

Schmallenberg virus

Updated: June 2013

Introduction

Schmallenberg virus (SBV) is a livestock disease that was first identified in Germany in November 2011, from samples collected that summer/autumn.¹ The first cases were confirmed in the south and east of England in January 2012.

Symptoms were initially observed in cattle, with adults showing brief signs of moderate disease. However, months after these initial symptoms, farms across Europe reported observing severe pathology in newborn sheep, goats, and cows, including abortions, stillbirths and malformations.

Due to its close relation to other arthropod-borne viruses,² it is strongly suspected that the major transmission route of the disease is through blood-sucking insects. *Culicoides* biting midges of the Obsoletus Group have been identified as harbouring the virus. This group is found throughout Northern Europe, including the UK.³

¹ OIE, *Technical Factsheet: Schmallenberg Virus*, May 2012 [accessed 30 May 2013]

² A group of viruses that have an intermediate insect host. The virus is usually passed on to animals in the insect's saliva.

³ DEFRA, *Update No.6 on Schmallenberg Virus in Northern Europe*, 11 March 2012 [accessed 30 May 2013]

Geographical distribution

SBV has been recorded in most countries in Europe⁴ including across all of the UK and the Republic of Ireland. The disease has been identified in animals on more than 6,000 holdings,⁵ with cattle holdings more affected than those with sheep.

As of 31st March 2013, there were 1753 farms in the UK reporting SBV:⁶ 1257 in cattle, 492 in sheep. The first confirmation of SBV occurred in **Wales on 24th September 2012**, affecting three cattle and one calf on a farm in **Ceredigion**.⁷ SBV is now found in all counties of England and Wales.⁸

SBV has been detected in several species including cattle, sheep, goats, horses, alpacas, wild deer and bison.⁹ SBV specific antibodies have also been detected in wild boar,¹⁰ fallow deer, roe deer, red deer and mouflons.¹¹

⁴ EFSA, *'Schmallenberg' virus: analysis of the epidemiological data*, May 2013, [accessed 31 May 2013]

⁵ Flu Trackers, *Schmallenberg virus – Map and Chart*, 28 September 2012 [accessed 30 May 2013]

⁶ DEFRA - AHVLA, *Schmallenberg virus – updated testing results*, 24 April 2013 [accessed 30 May 2013]

⁷ Welsh Government, *Schmallenberg virus*, 26 September 2012 [accessed 30 May 2013]

⁸ DEFRA - AHVLA, *Schmallenberg virus – updated testing results*, 24 April 2013 [accessed 30 May 2013]

⁹ EFSA, *'Schmallenberg' virus: analysis of the epidemiological data*, May 2013, [accessed 31 May 2013]

¹⁰ EFSA, *Intermediate technical report of the EU scientific studies on Schmallenberg virus*, April 2013 [accessed 31 May 2013]

¹¹ EFSA, *'Schmallenberg' virus: analysis of the epidemiological data*, May 2013, [accessed 31 May 2013]

Symptoms and pathology

SBV is not a notifiable¹² disease in the UK, but farmers are asked to contact their veterinary surgeon, who will contact their local Animal Health Office if they suspect the virus.¹³

The majority of farmers did not report observing any clinical signs in adult sheep and goats, although a few recounted anecdotal sightings of symptoms.¹⁴ In adult cattle, an acute infection may result in a variety of indicators including one or more of the following symptoms:

- Diarrhoea;
- Fever;
- Decreased appetite;
- Reduced milk yield; and
- General malaise.¹⁵

Adult animals usually show a full and rapid recovery over several days.

In late November 2011, the first cases of congenital malformation in dead and alive newborn lambs were reported in the Netherlands.¹⁶ Since then, congenital malformations have also been reported in newborn lambs, kids and calves in Belgium, France, Germany, Italy, Luxembourg, Spain, The Netherlands and the United Kingdom.¹⁷ Malformations observed to date include:

- Bent limbs and fixed joints;
- Twisted neck and/or spine;
- Domed appearance to the skull;
- Short lower jaw; and
- Brain and spinal damage.

