# Recent outbreaks of viral insect-borne diseases in Europe: where does livestock welfare stand?

By Alice Laurens

## Recent outbreaks

Since 2022, western Europe experienced major insect-borne viral diseases outbreaks in cattle and sheep, such as **bluetongue** and **epizootic haemorrhagic disease**, leading to significant socio-economic consequences and posing major issues in terms of animal welfare and pain management.

With the observed rise in temperature in the last few weeks, new outbreaks are currently ongoing.

*How could the veterinary and farming community get better prepared to fight these viral illnesses once again, whilst ensuring animal welfare remains the utmost priority?*

With **no licensed treatment** currently available on the market and vaccines approved for emergency use only seeming to have a mild effect on clinical signs of bluetongue and epizootic haemorrhagic disease, a more pragmatic approach centred on animal welfare and effective pain management based on published scientific evidence could be the way forwards.

## Climate change and emergence of tropical viral insect-borne diseases in new areas

**Climate change**, as well as **anthropologic factors** such as long-distance travel and commercial trade movements, have been incriminated with the **recent establishment of exotic vector-borne diseases** in new geographical areas, especially the recent emergence of bluetongue (BT) and epizootic haemorrhagic disease (EHD) in cattle and sheep in western Europe countries. EHD and BT are both **non-contagious, viral, insect-borne diseases** transmitted by *Culicoides* biting midges.

The viruses responsible for these seasonal diseases, respectively EHDV (Epizootic Haemorrhagic Disease Virus) for EHD and BTV (Bluetongue Virus) for BT, belong to the same *Sedoreoviridae* family.[1] EHD and BT being vector-borne diseases, their distribution is inherent to the distribution of adult female *Culicoides* midges and has significantly evolved in the last few years, conceivably mainly under the influence of global warming.

Traditionally, the geographical distribution of EHD and BT corresponds to temperate and tropical climates which support arthropod vector populations like *Culicoides,* the latter being more abundant from mid-summer to late autumn.

It is known that **temperature**, as well as the genotype of both the virus and the midge, and potentially other environmental factors including humidity, can i**nfluence vector competence**, which is the **ability of *Culicoides* to transmit the viruses** responsible for EHD and BT.[2,3]

In addition to having an influence on vector competence, temperature also affects other factors such as v**ector survival, extrinsic incubation period** (EIP), which is the time needed for the virus to develop inside the vector, and **intervals between blood meals**. There is evidence that higher temperatures would decrease the EIP, therefore benefitting the transmission of EHDV for longer intervals of time.[2] Climate change has therefore been implicated as a potential cause for the wider geographical distribution of *Culicoides*, making global warming an important factor to consider when trying to understand the establishment of traditionally exotic diseases such as EHD and BT in new geographical areas.

**Wind-borne dispersion** of midges is another environmental factor to take into consideration in the establishment of EHD and BT in new parts of the globe.[1] Midges are quite small compared to other arthropod vectors: their small size enables them to be **rapidly and passively spread over long distances** by prevailing winds. Modelling studies have shown the existence of a positive relationship between wind density and the BTV viral case density.[4]

Another element explaining the broader geographical spread of BT and EHD is the **plasticity** of the viruses responsible for these diseases, showing their ability to **adapt to new environmental niches**. For instance, the EHDV seems to survive and adapt to various environmental conditions; this adaptive evolution is supported by the many genetic variations present among EHDV strains that are likely to derive from mechanisms of gene duplication, mutations and recombination.[1]

## Worrying emergence of bluetongue and epizootic haemorrhagic disease in western Europe since 2022

Global warming, as well as other environmental factors, are therefore conceivably likely to influence factors related to the incubation period of the virus, the distribution of *Culicoides* and its ability to transmit both EHDV and BTV, partially explaining the significant epidemiological changes for both EHD and BT in the last decade.

Respectively initially located in North America, Asia, Africa and Oceania in the case of EHD, and in Africa, Middle East and Asia for BT, these diseases have now expanded to western European countries, posing a serious threat to animals and farming communities. In the last 18 months, **western Europe** witnessed **major outbreaks** of EHD in cattle and BT in sheep and cattle. Whilst not posing any threat to human health, both diseases are listed as **significant diseases** by the World Organisation for Animal Health (WOAH), and, in most countries, it is mandatory to promptly report cases to the authorities, to ensure national surveillance.

