

# Infection of sheep and cattle with BVD virus on a mixed farm

## Nikki Moore



### Towcester Farm Vets (Northamptonshire)

*Nikki worked in mixed practice in Worcestershire for 4 years after graduating from the Royal (Dick) School of Veterinary Studies, Edinburgh in 2009. Having enjoyed the challenge of treating all creatures great and small, she moved to pursue her long held enthusiasm for farm practice further and joined Towcester Farm Vets in May 2013.*

*She has a particular interest in health planning and infectious diseases particularly the control of BVD and Johne's in cattle herds.*

## \* INTRODUCTION

A small, lowland farm identified active Bovine Viral Diarrhoea (BVD) virus on farm through annual surveillance and subsequently identified persistently infected (PI) animals. Signs suggestive of Border Disease (BD) were seen concurrently in the co-located sheep flock which was diagnosed as BVD through blood testing. Control measures for both the cattle and sheep were introduced but signs persisted and a likely reservoir of infection in the sheep flock identified.

## \* FARM BACKGROUND

The affected farm comprises a small herd of 20 predominantly Spring calving, pedigree South Devon cows and a flock of 130 ewes. The farm retains its own breeding heifers. Male calves are mostly kept entire and sold as breeding bulls or fat.

The herd is a member of a Cattle Health Certification Standards (CHeCS) health scheme and annual testing for Johne's disease and BVD began in 2013. Vaccination with the primary course of an inactivated BVD vaccine (Bovidec, Elanco) began in December 2015 but lapsed the following year. Breeding females and bulls are purchased and animals attend shows but quarantine and testing is carried out as required by CHeCS standards (CHeCS Technical Document 2019). Replacement ewe lambs and tups are bought in from market but undergo no pre- or post- purchase screening.

At this time, co-grazing between sheep and cattle occurred and cattle also grazed adjacent fields only accessible via the sheep fields. There were two cattle neighbours but every effort had been made to provide double fencing with a 3m gap at boundaries.

## \* PREVIOUS BVD HISTORY

The farm had recently had a BVD breakdown. A routine check test in October 2016 had revealed three out of four calves to be seropositive for BVD. A PI animal was therefore likely to be present in the herd.

A PI hunt was undertaken during Winter 2016. Four antigen positive animals were identified; one was euthanased due to chronic pneumonia prior to repeat testing but the other three animals were confirmed as PIs on follow up samples three weeks later. An antigen positive stillborn calf was identified in November 2016. Tag and testing of all calves born began in 2017 with one further calf identified as antigen positive and confirmed as a PI with blood sampling 3 weeks later. This animal subsequently died.

## \* CLINICAL CASE PRESENTATION

During a routine farm visit, a neonatal lamb was presented for examination as 'wobbly'. The affected lamb had normal mentation, could stand with assistance and feed from the ewe but showed generalised tremors (Video 1). These signs were consistent with those described in PI lambs due to Border Disease. The lamb was blood sampled and the sample sent for polymerase chain reaction (PCR) testing for pestiviruses.



Results revealed the lamb was negative for BD virus but positive for BVD type 1 virus. Due to the clinical signs and the PCR positive result, this lamb was assumed to be a BVD PI and follow up samples were not taken. In total, 11 of 191 lambs showed similar signs, consistent with pestivirus infection (5.8%). The flock also had a much higher barren rate than normal at 18%.

Due to BVD PI animals being identified in both the cattle herd and sheep flock, control plans were drawn up for both as follows:

#### Control of BVD in the cattle herd

- Continue to tag and test all calves (including abortions and stillbirths).
- Begin BVD vaccination programme. In discussion with the farmer, it was agreed to move from Bovidec to a modified live BVDV-1 and BVDV-2 vaccine (Bovela, Boehringer Ingelheim). Due to the single dose this would be easier to manage. All breeding cattle, bulling heifers and any show animals would be vaccinated annually at the TB test in October.

#### Control of BVD in the sheep flock

- Assume all lambs showing tremor signs are PIs - blood sample dams to check their status.
- Some lambs could be clinically normal PIs so don't retain any of this lamb crop for breeding.
- Aim to send all lambs for slaughter pre-tupping to try to remove any circulating virus.
- Blood sample any bought in sheep in the last year.

#### Farmer experience

The farm lost four calves (three PIs, one stillbirth) and the scour outbreak was also likely due to immunosuppression by BVD virus. Unusually two PI animals were successfully fattened, reducing losses, but the cost of losing potential breeding animals in a small herd is high. Another issue for the herd was the set back in trying to achieve BVD Accreditation, which is highly desirable when selling breeding animals.

Losses in the sheep flock were also notable and a tremendous amount of effort was put in by the farmer to nurse 'wobbly' lambs. The emotional impact of losses and ongoing problems in a small herd and flock should not be overlooked.

#### Ongoing surveillance

In 2018, no lambs with clinical signs suggestive of a pestivirus were born and all calves born (including all stillbirths and abortions) were antigen tissue tagged with negative results.

