

“Schmallenberg virus” in Germany



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Background

During summer 2011 following symptoms were observed in dairy cows in North Rhine-Westphalia (similar to those described by NL):

- increased body temperatures ($>40^{\circ}\text{C}$)
 - impaired general condition
 - anorexia
 - reduced milk yield (by up to 50%)
- **symptoms disappeared after several days**

Laboratory investigations at the Friedrich-Loeffler-Institut (FLI)

- diagnostic screenings allowed to exclude infections with BTV, FMDV, EHDV, BVDV and other pestiviruses, BHV-1 and other herpesviruses, RVF and bovine ephemeral fever
- new technologies – **next generation sequencing and metagenome data analysis** – revealed Orthobunyavirus-like sequences

Sequences obtained were most closely related to Akabane, Aino and Shamonda viruses (Simbu-Serogroup of Orthobunyaviruses)

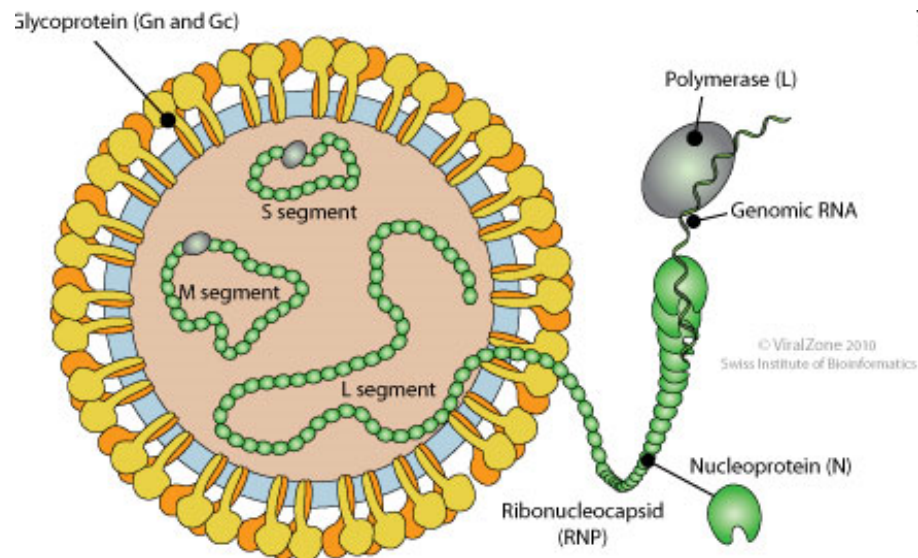
Orthobunyaviruses

Family: *Bunyaviridae*

Genome: segmented, single stranded negative-sense RNA

3 Segments: L (encodes for RNA dependant RNA polymerase)
M (encodes for two surface glycoproteins Gn and Gc)
S (encodes for the nucleocapsid protein)

Transmission: through mosquitoes and *Culicoides* biting midges



Orthobunyaviruses – Simbu-Serogroup

- 25 different viruses
- Isolated from insect vectors, cattle, small ruminants, (humans)
- Most are not infecting humans!
- Normally mild clinical disease
- But: fetal infections can induce e.g. abortion or severe congenital disorders

Sequence analysis:

Most related viruses (Shamonda, Aino, Akabane) are only infecting cattle, transmission mainly by insect vectors, previously not detected in Europe!

First results of investigations at FLI

- Virus provisionally designated „Schmallenberg virus“ (SBV) according to the origin of the first positive samples
- 12 PCR-positive cattle in six holdings detected between August and December, including one positive stillborn twin calf.
- Samples from holdings in unaffected regions (southern part of Germany, Mecklenburg-Western Pomerania) are negative
- 09.01.2012: First SBV-positive samples from malformed lambs. Up to now, positive lambs from 14 farms (7 in North Rhine-Westphalia and 7 in Lower Saxony). Positive PCR results from brain samples.
- Further cases from malformed lambs are reported and samples are under investigation.

Ongoing activities in FLI

- further epidemiological examination of cattle and sheep holdings in the affected area
- laboratory testing mainly of brain samples of malformed calves/lambs; the PCR protocol was also transferred to laboratories in the Netherlands, Belgium, UK, Italy, Denmark
- first inoculation experiment with cattle finished
- virus isolation in cell culture succesful. Virus is well growing on BHK-cells.
- development of tools for serological testing of cattle for Schmallenberg virus; indirect IF and neutralisation test have been established.
- Simbu-serogroup reference viruses were obtained from the World Reference Center for ARBO viruses (UTMB, Texas, USA). The viruses are well growing and sequencing for comparision studies has started.

„news“ around the virus since last SCOFCAH

- virus seems to cause intrauterin malformations in sheep (NL/D) and cattle (1 confirmed case up to now)
- detection of the virus in samples from sheep in Belgium
- detection of stillbirth and malformations in new born lambs in North Rhine-Westphalia and Lower Saxony; SBV was detected in brain samples from lambs with congenital abnormalities (FLI)
- Small scale serological studies will start as soon as possible
- no indications for the affection of humans by SBV