007

Bluetongue affects all cloven-hoofed animals and can cause fever, lameness, swelling of the head and tongue, abortion and fatalities. The disease is also economically important due to export restrictions and surveillance measures introduced to limit its spread.

The disease is spread by Culicoides biting midges whose flight activity is strongly influenced by the weather. The wind can also transport Culicoides over hundreds of kilometres in a single night, rapidly spreading disease into new areas.

In 2006 and 2007 widespread outbreaks of bluetongue occurred across mainland Europe costing the economies of the infected countries hundreds of millions of Euros. On 21 September 2007 the first UK outbreak was confirmed at Baylham Farm, Suffolk. By the end of the season 125 holdings were infected but the disease was contained to the south and east of England.

The continent continued to suffer from widespread outbreaks in 2008, but targeted vaccination policies implemented by Defra prevented further outbreaks in the UK.

How NAME was used

In collaboration with the Institute for Animal Health (IAH), Pirbright (www.iah.ac.uk), the Met Office has adapted its atmospheric dispersion model NAME to determine the flight paths taken by Culicoides biting midges, which act as vectors for bluetongue.

Entomological data was collected by IAH using a number of field and laboratory-based experiments designed to understand the flight capability of Culicoides. The results of these experiments then enabled the effects of meteorology and seasonality on Culicoides activity to be included within NAME.

This adapted version of NAME was then used in an early warning system to predict areas of the UK at high risk of midge incursions from the near-continent.

The area around Ostend, Belgium was infected with bluetongue during the summer of 2007. NAME was run from this area, releasing particles representing midges every evening during the risk period and the results were placed on the Met Office website for access by Defra.

An example of the NAME output provided on the website is shown on the right for the overnight period of 4 to 5 August 2007. This incursion episode was later determined to be the likely route of entry of bluetongue to the UK.

How NAME aided the UK government

The bluetongue early warning system helped Defra to contain and eradicate the disease in three main ways:

- In 2007 bluetongue was almost unheard of in the farming community. The system was used to target high risk areas with education campaigns to raise awareness of symptoms and disease control procedures.
- The warning system also provided assistance to Defra following the first outbreak. Results from the system for the overnight period 4 to 5 August 2007 were consistent with other epidemiological evidence and it was therefore concluded that an incursion of wind-borne midges on this date was the most likely source of introduction of virus to the UK. This information enabled an estimate to be made for how far disease had spread and the necessary size of the restriction zone around the outbreak. Additionally, other areas shown by the plume to be exposed to infected midges were targeted by surveillance operations.
- The system also identified which areas should be prioritised by Defra when designing a targeted vaccination programme carried out in 2008.

The modelling carried out by the Met Office was praised by Prime Minister Gordon Brown during a speech in Oxford, 27 February 2009:

“British science is not just helping people across the world – it is protecting jobs and livelihoods in Britain too. For example, when British scientists used meteorological data to predict that midges bearing bluetongue virus would be carried to specific parts of the UK from the continent – they enabled selective vaccination of livestock and saved nearly GBP500 million, together with 10,000 jobs.”