

Johne's Disease: Testing accuracy

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Concern is sometimes expressed by farmers about the accuracy of testing in the Irish Johne's Control Programme. In fact, one of the strengths of the IJCP is the way that test results at the level of individual animal are used to suitably assess Johne's disease risk at the herd level.

As a herdowner, you can use the test protocol of the IJCP with confidence for herd testing, but understand that the testing has only limited application for individual animals. Use your AVP as your technical advisor to interpret your results.

The ELISA test is designed to detect antibodies, which are produced by an animal's immune system in response to the presence of MAP, the bacteria that cause Johne's disease. The ELISA test used on milk or blood samples is very good at detecting MAP-specific antibodies when they are present.

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MAP has features (waxy coat, slow growth, hiding and replication within host immune cells) that prevent the immune system from recognising and responding to its presence, especially in early infection. This delays and reduces production of the antibodies detected by the test. As infection progresses over two years or more, antibodies may become sufficient to be detectable; animals in early infection typically test negative to the ELISA test.

Overall, the likelihood of detecting infection in an ELISA test of a single individual infected animal is in the order of 15% (hence the concerns about test accuracy, although that 15% likelihood should increase with age or onset of clinical disease). Consequently, the ELISA test is of little value in animals aged under two years, and a negative result to an ELISA test cannot be interpreted as the individual animal being not-infected, at any age. Never use an individual animal's negative ELISA test result as assurance when you are buying cattle.



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Johne's Control

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The real value of the ELISA test is when it is used as a herd test. This is shown in an Irish scientific study that underpins the IJCP. This shows that a herd test using ELISA on a typical infected herd of 100 cows has a likelihood in the order of 90% of detecting at least one of the infected animals. On the other hand, if all animals in a herd test have negative ELISA results, the herd is unlikely to be infected, with confidence in this conclusion increasing with herd size.

Confidence in all-negative herd test results also builds gradually with repeated rounds of all-negative tests, which is why the IJCP requires and supports annual whole herd testing. Annual herd testing is especially important for herds that have introduced replacement animals from other farms, depending on the number of animals introduced, the number of source farms, and the likelihood of those source farms being infected.

Used in this way, the test performs well at herd level to identify infected herds even if not all infected animals are identified. This enables the VRAMP management measures to be targeted at reducing the spread and impacts of infection in an infected herd or preventing the entry of infection in a herd with all-negative results.

The IJCP also uses the ancillary PCR test on a dung sample to ensure against a positive result to an ELISA test for an animal that is not infected, although that is rare. The PCR test detects DNA from MAP, to confirm the presence of the bacteria on the farm. Any animal with a positive or inconclusive ELISA test result should have follow-up testing by ancillary PCR, unless the herd has previously had a positive result to an ancillary dung test. A PCR test that is required by the programme is fully funded.

The ancillary PCR test is not required or funded in herds with a prior positive ancillary test result (indicating that the herd is infected) because subsequent positive or inconclusive ELISA results are reasonably interpreted as detection of infected animals. An ancillary PCR test on those animals will not alter their infected status.

Without the ancillary PCR test, an animal with a positive or inconclusive ELISA result is considered to be infected, and the herd is also considered to be infected. This may have negative consequences in terms of the herd's future standing, even if the presence of Johne's disease has not been confirmed. Only 8.4% of the PCR tests conducted in 2019 were positive, so it is expected that in the majority of cases, dung samples will test negative. It is therefore very important for both the herdowner and the programme that required ancillary PCR testing is completed, as soon as possible and within 45 days of the ELISA result.

Within an infected herd, test results (both ELISA and PCR) may be used to identify some but not all high-risk animals for specific interventions such as preferential culling, separation at calving, not retaining calves as replacements, and not using milk or colostrum to feed replacements.

Testing under the IJCP has been designed using the best scientific advice available in Ireland and elsewhere. If the tests are implemented according to the requirements of the IJCP, you can be confident that the results are accurate indicators of herd risk of infection and will identify high-risk animals in infected herds. Your vet can help to make the best use of this information, to reduce the spread and impacts of infection into and within your herd.