Schmallenberg virus: could infection of wildlife species result in an ever-present threat to livestock?

R. Tarlinton, J Daly, S. Dunham, J.H. Kydd

School of Veterinary Medicine and Science, University of Nottingham, Sutton Bonington, Loughborough, Leicestershire, LE12 5RD, United Kingdom

Schmallenberg virus (SBV) is the most recent vector-borne disease to pose a threat to Europe’s livestock industry. Since its recognition in northern Germany in April 2011, the range of SBV has continued to expand, infecting thousands of domestic ruminants in many European countries.

Initial reports of the clinical impact of SBV infection were restricted to cattle, sheep and occasionally goats. However, because the vectors (Culicoides spp.) ingest blood meals from a wide variety of animal hosts, researchers have started to monitor for the presence of this virus in related wildlife species. The paper by Larska and others in this issue reports the detection of SBV RNA in the serum of a Polish elk calf that died of bronchopneumonia (though it is unclear whether there was a causal relationship). They also report detection of SBV antibodies in the only remaining free-living herd of European Bison, raising the possibility that SBV could be a direct threat to endangered ruminant species. Finally, they additionally report the detection of antibodies in wild (and farmed) red deer.

Although antibodies were undetectable in fallow deer, samples from these animals were all taken prior to the detection of antibodies in red deer and bison. This data adds to reports documenting SBV seropositive samples in a variety of species of wild ruminants in Europe including fallow, red, roe and Sika deer,
chamois and reindeer (Barlow et al., 2013; Linden et al., 2012; Schiefer et al., 2013). The observations by Larska and others raise important questions about the risk of establishment of an endemic transmission cycle of SBV in wildlife species in Europe. The relative risk posed by wildlife populations is likely to be determined by multiple factors including population density and proximity to livestock, presence of insect vectors, and local climatic conditions.

Although several wildlife species seroconvert to SBV, indicating exposure, there is as yet no evidence that they suffer overt clinical disease. Therefore, a key question is whether these animals develop sufficiently high levels of viraemia to transmit virus onwards via feeding Culicoides. Detection of viral RNA has only been reported for one wildlife species, the elk calf documented by Larska and others. There have been no reports of fetal malformations in wild ruminants but, as several of the citations have indicated, aborted fetuses in wild populations are unlikely to be found due to scavenging by carnivores, and fewer animals of these species are farmed.

Akabane virus (AKAV), a close relative of SBV, is endemic in northern Australia. A peculiarity of AKAV in this region is it can re-emerge in the face of over 90% seropositivity in adult cattle (Kirkland, 2002). SBV may already be exhibiting similar epidemiology in Europe, with re-circulation of virus in Belgium in 2012 (Bayrou et al., 2013; Claine et al., 2013) despite seroprevalence of 84% and 86% in the national herds of sheep and cattle, respectively, in 2011 (Meroc et al., 2013a; Meroc et al., 2013b). Cryptic transmission in a wildlife reservoir could contribute to the continued circulation of virus. No wildlife reservoir species for AKAV in Australia have been identified. However, a serosurvey study of Akabane-like (Simbu group) viruses in Kenya identified positive samples in 14
different species of domestic and wild ruminants and *equidae* (Davies and Jessett, 1985).

It is also informative to consider the role of wild ruminants in the epidemiology of bluetongue virus (BTV), which is also transmitted by *Culicoides* midges. BTV can infect a variety of wild ruminants (reviewed in (Falconi et al., 2011)).

Usually, infection is subclinical in species indigenous to regions where BTV is endemic, such as South Africa, where wild ruminants are regarded as reservoir hosts. Mandatory vaccination of livestock is thought to have played a major role in bringing the epidemic of BTV that affected cattle and sheep herds in northern Europe in 2006/7 under control (Zientara et al., 2010). The subsequent decline of seroprevalence in Belgian red deer (Linden et al., 2010) suggests that wild ruminants are not able to indefinitely sustain BTV circulation in Europe, although the potential exists (Falconi et al., 2011).

The availability of an SBV vaccine places us in a better position to control the disease now than when it first emerged, albeit at a cost to farmers with already tight financial margins. However, it appears from anecdotal evidence that many farmers in the UK are choosing not to vaccinate against SBV, partly due to the assumption that the virus will “burn itself out” as BTV apparently has previously. Is this justified optimism or just wishful thinking?

Wild and feral deer populations cover a large proportion of Europe and population sizes have increased dramatically over recent years. The paper by Larska and others adds further weight to the need to study SBV in wild ruminants in order to understand the risk they pose in maintaining circulation of the virus and to develop appropriate surveillance and control strategies.

**References**