Since November 2022, EHD is worryingly spreading in Europe (EHDV-8 serotype).[5,6] It first started in Italy and then Spain with respectively three and two outbreaks of EHD reported in November 2022. Portugal and south of France respectively had their first EHD outbreaks in July 2023 and in September 2023.[5,6] France is the most affected country, with a spike in new cases since June 2024 (518 new outbreaks between June 1st and September 5th 2024).[6,6bis] New outbreaks are also still ongoing in Spain (20 new outbreaks in August 2024) and Portugal (last outbreak reported on August 13th 2024) with new declared cases of EHD since June 2024.[6]

Meanwhile, an outbreak of BT in sheep ignited in Netherlands[7] in September 2023 (BTV-3 serotype), followed by other outbreaks in Germany[8] (BTV-3 serotype) from October 2023, in the United Kingdom (BTV-3 serotype), as well as a major outbreak in France since September 2023 with a new strain of the BTV-8 serotype. Italy also recorded a significant number of BT outbreaks from multiple strains since September 2023 (over 270 outbreaks as of September 2023).[9,10]

In the last few weeks, alongside a rise in temperatures, the epidemiological situation dramatically changed especially in the Netherlands, France, Germany and Italy.

Since June 2024, the Netherlands have experienced a rise in new cases, with outbreaks still ongoing and reaching a total number of 5 872 confirmed cases through RT-PCR (BTV-3 serotype) for 2024 as of September 12th 2024[7], despite vaccination efforts.

At the end of July, a worrying increase in new BTV-3 serotype cases also re-ignited in the north of France. As of September 5th, France reported 712 outbreaks of BTV-3 serotype cases since early June.[6] Since early August, France has rolled out a free vaccination plan (BTV-3 serotype) and set up a monitored regulated zone in the north and the east of France. Since then, new cases of BT (BTV-3 serotype) have emerged in Belgium, close to the French border, with a total of 2 316 outbreaks since June 2024.[6]

Since July 2024[8], Germany has also experienced a significant spike in new cases (mainly BTV-3 serotype): there were 7 841 outbreaks declared on the national surveillance platform as of September 5th 2024[6], with at least 3 500 confirmed outbreaks of the BTV-3 serotype, despite vaccination efforts.

Italy has also seen a rise in cases since June 2024 (595 confirmed outbreaks), mainly due to the BTV-8 serotype.

Other European countries reported a few outbreaks over the summer, including Spain (BTV-8 serotype), the UK (BTV-3 serotype), Switzerland (BTV-3 serotype) and Denmark (BTV-3 serotype). BT is now also spreading to other countries: Norway and the Czech Republic have declared their first cases (serotypes currently in the process of being identified) respectively at the end of August and early September 2024.[6]

## Similarities in clinical outcomes calls for joined welfare and productivity considerations

Both diseases present **similarities in their clinical picture**, particularly the presence of oral lesions, drastically affecting cattle and sheep **well-being and productivity**.[11,12]

EHD clinical outcomes in cattle may vary depending on the form of the disease.

The **sub-acute form** presents ulcers in the oral cavity and the gastro-intestinal tract, as well as swelling of the tongue, salivation, and lameness, often causing pain and reduced milk production.

In its **acute form**, the haemorrhagic disease is characterized by vascular damage and coagulopathy, leading to multifocal haemorrhages.

Bluetongue affects domestic and wild ruminants (sheep, cattle, and goats)[11], although sheep are more affected by clinical signs. In highly susceptible sheep, morbidity can be as high as 100%. Mortality averages are 2–30% but can be as high as 70%.[11] Clinicals signs of blue tongue in sheep include mouth and nose ulcerations, ocular or nasal discharge, swelling of lips, tongue, head, and neck. Cattle can be affected too, with a decrease in productivity.

