

Scientists engineer the Schmallenberg virus genome to understand how to reduce disease caused by the virus

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Researchers from the MRC Centre for Virus Research at the University of Glasgow in Scotland have developed methods to synthesize and change the genome of Schmallenberg virus (SBV). SBV is a recently discovered pathogen of livestock such as cattle, sheep and goats. The researchers have laid bare important ways by which this virus causes disease. The full report about the study publishes on January 10 in the Open Access journal, *PLOS Pathogens*.

SBV is of great concern because it causes [stillbirths](#), abortions and fetal defects in pregnant cows and ewes. It has spread rapidly throughout Europe since its discovery in Germany less than eighteen months ago (in October 2011).

The new study describes researchers' use of molecular biological methods to design and assemble the viral "genome" completely in a test tube in a form that can be easily introduced and replicated in [cultured cells](#). From these cells the researchers recovered virus with identical infection properties to the "natural" SBV. This approach, known as 'reverse genetics', allowed them to control the [viral genome](#) and identify a gene (called NSs) involved in protecting the virus against the [immune response](#) of infected animals. The researchers made viruses missing the NSs gene and found they made mice in the laboratory less sick than viruses containing the NSs gene. The researchers also discovered that SBV rapidly grows in the brain and spinal cord of aborted lambs and

calves. The virus prefers to infect cells called neurons, which explains why it infects and damages the brain. This also results in muscular defects such as abnormally flexed legs often seen in stillborn animals when virus is transmitted from an SBV infected mother to the calves or lambs in the uterus during pregnancy.

Scottish researchers, led by Massimo Palmarini and Alain Kohl, suggest that the ability to engineer and control the SBV genome will allow the future development of new vaccines for this virus that is of great concern to European farmers. This work was conducted in collaboration with scientists in Italy at the Istituto G. Caporale and Germany (University of Veterinary Medicine in Hannover and the Friedrich Loeffler Institut).

More information: Varela M, Schnettler E, Caporale M, Murgia C, Barry G, et al. (2013) Schmallenberg Virus Pathogenesis, Tropism and Interaction with the Innate Immune System of the Host. PLoS Pathog 9(1): e1003133. [doi:10.1371/journal.ppat.1003133](https://doi.org/10.1371/journal.ppat.1003133)

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