The exact rate of malformation is not currently known and varies depending on the stage of gestation at the time of infection.¹⁸

A Europe-wide risk assessment has concluded that SBV is unlikely to cause illness in people; as yet, no human cases have been reported and the most closely related viruses only cause animal disease.¹⁹ However, farmers and veterinary surgeons are recommended to take sensible hygiene precautions when working with infected livestock and aborted material.²⁰

¹² A notifiable disease is named in section 88 of the *Animal Health Act 1981* or an Order made under the Act. Anyone suspecting signs of any notifiable disease must immediately notify the local AHVLA office.

¹³ DEFRA, *Schmallenberg virus*, 26 July 2012 [accessed 30 May 2013]

¹⁴ European Food Standards Authority (2012) "*Schmallenberg virus: Analysis of the epidemiological data and Impact assessment*", EFSA Journal, 10 (6) [accessed 30 May 2013]

¹⁵ United States Department of Agriculture *Schmallenberg Virus: Case definition and guidance*, 22 March 2012 [accessed 30 May 2013]

¹⁶ Van den Brom, R. et al., (2012) *Epizootic of ovine congenital malformations associated with Schmallenberg virus infection*, Tijdschr Diergeneeskd, 137 (2), 106-111 [accessed 30 May 2013]

¹⁷ OIE, *Schmallenberg virus: OIE technical factsheet on SBV*, May 2012 [accessed 30 May 2013]

¹⁸ World Organisation for Animal Health *OIE Technical Factsheet - Schmallenberg virus*, May 2012 [accessed 30 May 2013]

¹⁹ European Centre for Disease Prevention and Control, *New Orthobunyavirus isolated from infected cattle and small livestock-potential implications for human health*, May 2012 [accessed 30 May 2013]

²⁰ Veterinary Laboratories Agency, *Schmallenberg virus*, 5 March 2012 [accessed 03 June 2013]

Transmission

SBV belongs to a group of viruses known as orthobunyaviruses, found mainly in Asia, Africa, and Australia; they are usually transmitted by mosquitoes and/or *Culicoides* biting midges. Consequently, it is expected that SBV is transmitted by similar types of blood-feeding insects.

Recent studies²¹ have confirmed the presence of SBV DNA in *Culicoides* biting midges. Currently, three species of the Obsoletus Group have been implicated in the transmission of SBV.²² However, it is not yet certain whether these are the only, or even major carriers of the disease. Studies are also being undertaken to determine whether mosquitoes also play a role in SBV transmission.²³

Currently, there is no evidence of any other route of transmission other than transplacental-transmission²⁴ or through biting insects.²⁵

²¹ Rasmussen, L.D. et al., (2012) *Culicoides as Vectors of Schmallenberg Virus*, Emerging Infectious Diseases, 18 (7), 1204-1206 [accessed 03 July 2012]

²² Regge et al., (2012) *Detection of Schmallenberg virus in different Culicoides spp. by real-time RT-PCR*, Transboundary and Emerging Diseases, 59(6), 471-475 [accessed 30 May 2013]

²³ BBSRC: Pirbright Institute, *IAH Welcomes NFU to discuss Schmallenberg virus*, 21 March 2012 [accessed 03 June 2013]

²⁴ The passing of the virus through the placenta, causing transmission from mother to foetus.

²⁵ European Food Standards Authority (2012) "*Schmallenberg virus: Analysis of the epidemiological data and Impact assessment*", EFSA Journal, 10 (6) [accessed 30 May 2013]

Impact

Evidence has been gathered showing that SBV has had a relatively minor impact on livestock production (around 5,500 cases in newborn ruminants in the northern Europe up to July 2012, accounting for less than 0.005 per cent of the susceptible population).²⁶ Though economic impact can be significant on the farm-scale.²⁷ For most infected herds, the occurrence of birth abnormalities is low. Where higher rates of occurrence have been reported (up to 40 per cent), it is thought that this is due to management practices such as synchronisation.^{28, 29} The European Food Safety Authority (EFSA) has reported a decline in the numbers of malformed SBV-positive newborn animals after February 2012,³⁰ and fewer newly infected herds were reported in spring 2013 than spring 2012.³¹

²⁶ DEFRA, *Update No. 10 on Schmallenberg Virus in Northern Europe* [accessed 30 May 2013]