**Oral lesions** often encountered in both EHD and BT can be extremely painful for affected animals, taking several weeks to heal and preventing them from eating and drinking, **deeply affecting their welfare** whilst rapidly leading to anorexia and loss of condition (cf Photo 1).

*Photo 1 – Severe extensive tongue and nasal ulcerations in a calf affected by Epizootic Haemorrhagic Disease (photo credit: George Stilwell)*

These debilitating and painful diseases have **significant economic consequences**, due to long recovery times and their inevitable negative impact both on animal welfare and livestock productivity (decreased milk production, damaged wool, reproductive losses), as well as significant **psychological impact** on the farming community.

## Treatment

In terms of treatment, there is currently **no licensed drug** to treat both conditions, as there is no medicine available against both viruses responsible for EHD and BT.

However, it is often possible to influence the consequences of these viral infections: treatment of both EHD and BT is often aimed at **pain relief** and **inflammation inhibition**, as well as **preventing secondary bacterial infections**.

Therefore, the current approach for both diseases consists of implementing **a supportive and symptomatic treatment**, often involving the use of **antimicrobials**, to prevent the risk of wound secondary infection, and of **non-steroidal anti-inflammatory drugs (NSAIDs)** for their pain relief and anti-inflammatory properties.

**Local pain relief** can be provided for oral lesions, in order to facilitate food intake.

For instance, some sheep farmers reportedly use white willow bark as a natural local pain relief for oral lesions, as it contains salicin, a chemical component similar to acetylsalicylic acid known for its anti-inflammatory and pain relief properties. **Corticosteroids** can also be used to manage acute inflammation and oedema of nose and mouth if needed. **Fluid administration**, whether by drenching the affected animals or via infusion, is recommended to prevent dehydration if the animals are not drinking. Other possible concurring diseases, if any, need to be adequately treated as well to improve chances of recovery.

**Vaccination is not always an option.** There is currently **no licensed EHD vaccine** in Europe. France solely approved a vaccine against EHD (Hepizovac, Ceva) for **emergency use** on August 6th 2024.[6bis]
In relation to **BT**, there is **no licensed vaccine** either. To control the virus spread, **three currently unlicensed vaccines** against the BTV-3 virus strain (Bultavo 3, Boehringer Ingelheim; Bultavo 3, Boehringer Ingelheim; Syvazul BTV3, Syva) have been **approved for emergency use**[13,14] in **the Netherlands, Germany, Belgium**, and more recently in **the UK**. In France[15], emergency approval procedures at the end of July 2024 also enabled the rollout of vaccination plans with two vaccines (Bultavo 3, Boehringer Ingelheim; Bultavo 3, Boehringer Ingelheim) against the BTV-3 serotype.
These vaccines are s**uppressive, not preventative**, meaning that they will not prevent animals from being infected or infectious, although the expression of clinical signs might be reduced.[14]
All **movement controls** and **trade restrictions** are therefore still **applying to vaccinated animals**.

Also, it is worth noting that existing BT vaccine serotypes other than BTV-3 do not confer cross protection making it difficult to control the outbreak spreading into immunologically naïve susceptible species.[16]

**Prevention and control measures** include active surveillance programs of both insect vectors activity and potentially affected animals. **Quarantine** and/or **movement restrictions** are often applied too, to reduce the opportunity for vector transmission. If a case is confirmed and the spread restricted locally, animals may be culled to prevent the disease from spreading. In Europe, the management of BT is regulated and is subject to optional eradication programmes.

As we are now facing multiple new outbreaks of EHD and BT cases in Europe, due to a sharp increase in *Culicoides* activity and virus spread, and despite vaccination efforts, vets and farmers should carry on fighting these diseases once again, to mitigate the risks associated with them, while **making pain management a priority**.

## Literatur


(1) Jiménez-Cabello L, Utrilla-Trigo S, Lorenzo G, Ortego J, Calvo-Pinilla E. Epizootic Hemorrhagic Disease Virus: Current Knowledge and Emerging Perspectives. Microorganisms. 2023 May 19;11(5):1339. doi: 10.3390/microorganisms11051339. PMID: 37317313; PMCID: PMC10224379.

