

Johne's disease modelling is supporting the national programme

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The first publication from this project reported on the modelling of spread within herds. This will be followed by modelling of spread between herds. This month, we look at how farmers can apply this work to improve control and management of Johne's disease in their herds.

Most spread of Johne's disease occurs in the general indoor environment that includes calving pens and calf housing, according to the model and consistent with the conventional knowledge of the disease. Calves are very susceptible to being infected when they swallow *MAP*, the causative bacteria.

Cleanliness and hygiene are paramount. Bedding must be replaced to keep it clean, and cow legs, udders and teats, and back ends should be washed if soiled. Take care when harvesting colostrum and milk that udders, teats and hands are clean of soil and dung. Now that calving has almost finished, be sure that dung is not tracked into calf housing on boots or clothing, and that feeding equipment is thoroughly cleaned between feeds.

Test-positive cows are the animals most likely to shed *MAP* bacteria in their dung to contaminate the calves' environment, including soiling their udders and teats; and also at greatest risk of infecting their unborn calves in the womb. All test-positive animals, and especially those with high readings, should be considered high-risk.

The model shows that culling test-positive animals contributes to effective Johne's disease control, and that prompt culling (e.g. within 4 weeks after testing) is more effective than culling after a more extended period. Effective Johne's control in this context includes reducing the level of environmental contamination, the number of animals that are infected, and the duration of infection in the herd. Retaining test-positive cows means increasing the risk of exposing calves to infection at calving, in the calf housing, and out on pastures.

Note that the Irish Johne's Control Programme recommends, but does not require, that test-positive animals be removed from the herd. In practice many herds will not want to remove productive milkers until the end of the current lactation. However, dairy farmers in the Johne's programme can plan their testing and their subsequent actions to maximise the value of the results.

If the herd is tested early in lactation, test-positive animals can be excluded from breeding and scheduled for removal from the herd at drying off, or preferably sooner. This will protect the next crop of calves from the risk from these cows. Herds adopting this approach of testing as soon as possible after the herd has resumed milking should remember to wait until at least 180 days after last year's herd test, at least 7 days after calving has finished, and at least 90 days after a TB test.

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If the herd is tested at the end of the breeding season, there are still advantages from culling test-positive cows sooner rather than later. But if test-positive cows are retained until calving or beyond, calve them in an area separate from the rest of the herd, and thoroughly clean that area before using for other animals, so that test-negative cows and their highly susceptible calves are protected from exposure to the dung from the high-risk cows in the confines of indoor pens.

The next highest risk of transmission to calves occurs if the cows and calves have contact on pasture. Plan to graze calves on pastures that are not adjacent to adult cows' pastures.

Modelling is particularly useful to investigate spread of Johne's disease, because the actual disease spreads so slowly that a real-time experiment can take a challengingly long time. The technique uses a mathematical model of infection to test how certain factors might affect the spread within a population. The accuracy of the model depends on how well the design mirrors the 'real world' in all its complexity.

The current work uses a model of spread developed for the French dairy industry, adapted for differences of Irish dairy production, particularly herd size and seasonality. The modelling is being conducted by a post-graduate student in collaboration with the French modellers, UCD, Teagasc and Animal Health Ireland.

It is reassuring to have the knowledge already being applied to Johne's disease control validated by this modelling, and it is unlikely to markedly affect the findings or recommendations of existing VRAMPs relevant to cow and calf hygiene. However, the importance of testing and then removing or separating test-positive animals, preferably sooner but certainly before calving, may prompt a shift in emphasis and re-scheduling of testing.



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