

Johne's Disease in Cattle

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Summary

- **Johne's Disease is an infectious condition of cattle caused by *Mycobacterium avium paratuberculosis* (Map).**
- **Map is spread in infected faeces and results in diarrhoea, weight loss and reduced production in affected animals. There is no treatment available.**
- **Within the U.K. it causes significant financial losses in both beef and dairy herds and is a serious welfare concern.**
- **Early detection and removal of infected animals from the herd is an important part of control, along with reducing exposure of youngstock to infected faecal material.**
- **CHeCS schemes allow more confidence when buying in cattle as the status reflects the whole herd of origin.**

Introduction

Johne's disease (also known as paratuberculosis) is an infectious wasting condition of cattle and other ruminants. It results in progressive damage to the intestines of affected animals and in cattle results in profuse and persistent diarrhoea.

While cattle remain susceptible to infection throughout their life, they are at their most vulnerable in the first few months of life. The advanced clinical signs of the disease (diarrhoea and weight loss) are rarely seen in cattle under two years of age. Most commonly these clinical signs are seen in cattle aged three to five years.



The Organism

Mycobacterium avium subspecies *paratuberculosis* (Map) is the bacterium that causes Johne's disease. It is in the same family of bacteria as those that cause tuberculosis and leprosy. Map is slow growing and takes several weeks to grow to detectable levels in the laboratory.

Out with the confines of the laboratory it can only multiply within an animal, but nevertheless survives well in the environment and can be isolated from pasture, slurry, and water after periods of up to one year.

How is Johne's Disease Spread?

The bacterium (Map) is passed in large amounts in the faeces of infected animals, but can also be found in milk, particularly colostrum. Calves can be infected in the womb but are more commonly infected through drinking colostrum and whilst suckling teats that are soiled with faeces.

In the dairy herd, practices such as pooling colostrum and feeding waste milk to calves that are destined to be herd replacements is significant in spreading the disease rapidly within a herd.

The major source of infection into a herd is the purchase of infected animals in the early stages of the disease. These are likely to appear healthy as they are not yet showing signs of the disease. Buying in replacement heifers and stock bulls has the potential to bring the disease into your own herd. To reduce this risk, stock should be bought from herds with Risk Level 1 status.

While there has been consideration of a link between Johne's disease in ruminants and Crohn's disease in humans, the medical consensus is that the Johne's organism does not have a primary causal role in Crohn's disease.

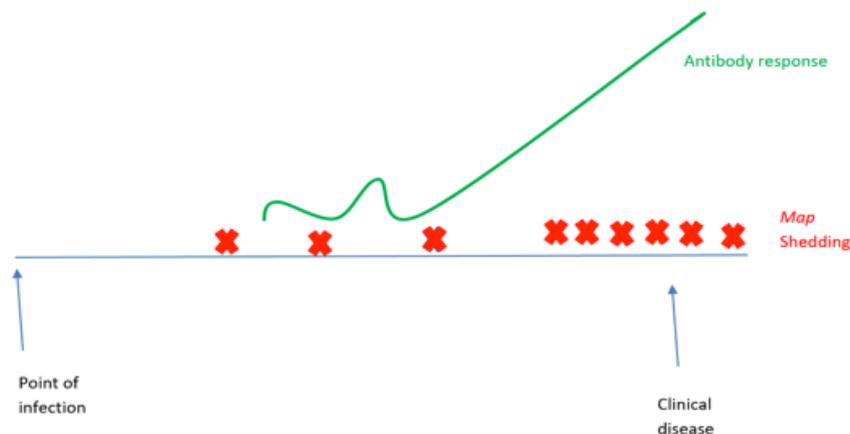
Diagnosis and Diagnostic Tests

Once an animal has severe diarrhoea and is losing weight (clinical disease) the disease can readily be confirmed by a blood antibody test (ELISA) and the Map organism can be detected in faeces by PCR. However, diagnosis of the presence of the infection in animals in the silent period of disease is difficult. They tend to pass detectable numbers of the Map organism in their faeces intermittently from a young age, but only do so consistently once as they begin to develop the external signs of the disease.

Similarly, antibody in blood samples tends to be detected in the months before signs of the disease are apparent. This means that animals that have been infected early in life may give negative results in several annual tests before they eventually test positive. Therefore, testing animals at the point of sale, or on arrival in their new herd, is an unreliable method of preventing introduction of infected animals into the herd.

Using the blood antibody test, over 90% of animals with clinical disease will be detected but this could fall as low as 20% in young animals and those in the early stages of infection. Animals in the early stages of disease will not all shed or may intermittently shed Map bacteria. Therefore, negative results on faecal PCR testing do not guarantee absence of disease. Figure 1 displays the possibility of fluctuations in antibody level and intermittent Map shedding early in the disease process that may lead to a negative result in an infected animal.

Figure 1 – Levels of antibody and Map bacteria throughout disease progression.



Although testing blood for antibody and faeces by PCR in the same animal gives the highest detection rate in an individual animal, it is expensive and is unlikely to be cost effective for whole herd screening on most farms. Nonetheless, it may be justified for purchased individuals such as bulls.

It should be emphasised that this does not guarantee freedom of infection and the status of the herd of origin should also be considered. Milk sampling can also be used in dairy herds to detect antibodies. This testing is best used to detect trends rather than used as a one-off diagnostic test.

