

SURVEILLANCE OF INFECTIOUS DISEASES

IN ANIMALS AND HUMANS IN SWEDEN 2022

*Chapter excerpt:
Bluetongue*



Editor: Karl Ståhl

Department of Epidemiology and Disease Control
National Veterinary Institute (SVA), SE-751 89 Uppsala, Sweden

Authors: Emmi Andersson, Märit Andersson, Charlotte Axén, Anna Bonnevie, Ioana Bujila, Erika Chenais, Mariann Dahlquist, Leigh Davidsson, Rikard Dryselius, Helena Eriksson, Linda Ernholm, Charlotta Fasth, Malin Grant, Gittan Gröndahl, Gunilla Hallgren, Anette Hansen, Marika Hjertqvist, Mia Holmberg, Cecilia Hultén, Hampus Hällbom, Helena Höök, Karoline Jakobsson, Désirée Jansson, Tomas Jinnerot, Jonas Johansson Wensman, Jerker Jonsson, Oskar Karlsson Lindsjö, Sara Kjellsdotter, Ulrika König, Elina Lahti, Emelie Larsdotter, Neus Latorre-Margalef, Mats Lindblad, Anna Lundén, Anna Nilsson, Oskar Nilsson, Maria Nöremark, Anna Omazic, Anna Ordell, Ylva Persson, Emelie Pettersson, Ivana Rodriguez Ewerlöf, Thomas Rosendal, Marie Sjölund, Karl Ståhl, Lena Sundqvist, Robert Söderlund, Magnus Thelander, Karin Troell, Henrik Uhlhorn, Anders Wallensten, Stefan Widgren, Camilla Wikström, Ulrika Windahl, Beth Young, Nabil Yousef, Siamak Zohari, Erik Ågren, Estelle Ågren

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Reporting guidelines: Reporting guidelines were introduced in 2018 for those chapters related to purely animal pathogens. The guidelines build on experiences from several EU projects, and have been validated by a team of international experts in animal health surveillance. The aim is to develop these guidelines further in collaboration within the global surveillance community and they have therefore been made available in the form of a wiki on the collaborative platform GitHub (<https://github.com/SVA-SE/AHSURED/wiki>). Feel free to contribute!

Layout: The production of this report continues to be accomplished using a primarily open-source toolset. The method allows the source text to be edited independently of the template for the layout which can be modified and reused for future reports. Specifically, the chapter texts, tables and captions are authored in Microsoft Word and then converted to the LaTeX typesetting language using a custom package written in the R software for statistical computing. The package uses the pandoc document conversion software with a filter written in the lua language. Most figures and maps are produced using R and the LaTeX library pgfplots. Development for 2022 has focused on generalising the R package to accommodate conversion into formats other than LaTeX and PDF, with a focus on markdown files which can be published as HTML websites using the Quarto publishing system. The report generation R package and process was designed by Thomas Rosendal, Wiktor Gustafsson and Stefan Widgren.

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Bluetongue

BACKGROUND

Bluetongue is a vector-borne disease of ruminants and camelids caused by any of 27 serotypes of bluetongue virus (BTV). The virus is transmitted by haematophagous midges (*Culicoides* spp.).

Until 1998, bluetongue had not been detected in any European country, but since then, outbreaks of several different serotypes have frequently been detected in the Mediterranean countries. In August 2006, BTV-8 appeared in the Netherlands. During 2006 and 2007 this outbreak spread to a large number of countries in Northern and Western Europe. In 2008, further cases were reported, and vaccination campaigns were launched in most of EU as soon as inactivated vaccines became available. In September 2008, the first case of BTV-8 infection in Sweden was confirmed and a vaccination campaign and intensive surveillance activities were initiated nationally. In the first quarter of 2009 transplacental infection was detected in three newborn calves, all three cases originating from infections of their dams in autumn 2008. In December 2010, after extensive surveillance, Sweden was declared free from BTV-8. After that, surveillance has been carried out annually. Vector surveillance was initiated in 2007 to document the activity of relevant *Culicoides* spp. throughout the different seasons of the year. The programme was discontinued in 2011 after Sweden was declared free from BTV-8.

DISEASE

BTV infection causes clinical disease in ruminants, mainly in sheep. The different serotypes appear to vary in their ability to cause clinical signs in different animal species and in the severity of clinical signs in the same species. The signs may include fever, lesions in the mucous membranes of the mouth and nostrils, inflammation of the coronary band, swollen head and oedema in various body tissues.

LEGISLATION

Bluetongue is a listed disease (category C, D and E) in the Animal Health Law (EU) 2016/429. The surveillance, eradication programmes, and disease-free status for certain listed and emerging diseases are governed by Commission Delegated Regulation (EU) 2020/689. Since 2010, Sweden has the status of disease-free. Bluetongue is a notifiable disease and is included in the Swedish Act of Epizootic diseases (SFS 1999:657 with amendments).

SURVEILLANCE

All diagnostic testing, as outlined below, was performed at the National Veterinary Institute (SVA) with the purpose of demonstrating sustained freedom from BTV in Swedish cattle. Bulk milk samples were analysed with an indirect ELISA (ID Screen Bluetongue Milk Indirect, Innovative Diagnostics, Grabels, France)

Bluetongue virus infection cycle

Uninfected adult midge bites host animal which has virus circulating in the blood.

