

Schmallenberg virus — lessons learnt from the emergence of a novel virus

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Summary

- Schmallenberg virus (SBV) was identified in Ireland in 2012. A Teagasc/UCD research project was set up to monitor the virus in dairy herds using blood and bulk-tank milk samples and midge surveillance studies.
- From this research it is predicted that SBV, and other insect-borne viruses (e.g. BTV), will affect Irish herds in the future.
- Bulk-tank milk ELISA testing was demonstrated to be a suitable surveillance tool to monitor SBV infection dynamics in dairy herds.

Introduction

In Autumn 2011, cows with fever, diarrhoea, and drop in milk yield were observed near the German town of Schmallenberg. Blood samples revealed the presence of a novel virus which was named Schmallenberg virus (SBV). In late 2011/early 2012 an outbreak of abortions and congenital malformations in calves, lambs and goat kids spread across continental Europe. It soon became evident that SBV was an insect-borne teratogenic virus. The first Irish case of SBV was confirmed in Cork in late 2012 in a calf. Subsequently, an outbreak of congenital Schmallenberg disease occurred in the south and south east of Ireland in late 2012/early 2013. Hence, a joint Teagasc-UCD-DAFM research project was established with the aim to:

- monitor SBV circulation in dairy herds in the south of Ireland.
- evaluate the ability of bulk-tank milk (BTM) ELISA results to predict SBV seroprevalence within herds.
- investigate the species and abundance of *Culicoides* biting midges on Irish livestock farms and evaluate their potential role in the transmission of SBV and other novel insect-borne viruses.

SBV research project

A sentinel herd surveillance program (bovine serology and *Culicoides* entomology and virology) was established on 26 dairy cattle farms located in the south of Ireland between 2014 and 2017. Bovine serum samples and bulk-tank milk (BTM) samples were collected and analysed for SBV antibodies. *Culicoides* biting midges (Figure 1) were also collected and identified to species level on 10 study farms and a sub-sample of specimens was tested for SBV. Experimental laboratory viral studies were also conducted.

Results

During the two years (2014 and 2015) following the initial Schmallenberg outbreak in Ireland, there was little, if any evidence of SBV circulation in Ireland. However, SBV re-emerged and recirculated at a significant level in Ireland in late 2016 and early 2017 resulting in a second outbreak of congenital Schmallenberg disease. SBV continued to circulate at a low level during 2018. An abundance of putative *Culicoides* biting midge vectors was identified on Irish cattle farms. The re-emergence of SBV in Ireland in 2016 is likely a result of wind-assisted transport of virus-infected *Culicoides* into Ireland from continental Europe.

The future?

Given the relatively recent re-incursion of the virus and resultant boost in herd immunity, renewed SBV disease is not predicted nationally in 2019. Should a subsequent re-incursion occur in the future farmers can monitor their dairy herd status using the bulk-tank milk test (where available) and if a serious outbreak is predicted (or has already occurred in the rest of Europe), re-introduction of SBV vaccination may be warranted. Use of fly repellents has not been shown to prevent spread of the virus. The latest research indicates that the virus may overwinter in the midge population and so via trans-ovarian transmission may spread infection during the subsequent midge-active season meaning cyclical outbreaks are likely.



Figure 1. *Midges spread the Schmallenberg virus to cattle and sheep*

Conclusions

This project highlighted that SBV appears to circulate in a cyclical pattern every couple of years and is likely to continue this pattern of virus emergence and re-emergence on farms in Ireland. Bulk-tank milk ELISA testing was also demonstrated, for the first time, to be a suitable surveillance tool to monitor SBV infection dynamics in dairy herds.