

Testing for BVDv: Unravelling the options

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Tests for bovine viral diarrhoea (BVD) have increased over the past few years as knowledge and interest in the disease grows. Even the application of existing tests has been expanded to meet the need to screen groups of cattle.

In this article, the best way to use these tests is explained based on the two most commonly asked questions.

1. Is this animal infected and infectious? (Is it viraemic?)
2. Has this animal been infected or not? (Is it immune?)

Is it viraemic?

Question one is actually asking “is this animal infected at the moment?” and, if so, “is this animal persistently infected or only transiently infected?” And, to save money, “can we test and screen lots of animals at once?”

Question one can be answered using a range of tests to search for the bovine viral diarrhoea virus (BVDv). In the past, only virus isolation could be used to grow the virus before it could be identified – a complicated and protracted test taking several days. In the early 1990s, the development of antigen ELISA tests allowed detection of

virus in white blood cells in only one day. Progressive developments improved the accuracy and sample type so serum and skin could also be tested. This century, molecular biology – the science of applying polymerase chain reaction (PCR) technology to biological samples – has revolutionised the search for this RNA virus in minute quantities amongst vast vats of milk or pooled serum samples.

Is it immune?

Question two can be answered by searching for antibody produced to BVDv in either milk or serum samples. Recent innovations allow testing pools of sera as well.

The tests are robust and accurate. In a well-organised and disciplined world, control would be relatively simple. Test every bovine, kill the infected ones and prevent reinfection. Switzerland has plans to do exactly this over a two-year period. Of course,

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government-subsidised tests and compensation make this approach attractive for their farmers. In user-pays New Zealand, such a system is unlikely. Still, there are significant economic advantages in avoiding BVDv infection in a herd.

Kiwi innovation was applied to take the production-limiting features of the disease and couple them with PCR testing to allow cost-effective investigation of the virus and the immune status of dairy herds. Now pooling serum samples provides a cheaper option for investigating the immune status of non-milking animals also.

Frequently asked questions

The tests now available provide an opportunity to investigate a cattle herd's BVD status but can lead to confusion when things don't go quite as expected.

Should I use the PCR or antigen ELISA to test for infected animals?

Both tests are equally effective but convenience, cost, sample type and animal age should be considered when choosing the test to use (Table 1).

- PCR is cheaper when samples are pooled. It has a longer turnaround time, although animals of any age can be tested and either serum or milk can be used.
- Antigen ELISA is more expensive but results are available sooner. Skin samples can be tested at any age and serum from 35 days of age.

Both tests detect the BVD virus itself. In this context, the words "virus" and "antigen" are the same; an antigen is defined as any substance that can stimulate an immune response and in these tests the antigen we want to detect is BVD virus.

Table 1: Test comparison for BVD virus testing

Test	PCR		Antigen ELISA	
Sample	Milk	Serum	Skin	Serum
Age limit	Milking	None	None	>35 days
Speed	Slower		Quickest	
Cost	Cheapest		More expensive	

I received a PCR result on tank milk with the result "Detected". What does this mean?

Virus was detected in the milk sample tested. This means a milking cow was excreting virus on the day the sample was collected.

Was she persistently or transiently infected?

Transiently infected cows in a herd present some difficulty. The PCR test is so sensitive it can detect minute amounts of virus. A second milk PCR test undertaken in a few weeks' time will answer this question. If the second test is also positive it is most likely that a persistently infected cow is present. If no virus is detected in the second test and no cows have been removed, then you know only transient infection had occurred. Even though there is no virus in this second sample, the testing has told you exposure to virus has occurred recently, so a BVD investigation to find the source of infection is required.

I've tested the poorest-producing 10% of the herd and haven't found the infected animal yet. What should I do?

First make sure no animals have left the herd in the period between milk testing and blood sampling. Ask the farmer if any cows have been culled, died or were in other mobs (for example, the mastitis mob) when the blood samples were taken. Decide with the farmer

if you want to keep testing. I conducted a limited survey in 2009 and again in 2010 to see how the system was working. In 2009, 12 out of 13 herds (92%) detected the infected animal in the lowest 10%. In 2010, 14 out of 16 herds (88%) did. In the two herds in 2010 where the infected animal was not found immediately, one farmer stopped at 20% and the other persevered till she was found in the 30–40% group.

I have a client with a herd of 2,000 cows. Can the PCR test cope with this many animals?

Certainly. A dilution study indicated the PCR test could detect one infected animal in milk from 4,800 cows. While a negative result on such a large group is very helpful, a positive result makes finding the infected animal complicated. A useful approach is to collect milk from subsets of the larger herd and narrow down the search this way.

What samples can be tested by the pooled antibody test?

Either serum or milk can be tested (Table 2).

Table 2: Options for testing with BVD antibody ELISA

Test	Antibody ELISA		
Sample	Milk	Single serum	Pooled sera (10–15)
Age limit	Milking	> 10 months	> 10 months
Speed	Quick	Quick	Slower
Cost	Cheap	More expensive	Cheaper

What does a high antibody result on a pooled blood or milk sample mean?

Antibody concentrations increase with recency of exposure to virus. Hence a high value indicates the herdmates of a viraemic animal have been exposed to the virus, seroconverted and are producing antibody. Soon after infection the concentration of this antibody is highest and drops slowly once virus exposure ceases. Further investigations are needed in herds with a high antibody concentration. Antibody testing of other age groups, or searching for the infected animal, could be instigated. A low antibody value on a pooled test indicates the opposite: no exposure to virus has occurred.

Conclusion

Investigating the BVD status of a cattle herd can be a satisfying disease control experience. Problems can occur but effective use of the tests available can make the process more enjoyable and rewarding. Gribbles Veterinary has a wealth of BVD disease investigation expertise and is happy to offer help and advice at every stage of the process. ■