

## Updated Situation Assessment

# Bluetongue virus (BTV-8) in France

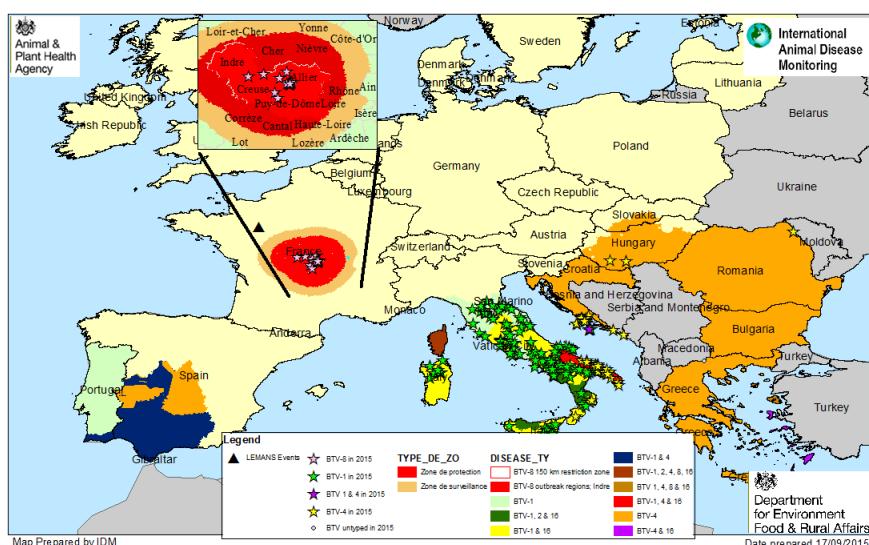
22<sup>nd</sup> September 2015

Ref: VITT/1200 BTV-8 in France

## Disease Report

France has now reported a further ten outbreaks of BTV-8 in Allier, Creuse and Puy de Dome regions, Central France in addition to the eight last week (OIE, 2015; see map). As

a result, the restriction zones have been increased in size (Legifrance, 2015). Of the eighteen outbreaks, sixteen are in cattle or mixed sheep and cattle holdings, the other two are in sheep holdings only. This area of France has a high density of beef cattle and France has the highest population of cattle in the EU (Ame, 2011).



BTV-8 in France, current Restriction Zones\* and other BTV outbreaks for 2015

\* restriction zones are available on the EC website and not necessarily correctly represented here due to GIS issues

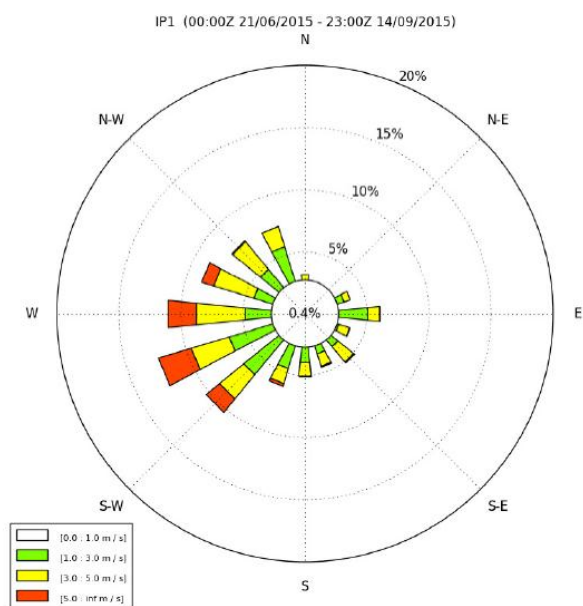
## Epidemiological

investigations continue into the source of virus, but initial sequence analysis of part of the genome suggests it shows high sequence homology to the virus present in the 2006/2008 epizootic in Northern Europe.

## Situation Assessment

The Met Office's dispersion model NAME (Numerical Atmospheric-dispersion Modelling Environment) was run to assess the likelihood that the UK has been exposed to windborne *Culicoides* midges from the site of the initial outbreak in Allier, France from mid-June to mid-September. The model estimated that the probability of windborne spread of midges from Allier to the UK was negligible. Although the model was not designed to estimate the spread of *Culicoides* over land as their behaviour is very different to their dispersal over sea, there is a high probability that there were not suitable conditions during the risk period for windborne spread of midges to the UK. The model was also re-run to cover an area to the north (the triangle on the map) and again, there was negligible risk.

