Background
Between August and October 2011, outbreaks of disease in adult cattle causing mild to moderate fever, reduced milk yield, loss of appetite, loss of body condition and diarrhoea were reported in both the Netherlands and Germany.

Testing for common causes of diarrhoea proved negative. From December 2011, abortion and stillbirths associated with foetal abnormalities, affecting mainly sheep but also cattle and goats, were identified in the Netherlands, Germany and Belgium. A new virus was identified in November 2011 as the cause of both conditions. This was named 'Schmallenberg virus' (SBV) after the German town where the virus was first identified.

Schmallenberg virus is in the Simbu serogroup of the Orthobunyavirus group. This group of viruses includes many different viruses which occur in Asia, Africa and Australia, but had not previously been identified in Europe. Schmallenberg Virus is similar to some other animal disease pathogens including Akabane and Shamonda viruses, which are transmitted by biting midges. Schmallenberg virus can infect and has been shown to cause disease in sheep, cattle and goats.

The virus has also been found in llama and in deer, but as yet, has not been shown to cause disease.

Schmallenger is spread by Culicoides midges. It does not spread directly from animal to animal, Its spread is closely linked to the numbers of midges, which typically peak in late summer/early autumn (August/September) and drop sharply once frosts begin. Some transmission does occur over winter when midge numbers are low but it is very reduced.

Disease in the UK
The first positive SBV case in GB diagnosed in recent months by APHA was in a calf in Cornwall in October 2016. This was followed by four confirmed cases in deformed lambs in the south west of England during December 2016. On January 23 SBV was reported on four sheep farms in Norfolk, Suffolk and East Sussex. In these initial cases, the disease was diagnosed following the testing of deformed lambs. Regional updates on SBV are provided on the Government Vet Gateway.

Clinical Signs
Acute clinical disease in adult cattle presents as fever, reduced milk yield, inappetence, loss of body condition and diarrhoea. Adult sheep and goats generally do not show signs of clinical disease. Outbreaks of disease have lasted 2-3 weeks, with individual affected animals affected for only a few days

In newborn animals and fetal sheep, goats and cattle, the disease is associated with animals born alive or dead at term or aborted following infection of the dam. Malformations observed include bent limbs and fixed joints, which may be all limbs and spine or only some limbs or joints, brain deformities and damage to the spinal cord. Persistent flexion/fusion of the joints (arthrogryposis or "contracted tendons") is a very common birth defect with Schmallenberg virus. However, arthrogryposis can also be inherited as an autosomal recessive condition therefore veterinary investigation is essential. Some animals are born with a normal appearance but have nervous signs such as a 'dummy' presentation (blindness, ataxia, recumbency, an inability to suck, and sometimes seizures). The fetal deformities vary depending on when infection occurred during pregnancy. In sheep there may be only one lamb out of a multiple birth affected with the others normal.

Potential diseases causing similar nuerological signs to SBV in calves:
- Bovine virus diarrhoea virus (BDVv) - present at birth.
- Intracranial haemorrhage as a consequence of dystocia - present at birth.
- Hypoxia as a consequence of dystocia - present at birth.
- Bacterial meningitis - appears at 3-7 day-old.
Potential diseases causing similar neurological signs to SBV in lambs
- Congenital swayback - present at birth.
- Border disease - present at birth.
- Toxoplasmosis - present at birth.
- Intracranial haemorrhage as a consequence of dystocia - present at birth.
- Hypoxia as a consequence of dystocia - present at birth.
- Dandy-Walker syndrome - present at birth.
- Starvation/exposure/hypothermia - occurs from 6-12 hour-old
- Septicaemia - appears at 1-3 day-old
- Bacterial meningitis - appears at 3-7 day-old

Treatment and control
Malformations affecting lambs and calves exposed to the virus in pregnancy may lead to lambing or calving difficulties. Excessive force must not be used during lambing or calving as this may risk injury to both the ewe and lamb or cow and calf. Farmers should contact their veterinary surgeon because a caesarean operation may be necessary for safe delivery. These caesareans are likely to be more difficult than usual due to the nature of the deformities. Lambs or calves delivered alive with severe deformities must be euthanased for welfare reasons.

While several vaccines were released after the initial outbreak these are not currently commercially available (June 2017). Unpublished data from the current outbreak would indicate that animals either previously vaccinated or infected in the initial outbreak are not necessarily protected from repeated infections. Application of insecticide may help reduce the numbers of midges biting individual animals but hasn't been successful in controlling midge numbers at a large scale. Shifting mating until later in the season (for sheep flocks) is probably the most practical solution for minimising Schmallenberg risk, however midge numbers may remain high until October in years with a late onset of frosts.

Risk to humans
A Europe-wide risk assessment has concluded that Schmallenberg virus is unlikely to cause illness in people. As yet, no human cases have been detected in any country, and the most closely related viruses only cause animal disease.

Pregnant women should not have contact with sheep and goats at lambing/kidding time due to risks of exposure to other disease causing organisms.

A typical Schmallenberg virus affected calf showing arthrogryposis (limb fusion) of the hind limbs (photo courtesy of Dr Rachael Tarlinton, University of Nottingham).

Calves affected with SBV-induced brain defects would be expected to show signs of low head carriage, wide-based stance, inco-ordination, and possibly blindness from birth.
Signs of low head carriage, ataxia and wide-based stance are commonly seen in congenital BVDv infection.

Calf affected by hydranencephaly. This calf showed signs of low head carriage, ataxia and wide-based stance but was also blind from birth. (see below).

Hydranencephaly (see above) at necropsy. There is little cerebral cortex and cerebellum - the common reported defects for Akabane infection, and most likely SBV.

Newborn lamb affected by Dandy-Walker syndrome. The clinical signs (if born alive) would be similar to SBV.

Septicaemia in day-old lamb. Onset of clinical signs would differentiate from congenital SBV infection.

Public health
Schmallenberg Virus is not a notifiable disease but farmers and vets should remain vigilant and report any suspicious cases to AHVLA for testing as part of our enhanced surveillance. The European Centre for Disease Prevention and Control suggests that there is a low likelihood of any risk to public health.

MSD Animal Health