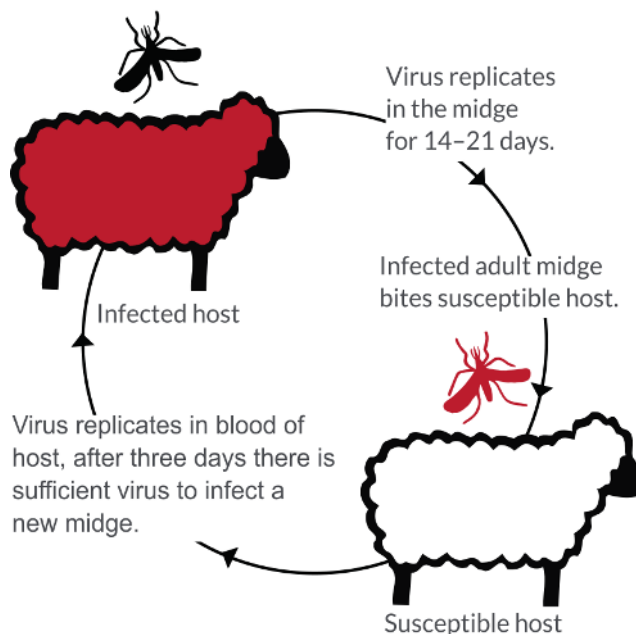


Figure 8: Transmission of Bluetongue virus involves insect vectors (midges) and a ruminant host. Virus replication in the midge is highly dependent on the surrounding temperature and is thought not to happen at all below 14°C. Infographic by Erika Chenais.

and serum samples were analysed with a competitive ELISA (ID Screen Bluetongue Competition ELISA, Innovative Diagnostics, Grabels, France). For clinical suspicions, organs or blood were analysed with real-time pan-PCR detecting 27 serotypes.

A positive case is defined as an animal giving rise to a positive PCR product, or an unvaccinated animal without remaining maternal antibodies giving a significant antibody titre.

Passive surveillance

Suspicious based on clinical signs must be reported to the Swedish Board of Agriculture and will be subsequently investigated. The investigation includes sampling of affected animals and examination of the herd. During the investigation, the farm is placed under restrictions.

Active surveillance

In the 2022 bluetongue surveillance, 190 dairy holdings from a risk-based sampling area, comprising the nine southernmost counties of Sweden, were randomly selected for bulk milk testing. Based on the total size of the dairy cow population in the selected area, the average herd size and the test specifics, bulk milk samples from 172 holdings should be tested to detect 2% prevalence with 95% confidence.

Samples were collected at the selected holdings by personnel from the milk collection service. The sampling took place after the vector season in December 2022. Samples were analysed with the milk ELISA routinely used.

In addition to the field testing, serological testing for bluetongue was performed prior to import and export and at breeding centres.

RESULTS

Bulk milk samples from 182 holdings were tested in the field surveillance, all with negative results. Four clinically suspect cases were investigated and tested during 2022 and found negative. All other testing performed prior to import and export was also negative.

DISCUSSION

In summary, no clinical suspicions of bluetongue were confirmed, nor was there any indication of viral circulation during 2022, confirming the continued sustained freedom from BTV in Sweden.

Competent vectors are present in Sweden and may spread the infection. Reintroduction of the virus to Sweden may occur by infected animals, infected vectors or other yet unidentified means.

At present, there are no indications of BTV circulation in direct neighbouring countries. However, in 2015, BTV-8, of the Northern European strain from 2007 re-emerged in France. Recent research suggests the reappearance may have resulted from accidental release of virus originating from material, e.g., bull semen, that had been kept frozen since the time of the original outbreak. Between 2015 and 2020 several thousand cases (defined as animal found positive for BTV with real-time PCR) were reported by France every year. Most of these cases were animals found positive within active surveillance activities; few were animals with clinical signs of disease. From December 2018 an increase in transplacental transmission of BTV-8 in cattle in France was reported. Such calves were born blind, small, and dying at a few days of age. During the vector season of 2018 and 2019 Germany, Switzerland, and Belgium, and in 2020 also Luxembourg, each reported some cases of BTV-8 (using the same definition) found during routine surveillance and tests for export/import. The United Kingdom reported single cases of BTV-8 in cattle imported from France in 2018.

In 2021 only a handful of cases of BTV-8 were reported from France, three from Belgium and one from Germany, and in 2022 no such cases were reported. During 2022, as in all previous years, several BTV serotypes were circulating in sheep and cattle in the Mediterranean countries.

The detection of BTV-8 in France in 2015 after several years of silence, the numerous cases detected in France since then, as well as limited number of cases in Belgium, Germany, Luxembourg, and Switzerland in 2020, again demonstrate that BTV may spread and become established in livestock populations in northern Europe. Moreover, as the prevalence of seropositive animals due to vaccination are getting very low, the population is again becoming susceptible to BTV-8. Therefore, new introductions of this serotype, or any remaining foci in previously infected countries, could pose a threat. Likewise, new serotypes could emerge in the Mediterranean region or start circulating worldwide, underlining how the situation can rapidly change.

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