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**Figure: Hourly wind direction and speed at Louroux de Bouble (direction shown is where winds come from). Bars show the percentage of time in each direction and colours indicate the speed. The number in the centre describes the percentage of time where winds were calm (< 1m/s)**

Even considering the new outbreaks and the possible northerly expansion of disease in Central France, the risk to the UK for direct transfer of midges was therefore considered negligible. However, given the uncertainty around the disease distribution this early in the investigations, the assessment could change and will therefore be kept under review. It is understood the midge transmission season in France will last until at least early December, depending on the daily temperatures.

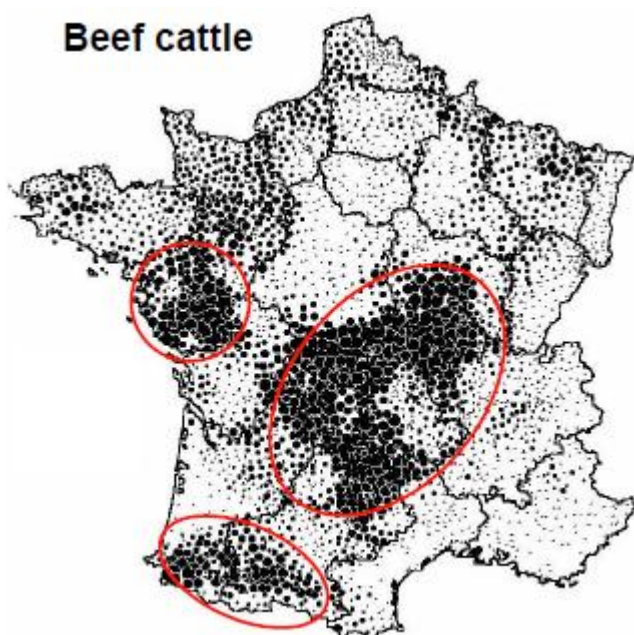
Disease transmission for vector borne disease relates to the basic reproductive rate ( $R_0$ ) which is driven by temperature, the number of infectious vectors, the biting rate and the level of naïve animals present. BTV transmission is optimal at a mean temperature of 20–25°C and decreases at warmer and cooler temperatures. The UK has a lower density of cattle and sheep along the south and east coasts than in France and during the European epizootic had far fewer outbreaks than other EU Member States, which could suggest the  $R_0$  was considerably lower, although vector competence would have been the same. When the  $R_0$  is at unity (i.e. =1), disease reaches enzootic levels; when the  $R_0$  is below unity, the disease will die out and; above unity, disease can spread. Expert opinion suggests the  $R_0$  will be <1 at average daily temperatures of below 15°C (S.Gubbins, Pers Comm), while the Met Office has confirmed the chances of meeting a mean temperature of 20 – 25°C over the next few weeks in Southern England is minimal (L.Burgin, Pers. Comm.). Taken together, this may mean there is a low risk of spread of BTV-8 if an incursion occurs, but there is a moderate level of uncertainty at present.

Another vector borne disease of livestock, Akabane virus, has a re-emergence pattern in Australian cattle of five to ten years and in sheep of around seven years (Charles, 1994). In the traditional Merino industry, castrated wool producing males are replaced every seven to eight years; this is similar to the replacement age for beef cattle. Re-emergence, after a

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period of absence of clinical disease, could occur when meteorological circumstances change, in favour of the vectors and orthobunyaviruses and/or when a large proportion of hosts are (again) susceptible, especially at the edges of an endemic area.

Given the increased restriction zones, TRACES, the EU trade notification system, has been further investigated, looking at consignments since mid June 2015. There have been several direct cattle, sheep and goat consignments from regions which are now under the increased protection and surveillance zones, so livestock owners should be aware of the possible risk and consult with their veterinary surgeon prior to arranging any trade from France until we understand more. Inactivated vaccines for BTV-8 are authorised for use in GB.