²⁷ Beer et al., (2013) '*Schmallenberg virus*' – a novel orthobunyavirus emerging in Europe, Epidemiology and Infection, 141, 1-8 [accessed 31 May 2013]

²⁸ Synchronisation ensures that all dams that are held at mating or artificial insemination (AI) are all within a few days of each other at the same stage of pregnancy

²⁹ NFU, *Schmallenberg virus leaflet*, March 2013 [accessed 31 May 2013]

³⁰ European Food Standards Authority (2012) "*Schmallenberg virus: Analysis of the epidemiological data and Impact assessment*", EFSA Journal, 10 (6) [accessed 30 May 2013]

³¹ EFSA, '*Schmallenberg virus: analysis of the epidemiological data*', May 2013, [accessed 31 May 2013]

Immunity, preventative vaccination and control

Immunity

The ability to develop long lasting immunity has been previously observed in animals infected with the Akabane virus (AV), an orthobunyavirus closely related to SBV.³² Pregnant animals that have been repeatedly infected with AV possess sufficient immunity to suppress transfer of AV to the developing foetus. Pathogenic effects of AV are usually therefore only realised when the virus passes out of its endemic zone, infecting non-immune individuals.³³

It is not currently known whether the analogy of SBV with AV is entirely appropriate. However, some preliminary studies show that animals re-infected with SBV following previous exposure do not develop further viral infections.³⁴

Preventative Vaccination

In May 2013, the Veterinary Medicines Directorate announced that it had licensed MSD Animal Health to sell a vaccine for SBV 'bovis SBV' to be available in summer 2013.³⁵ To achieve full immunity, cattle require two doses, and sheep one dose of the vaccine. It is recommended that the course is completed at least three weeks before mating.³⁶

³² European Food Standards Agency *"Schmallenberg" virus: likely epidemiological scenarios and data needs*, February 2012 [accessed 30 May 2013]

³³ *ibid*

³⁴ European Food Standards Authority (2012) *"Schmallenberg" virus: Analysis of the epidemiological data and Impact assessment*, EFSA Journal, 10 (6) [accessed 30 May 2013]

³⁵ Veterinary Medicines Directorate, *Schmallenberg vaccine ready for use this summer*, May 2013, [accessed 31 May 2013]

³⁶ Farmers Guardian, *Your questions answered on the new Schmallenberg vaccine*, 30 May 2013 [accessed 31 May 2013]

Control

Prior to the licensing of a vaccine, the Animal Health Veterinary Laboratories Agency (AHVLA) issued the following list of actions which could be taken to minimise the risks of SBV:

- Delaying tupping until midge activity is reduced;
- Delaying breeding from ewe lambs until 2013;
- Using products that repel or control biting insects prior to tupping and in early pregnancy;
- Housing ewes inside; and
- Removing muck heaps to deny breeding habitats.³⁷

³⁷ Farmers Weekly, *Candidate Vaccine announced for Schmallenberg*, 2 July 2012 [accessed 30 May 2013]

Diagnosis

Blood samples from live animals with suspected SBV can be used to detect the virus. Brain or spleen samples from dead or aborted fetuses suspected of having the virus can also be used.

Tests that can detect the presence of SBV directly in a blood sample rely on testing for the presence of viral DNA. However, in order to detect the viral DNA in a live adult, blood samples must be collected from the animal during the clinical stage of infection (which usually lasts just a few days), limiting the utility of the test to this period.³⁸

Development of a test that is capable of detecting SBV-specific antibodies, which persist in the blood after the virus itself has disappeared, has therefore been a priority. An indirect ELISA³⁹ antibody testing kit has been validated by AHVLA and is commercially available for use in cattle, sheep and goats,⁴⁰ with a turn-around time of seven days. A similar test has been developed to detect antibodies in milk samples.⁴¹ Farmers in the UK are urged by the Department for Environment, Food and Rural Affairs (DEFRA) to report Schmallenberg virus symptoms to private vets. The Animal Health and Veterinary Laboratory Agency previously paid for testing for SBV in deformed calves or lambs in the areas where the disease has not yet been reported.⁴² This has ceased now that SBV has been reported in all counties of England and Wales.⁴³

³⁸ Elbers R.W. et al., (2012) *Seroprevalence of Schmallenberg Virus Antibodies among Dairy Cattle, the Netherlands, Winter 2011-2012*, Emerging Infectious Diseases, 18 (7) [accessed 30 May 2013]

³⁹ Enzyme-linked immunosorbent assay – an assay technique that uses enzymes to detect the presence of antibodies to a specific antigen.

