



# Diagnostic Tests for Bovine Johne's Disease

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*Understanding the strengths and weaknesses of the current diagnostic tests for bovine Johne's disease (BJD) will help producers select an appropriate test for their circumstances, and interpret the results of testing.*

## Types of tests

Two types of tests are used for the diagnosis of BJD in living animals. There are blood tests to detect antibodies to the BJD bacterium (eg. ELISA) and tests to detect or grow the BJD bacterium in manure (eg. faecal culture and PCR/gene probes).

Blood tests are cheap, easy to perform and ideally suited to large scale testing programs. Faecal culture is expensive and slow, taking at least 8 weeks to get a positive result and 12 weeks for a negative result, even using the "rapid" methods.

## Sensitivity and Specificity of tests

Scientists compare the performance of different diagnostic tests by comparing the "sensitivity" and "specificity" of the tests. The *sensitivity* of a test is the ability of the test to give a positive result if an animal is infected with the disease. The *specificity* of a test is the ability of the test to give a negative result if an animal does not have the disease. A perfect test would be both 100% sensitive (always test positive for an infected animal) and 100% specific (always giving a negative result if an animal is not infected).

## Diagnosis of BJD

The diagnosis of BJD can be considered on two levels;

- laboratory confirmation of a diagnosis made in a sick animal, and
- identification of animals with infection but no signs of disease.

The diagnosis of BJD when an animal is scouring and wasting is not difficult. Most farmers and practitioners familiar with BJD can reliably diagnose the disease. In

addition, most laboratory tests are accurate when applied to cattle with terminal disease.

Because the BJD bacterium grows slowly, it takes many years to produce significant lesions in an animal. Antibody levels are only detected late in the course of the disease and most animals do not pass significant numbers of BJD bacteria in their manure until about the same time. Consequently none of the diagnostic tests are able to detect all infected animals – the animals in the early stages of infection are likely to be test negative, whatever diagnostic test is used.

It has been estimated that when used as a whole herd test the ELISA can detect, on average, 30% of apparently healthy, BJD infected cattle or "carriers", while faecal culture can detect around 50% of apparently BJD infected cattle.



*Figure 1. Performing the BJD ELISA test on blood samples.*

Faecal culture has the advantage of not producing false positive results, because the organism cannot be cultured unless it is present in the manure. The ELISA also gives very few false positive test results. Studies in Australia have consistently shown that the specificity of the ELISA is around 2 animals for every 1000 disease free cattle tested (ie: 2 in 1000 "false positives").

## Using the tests

Both types of tests may be used on the same animal or groups of animals to increase the chance of detecting infected cattle. The tests can either be conducted at the same time with animals positive to either being considered infected. Alternatively, the tests can be used in sequence so that an animal that is positive to one test (eg the ELISA) is then tested with another (eg faecal culture), to confirm the presence of BJD. In this case, only animals positive to both tests are considered infected.

In general, cattle less than 2 years of age are not tested for BJD because the test results in animals under this age are unreliable.

To diagnose BJD from samples collected from a slaughtered animal, the culture methods that are used on faeces may be applied to tissues such as lymph nodes and gut. In addition, the tissues are examined under the microscope to actually see the BJD bacteria in the tissues. A positive culture or microscopic examination confirms the animal had BJD, but some mildly infected animals may be classed as negative.

## New diagnostic tests for BJD

New diagnostic tests for BJD are under development. Many are variations and improvements of existing tests, while others are applications of new technology to BJD. Unfortunately, a perfect test for BJD is unlikely to be developed in the near future. However, intelligent application of the available tests will allow confirmation of a diagnosis in a sick animal, at a herd level, enhance BJD control in infected herds and provide assurance of low risk of BJD under the national Cattle JD Market Assurance Program (CattleMAP) (refer to Agriculture note: *What is CattleMAP?*).

## Further information

Further information about diagnostic tests for BJD can be obtained from Animal Health staff at your nearest DPI office or on the DPI external site:  
<http://www.dpi.vic.gov.au/farming/bjd>.

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