However, in 2019, a lamb was again presented with generalised tremors (Video 2). This lamb was tested for pestivirus and was PCR positive for BVD and inconclusive for BD. Subsequently a calf was identified as antigen positive on tag and test and was confirmed as a PI by blood sampling 3 weeks later. Both animals were euthanased. Identification of a PI calf was initially disappointing as a herd vaccination programme had been started but it was subsequently established the dam of the PI had not been vaccinated and had been accidentally been caught by the bull.

After discussion with colleagues at SRUC Veterinary Services regarding this case, both samples were sent for DNA sequencing at the Moredun Research Institute and were identified as BVDV Type 1a. The conclusion was that both animals were likely to have been infected from the same virus source (PI cow probably).

#### Checking the flock

As there was no PI cow present on the farm at that time, it was hypothesised that the sheep could have been infected the

last time a PI cow was present and had been incubating the virus (Personal communication, Mary Flook, SRUC Veterinary Services). It was therefore agreed to blood sample all remaining sheep.

All sheep tested negative for BVD virus apart from one 2017 ewe lamb which was immediately culled. This animal was clinically normal but the decision was made to cull without follow up testing. This illustrated the importance of ensuring all animals are tested during a PI hunt.



Again, due to the possibility of other clinically normal PI animals being present, no 2019 lambs were kept for breeding.

### Future Control

- Any retained ewe lambs and any bought in animals will be blood tested for pestiviruses.
- All calves born (including stillbirths and abortions) will be tissue tested for BVD antigen and submitted to the CHeCS scheme as the herd seeks to gain BVD Accreditation.
- Annual BVD vaccination using Bovela will occur.
- Bought in cattle will be sourced carefully and appropriate quarantine and testing will take place.

### \* DISCUSSION

If routine surveillance had not identified active BVD, it is possible the first indicator of pestivirus infection on farm would have been the 'wobbly' lambs. Clinical signs in the cattle herd were relatively mild. As the same clinical signs as seen in BD may be caused by BVD, especially where there is close contact between sheep and cattle (OIE Terrestrial Manual 2017), BVD should be a differential diagnosis for signs suggestive of BD in sheep. Surveillance in cattle herds for BVD where BD is suspected would be also recommended.

BVD is known as one of the biggest costs to the cattle industry. Estimates of costs vary but a mean impact of £46.50 per cow has been described (Yarnall et al, 2017). These costs are usually associated with poor calf health and poor fertility. This breakdown, however, also incurred costs due to losses in the sheep flock. It may therefore be prudent to warn farmers on mixed farms with BVD about possible spread into the sheep flock and wherever possible, prevent exposure of pregnant sheep to PI cattle.

Pestiviruses have been demonstrated to circulate widely in British sheep. Understanding the implications of this on the national BVD eradication scheme is vital because of the possibility that sheep could be circulating BVD (Jennings et al, 2018). Sequencing was not carried out on samples in 2017 to confirm that these PIs were infected with the same BVD strain as the later animals. The 2017 BVD positive ewe was not blood sampled twice 3 weeks apart to confirm PI status though the single sample does indicate active BVD in the sheep flock in 2019. It is likely that BVD remained in the sheep flock, despite eradication efforts in the cattle herd and acted to infect the naïve pregnant heifer. This is important to note for mixed farms involved in BVD eradication, especially as England works towards BVD freedom.

### \* ACKNOWLEDGEMENTS

Mary Flook and Fiona Howie, SRUC Veterinary Services, Edinburgh (testing laboratory) for advice and support and for enabling sequencing of the 2019 BVD samples. Boehringer Ingelheim for their contribution towards the costs of blood testing the sheep flock.

### \* References:

1. CHeCS Technical Document. 2019. The Rules of CHeCS. [www.checs.co.uk/wp-content/uploads/2019/11/CHeCS-Technical-Documnet-2019-FINAL-VERSION.pdf](http://www.checs.co.uk/wp-content/uploads/2019/11/CHeCS-Technical-Documnet-2019-FINAL-VERSION.pdf). Accessed 15th March 2019
2. OIE. Border Disease. Chapter 3.7.1 2018. Manual of Diagnostic Test and Vaccines for Terrestrial Animals 2019 [www.oie.int/standard-setting/terrestrial-manual/access-online/](http://www.oie.int/standard-setting/terrestrial-manual/access-online/) Accessed 15th March 2019
3. Yarnall, MJ., Thrusfield, MV.(2017) Engaging veterinarians and farmers in eradicating bovine viral diarrhoea: a systematic review of economic impact. *Veterinary Record* **181**, 347
4. Jennings, A., Gascoigne, E., Macrae, A., Burrough, E., Crilly, J P.. (2018) Serological survey of British sheep flocks for evidence of exposure to ovine pestiviruses. *Veterinary Record* **183**, 220.