⁴⁰ Veterinary Laboratories Agency, *Schmallenberg virus*, 5 March 2012 [accessed 03 June 2013]

⁴¹ Humphries, D. and Burr, P., (2012) *Schmallenberg virus milk antibody ELISA*, The Veterinary Record, 171(20), 511-512

⁴² Department for Environment, Food and Rural Affairs *Update No. 10 on Schmallenberg-2 Virus in Northern Europe*, 25 July 2012 [accessed 30 May 2013]

⁴³ AHVLA, *Schmallenberg virus – updated testing results*, 14 December 2012, [accessed 31 May 2013]

Import restrictions

Since the outbreak of SBV, numerous countries have imposed import restrictions on ruminant-based commodities including live ruminants, meat, semen and embryos. Countries with import restrictions on EU products due to SBV include the Russian Federation, Egypt, Morocco, the United States, Uruguay and Brazil.⁴⁴

In light of an analysis of the available scientific information, the European Commission (EC) has concluded that the risk posed by commodities such as meat, milk, semen, and embryos is negligible.⁴⁵ The EU has therefore urged countries that have adopted restrictive measures on imports to remove them, as 'restrictions are neither scientifically justified nor proportionate due to the negligible risk posed by these commodities'.⁴⁶

⁴⁴ European Commission *List of third countries that impose import restrictions to EU products concerning Schmallenberg virus (SBV)*, 10 May 2012 [accessed 30 May 2013]

⁴⁵ World Trade Organization *Restrictions to Trade Adopted in Relation to the Occurrence of the Schmallenberg Virus in the European Union*, 2 July 2012 [accessed 30 May 2013]

⁴⁶ *ibid*

Origin and future outbreaks

SBV belongs to a subgroup of the orthobunyaviruses called the Simbu serogroup. Simbu viruses have never been reported in Europe before. It is not yet known how SBV arrived in Europe, although virologists have speculated that infected insects may have been imported on aircraft, with infected animals, or on cut flowers from Africa.⁴⁷

Continued infections of SBV since 2011 show that the virus is capable of overwintering,⁴⁸ and did so between 2011-2012⁴⁹ and 2012-2013. SBV is likely to spread in unaffected regions, or those with a low prevalence of infection previously.⁵⁰ Future incidences of SBV infection will depend on the uptake of the new vaccine.

Welsh Government response

The Welsh Government has not yet released a policy statement concerning the Schmallenberg virus. In a written statement, the previous Minister for Environment and Sustainable Development, John Griffiths stated that: 'The Welsh Government will continue to work closely with AHVLA, stakeholders and other administrations to monitor the disease and to provide consistent information and advice as it becomes available.'⁵¹

⁴⁷ Kupferschmidt K *Scientists Rush to Find Clues on New Animal Virus*, Science: News and Analysis – Infectious Disease, 2 March 2012 [accessed 30 May 2013]

⁴⁸ European Food Standards Authority (2012) "*Schmallenberg virus: Analysis of the epidemiological data and Impact assessment*", EFSA Journal, 10 (6) [accessed 30 May 2013]

⁴⁹ DEFRA, *Update No. 10 on Schmallenberg Virus in Northern Europe*, 25 July 2012 [accessed 30 May 2013]

⁵⁰ European Food Standards Authority (2012) "*Schmallenberg virus: Analysis of the epidemiological data and Impact assessment*", EFSA Journal, 10 (6) [accessed 30 May 2013]

⁵¹ Welsh Government, John Griffiths, *Schmallenberg Virus Update*, Written statement, 17 January 2013 [accessed 03 June 2013]

Further information

For further information on the **Schmallenberg virus** please contact **Nia Seaton** (Nia.Seaton@Wales.gov.uk), Research Service.

See also:

- Department for Environment, Food and Rural affairs (DEFRA) **Schmallenberg Virus Update Reports**

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