From Ame, 2011

The source of disease in France is still not known. There are several theories behind disease re-emergence or introduction:

1. A new introduction through imported animals, germplasm or infected midges. However, according to the French Authorities, there had been no recent imports into the affected farm. Although if this were not the index case, it does not preclude the import elsewhere into France and resulting circulation. It is possible that the clinical signs of BTV-8 have not been as severe as in the previous epizootic and therefore livestock keepers and attending veterinarians have not reported disease (see point below on immune animals).
2. Silent circulation since the epizootic in 2006/2008. During those two years, France reported over 15,500 outbreaks in 2007 and 27,000 outbreaks in 2008. Mandatory vaccination was carried out in 2008 to 2010 resulting in a high proportion of immune animals (estimates at between 50 and 90%; SCoFCAH, 2009) and the final outbreak was in June 2010 therefore France was declared free of BTV-8 in 2012 (SCoFCAH, 2012). The likelihood of continuing circulation given the surveillance required for disease freedom and

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the clinical signs which would be expected in non-immune animals, this is thought to be unlikely.

3. Wildlife would not have been vaccinated and therefore could have acted as reservoirs for disease in the intervening years. In Spain, red deer were tested positive (PCR) for BTV in areas where there were no clinical cases in livestock. However this is not thought to be a major factor in disease transmission, as viral RNA can still be present many days after infection. In North America, bluetongue cycles every one to three years in deer populations in endemic areas and every eight to ten years in epidemic areas, but outbreaks in livestock would be expected given the co-habiting ranges of the animals in Europe (Niedbalski, 2015).

4. Clinical signs not seen in vaccinated animals. The vaccination programme in France was mandatory between 2008 and 2010 and then became voluntary in 2010, but there is no information on how many farmers continued with it. It is therefore possible that animals' herd immunity has significantly waned and they are at risk from exposure. However, given the immune response is understood to last as long as 4.5 years (Expert opinion) , that the majority of animals in this area are beef cattle and are replaced less frequently than dairy animals, there may be animals present which were vaccinated in the original programme. New infection with BTV-8 will therefore act as a "booster" so mild clinical signs could be missed when infection re-emerged or was re-introduced. Natural immunity is believed to be life-long.

5. Transplacental spread. BTV-8 was capable of being transmitted transplacentally. It is not thought likely that animals which were vaccinated were capable of harbouring the virus in lymph nodes and then be transmitted to the foetus to give rise to new outbreaks.

6. The source for the original BTV-8 outbreaks in Northern Europe in 2006 was never discovered. Therefore it is not possible to rule out a similar event occurring in Central France this year given the uncertainty.

7. Vaccine strains have been reported in the EU in the past (BTV-6, BTV-11 and BTV-14) possibly due to illegal use of an attenuated live vaccine. Sequence information should be able to determine whether this has occurred in this event.

## **Conclusion**

This is clearly not a single, isolated outbreak. The risk of introduction from France to the UK could occur through several pathways:

1. Via infected midges. Currently considered negligible, given the outbreak locations.
2. Infected and viraemic animals consigned from an affected area, leading to virus circulation in the UK. There have been animals consigned from the restriction zones in the

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last two months and these will be followed up. Onward spread will depend on the (temperature dependent)  $R_0$  or potential for overwintering.

3. UK is at risk of midge incursion if disease is undetected in Northern France and BTV-8 could spread during what remains of the vector season. However the average daily temperature is estimated to fall below 15°C from now on in Southern England, so this spread would be less likely.

4. Whether disease has truly re-emerged in France and if so, whether that could occur in the UK in a similar manner (ie if  $R_0$  is  $>1$ ), and this needs to be investigated in more depth.

5. If disease continues to spread in France over the coming weeks, the UK may be at risk next transmission season. In 2006, France reported just a handful of outbreaks but the disease caused a major problem in 2007 in cattle and 2008 in sheep, before vaccination was introduced.

6. Vaccine use. There is still some uncertainty around the likely presence and spread of disease in the UK *at this time*, but next transmission season it will be important to be prepared and that means considering vaccine use.

There is still considerable uncertainty around the source of disease and the distribution in France. We will continue to report any further updates.

## **Authors**

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