(2) Wittmann, E.J., Mellor, P.S. and Baylis, M. (2002), Effect of temperature on the transmission of orbiviruses by the biting midge, Culicoides sonorensis. Medical and Veterinary Entomology, 16: 147-156. https://doi.org/10.1046/j.1365-2915.2002.00357.x

(3) Maclachlan NJ, Guthrie AJ. Re-emergence of bluetongue, African horse sickness, and other orbivirus diseases. Vet Res. 2010 Nov-Dec;41(6):35. doi: 10.1051/vetres/2010007. Epub 2010 Jan 27. PMID: 20167199; PMCID: PMC2826768.

(4) Hendrickx, G.; Gilbert, M.; Staubach, C.; Elbers, A.; Mintiens, K.; Gerbier, G.; Ducheyne, E. A Wind Density Model to Quantify the Airborne Spread of Culicoides Species during North-Western Europe Bluetongue Epidemic, 2006. Prev. Vet. Med. 2008, 87, 162–181

(5) Department for Environment, Food and Rural Affairs Updated Outbreak Assessment #2 Epizootic Haemorrhagic Disease in Europe. 6 September 2023. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1184320/EHDv_Europe_30_Aug_23.pdf

(6) Bulletin hebdomadaire de veille sanitaire internationale du 10/09/2024. Accessed September 13th 2024. https://www.plateforme-esa.fr/fr/bulletin-hebdomadaire-de-veille-sanitaire-internationale-du-10-09-2024

(6bis) Maladie hémorragique épizootique (MHE): point de situation sur une maladie émergente. Accessed September 13th 2024. https://agriculture.gouv.fr/mhe-la-maladie-hemorragique-epizootique

(7) Netherlands BTV outbreak. Accessed September 13th 2024: https://www.nvwa.nl/onderwerpen/dierziekten/documenten/dier/dierziekten/overige-dierziekten/publicaties/index

(8) Germany BTV outbreak. Bluetongue Disease (BT) - Friedrich Loeffler Institut https://www.fli.de/en/news/animal-disease-situation/bluetongue-disease/ Accessed August 22nd 2024.

(9) Department for Environment, Food and Rural Affairs 1 Updated Outbreak Assessment #6 Bluetongue Virus Europe. October 2023. https://assets.publishing.service.gov.uk/media/651edccd7309a1000db0a965/BTV_Europe_Updated_Outbreak_Assessment.pdf

(10) Research and analysis. 29 November 2023: updated outbreak assessment for Bluetongue virus in Europe. Updated 8 December 2023.https://www.gov.uk/government/publications/bluetongue-virus-in-europe/29-november-2023-updated-outbreak-assessment-for-bluetongue-virus-in-europe

(11) Bluetongue. World Organisation for Animal Health. https://www.woah.org/en/disease/bluetongue/

(12) Bluetongue virus. Ruminant Health and Welfare. Updated 19.02.2024.https://ruminanthw.org.uk/bluetongue-virus/

(13) Updated Outbreak Assessment #11 Bluetongue Virus in Europe. https://assets.publishing.service.gov.uk/media/66e151e0865c0eef0bc42dfd/Updated_Outbreak_Assessment__11_Bluetongue_Virus_in_Europe.pdf

(14) Bluetongue serotype 3 (BTV-3) vaccine permits. https://www.gov.uk/government/collections/bluetongue-serotype-3-btv-3-vaccine-permits

(15) Fièvre catarrhale ovine : déploiement d'une campagne de vaccination volontaire ciblée contre le sérotype 3 dans le Nord de la France. https://agriculture.gouv.fr/fievre-catarrhale-ovine-deploiement-dune-campagne-de-vaccination-volontaire-ciblee-contre-le

(16) Cappai, S., Rolesu, S., Loi, F., Liciardi, M., Leone, A., Marcacci, M., Teodori, L., Mangone, I., Sghaier, S., Portanti, O. and Savini, G., 2019. Western Bluetongue virus serotype 3 in Sardinia, diagnosis and characterization. Transboundary and emerging diseases, 66(3), pp.1426-1431.