



Information of the Friedrich-Loeffler-Institut on

'Schmallenberg virus'

(European Shamonda-like orthobunyavirus)

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Causative agent

'Schmallenberg virus' is an orthobunyavirus strongly related to viruses of the Simbu serogroup, which also comprises the Akabane virus. So far, the strongest genetic similarity has been detected to Shamonda virus within this group. The genome of these viruses consists of three segments (S, M, and L) which encode at least 5 proteins.

Affected animals

So far, 'Schmallenberg virus' has been detected in cattle, sheep, and goats in Germany, the Netherlands, Belgium, United Kingdom and France. If wild ruminants are affected is not known yet.

Transmission

Like other viruses of the Simbu serogroup, 'Schmallenberg virus' is probably transmitted by insects (biting midges and mosquitoes). Cattle, sheep and goats develop clinical disease. It is unknown whether wild ruminants or other species are also susceptible to the virus.

Human health risk

The Akabane-like viruses, which have occurred in cattle so far, represent no health risk for humans. They are no zoonotic pathogens. Due to the relationship of 'Schmallenberg virus' with Shamonda, Aino, and Akabane virus a human health risk is not to be expected according to the current state of knowledge (also see risk assessment of the European Center for Disease Prevention and Control:

http://ecdc.europa.eu/en/publications/Publications/Forms/ECDC_DisForm.aspx?ID=795).

Clinical picture

Cattle with acute infection show mild symptoms such as a drop in milk yield, fever, and diarrhea. These symptoms have mainly been observed during the vector-active season (April to November) of 2011. So far, no symptoms have been reported in small ruminants (sheep, goats). The viraemic stage is very short (1 to 6 days) and the clinical symptoms usually subside within a few days.

Fetal infection plays a special role. If infection occurs during a vulnerable stage of pregnancy (analogously to Akabane virus in sheep probably between days 28 and 36 (56) and in cattle probably between days 75 and 110 (150)), the virus may infect the fetus and cause severe damages. In addition to abortions and mummified fetuses, premature or stillbirths and the birth of weak, malformed lambs and calves are typical. The most common malformations are severe arthrogyroses (ankylosis, tendon shortening), torticollis and hydrocephalus (Fig. 1 and 2). The central nervous system may show extreme deformations. Altogether, the clinical picture is very similar to that of infections with the Akabane virus. The malformations induced by viruses of the Simbu serogroup are designated „arthrogryposis hydrencephaly syndrome" (AHS).

In some cases, various degrees of encephalitis in both, acute infections and newborns, are observed for viruses of the Simbu serogroup.



Fig. 1: Malformed lamb with arthrogryposis of individual joints.



Fig. 2: Malformed lamb with arthrogryposes, torticollis and hydrocephalus

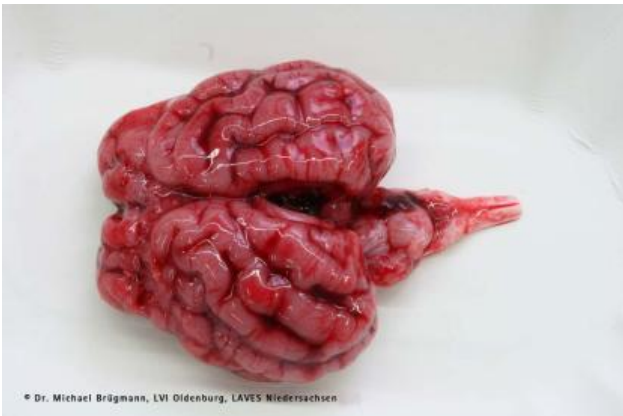


Fig. 3: Cerebellar hypoplasia



Fig. 4: hydranencephaly

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Laboratory diagnostic detection

Pathogen detection:

Pathogen detection is done by *real-time* RT-PCR or virus cultivation.

For pathogen detection during acute infection, serum and EDTA blood samples can be used which must be collected during the clinical stage (fever, drop in milk yield, diarrhea).

Pathogen detection in fetuses, abortions, stillbirths, and in malformed lambs and calves (AHS) is mainly done from brain samples (cerebrum as well as cerebellum samples); supplementary investigation of spleen and blood samples is recommended.

Indirect detection:

Currently, antibody detection is done by immunofluorescence and neutralization test. Therefore, only limited numbers of samples can be investigated at present. An ELISA is being developed.

The sample materials of choice are serum samples; EDTA blood samples are less suitable for neutralization test.

Origin and distribution

It remains unclear whether this exotic virus has been newly introduced in 2011 or whether this orthobunyavirus has already been present in Europe for some time.

So far 'Schmallenberg virus' has occurred in Germany, Belgium, the Netherlands, United Kingdom and France. In Germany, cases have been confirmed in all federal states except Bremen.

If the virus is newly introduced into naive ruminant populations with a high animal density, a rapid spread and malformed lambs and calves must be expected. Presumably, the spread will mainly be done by insects (biting midges, mosquitoes). The epidemiological role of malformed calves and lambs is unclear.

Control

For the forthcoming season, the protection of susceptible animals from biting midges/mosquitoes will be the only possibility to reduce the number of cases. A vaccine is not available and will be developed.

Recommendations for animal holders and veterinarians

Upon occurrence of the described symptoms of acute infection (drop in milk yield, fever, and diarrhea) in cattle during the time of insect activity, suitable samples should be sent to the responsible diagnostic agencies of the federal states for detection of a possible infection with 'Schmallenberg virus'. The same applies for clinically suspicious newborns (AHS, see above).