Johne's Disease – Beef Herds

Johne's disease impacts production and in turn reduces a herd's profitability. It has been shown that calves from cows that have tested positive are on average 21.5kg lighter than calves from cows with a negative result. The trend towards rearing heifer replacements reduces the risk of introducing the disease through bought in animals. However, retaining replacement heifers perpetuates spread of the disease if it is already present within a herd. Johne's disease in a pedigree beef herd can lead to the premature loss of valuable bloodlines.

Key control points in the beef herd:

- Prevention of entry infection to the herd – purchase stock (replacement heifers, stock bulls) from herds of R1 status (Risk Level 1 see page 4).
- Prevention of heifers from positive dams being retained for breeding – these heifers should be removed from the herd or isolated from the breeding herd and not housed or grazed alongside uninfected animals intended for breeding.
- Ensure calving cows and young calves (vulnerable to disease) are well bedded to avoid calves ingesting faeces when sucking teats.
- Avoid using colostrum from dairy herds.
- Regular testing and culling of positive animals in the main herd is crucial.

Johne's Disease – Dairy Herds

In dairy herds Johne's disease causes production losses due to its impact on milk yield and fertility. Premature culling is another consequence of the disease. Again, the trend towards rearing and retaining replacement heifers favours a build-up of disease within an infected herd. A tendency for increased herd sizes leads to busy calving areas resulting in an increased risk of calves coming into contact with faecal material at calving. Pooling of colostrum before feeding to calves leads to an increased number of calves becoming infected per infected cow.



Key control points in the dairy herd:

- Prevention of infection spread by limiting faecal contamination of dry cows that could lead to infection of calves at calving.
- Calves from known positive cows should be snatched at birth and fed colostrum from a non-infected cow. These heifer calves should not be retained for breeding.
- Do not pool colostrum before feeding calves.
- The hygienic collection and pasteurisation of colostrum reduces the risk of infection.
- Blood sampling cows at dry off is a useful management tool. This allows management changes to be put in place for calving and assists in deciding whether to put cows back in calf.
- Cull infected animals.

Control Measures

Regular testing and culling of positive animals alone may not be enough to make satisfactory progress in herds where the prevalence of disease is high. There must also be a focus on preventing infection between animals within a herd.

- As Johne's disease is most frequently spread through faeces, improved hygiene can reduce the number of newly infected animals in both beef and dairy herds. Map bacteria can persist in slurry for up to 12-months. Slurry systems such as injection can avoid mass contamination of grazing.
- Youngstock should not be grazed in recently or heavily slurried fields as they are most vulnerable to becoming infected.
- Avoid having slurry spread on your land that has come from cattle of unknown Johne's status.
- Water contamination is also a potential source of infection so use mains water where possible and fence off natural watercourses where faecal contamination from grazing cattle may be possible.
- Co-grazing with sheep is also not advisable due to the risk of sheep carrying the infection.
- A Johne's disease vaccination is licensed for use in sheep and goats in the U.K. and could be used "off label" in cattle. It does however complicate eradication of infection and interfere with the skin test for tuberculosis so is seldom considered a favoured method of control.

Health Schemes



Cattle Health Certification Standards (CHeCS) schemes (such as Hi Health Herdcare and SRUC’s Premium Cattle Health Scheme (PCHS), are a structured way of demonstrating herd status and are used by both commercial producers and those selling high value pedigree stock. In herds that have evidence of Johne’s disease, the CHeCS protocols can be used to decrease infection and work towards a lower risk level status. In herds with no evidence of infection, testing is performed routinely and increasing years of clear tests gives further confidence to prospective purchasers. All CHeCS schemes follow the same set of testing procedures.

www.checs.co.uk/about-us/cattle-health-licensed-schemes/

Member herds are screened annually for Johne’s disease with any positive animals and their offspring being removed from the herd. Infection is prevented from entering herds by strict biosecurity rules such as preventing contact with non-accredited animals and their faecal material. Herds can achieve the highest status Risk Level 1 after three consecutive annual tests where there is no evidence of disease in the herd.

The Johne’s status of a herd is categorised on a Risk Level basis (see Table 1). Those purchasing cattle should aim to buy from herds with the lowest Risk Level i.e. Risk Level 1. The longer a herd has had an R1 status, the lower the risk associated with that herd. Risk Level 5 herds are considered to have a high risk of infection.

Table 1: Johne’s Risk Levels

Risk Level 1	<i>The herd has had at least three clear annual herd tests.</i>
Risk Level 2	<i>This herd’s most recent test was clear and it has had one or two clear annual herd tests.</i>
Risk Level 3	<i>The herd has had less than 3% of animals testing positive for Johne’s.</i>
Risk Level 4	<i>The herd has had more than 3% of animals testing positive for Johne’s.</i>
Risk Level 5	<i>May be testing and are not adhering to the CHeCS Johne’s Disease control protocol.</i>

Herds with Risk Levels 1 to 4 have a CHeCS Johne’s health plan in place, agreed between the farmer and their vet, which is updated annually. There are both mandatory and advisory elements of the health plan as summarised in Table 2. As demonstrated by figure 2 proactive herds that are members of the scheme can make good progress to become free of Johne’s disease. Herds participating in health schemes have the advantage of offering buyers peace of mind that they are less likely to be buying in infection. Open herds should take advantage of this when introducing new bloodlines.

Figure 2 – Percentage of PCHS member herds at each risk level (January 2021).

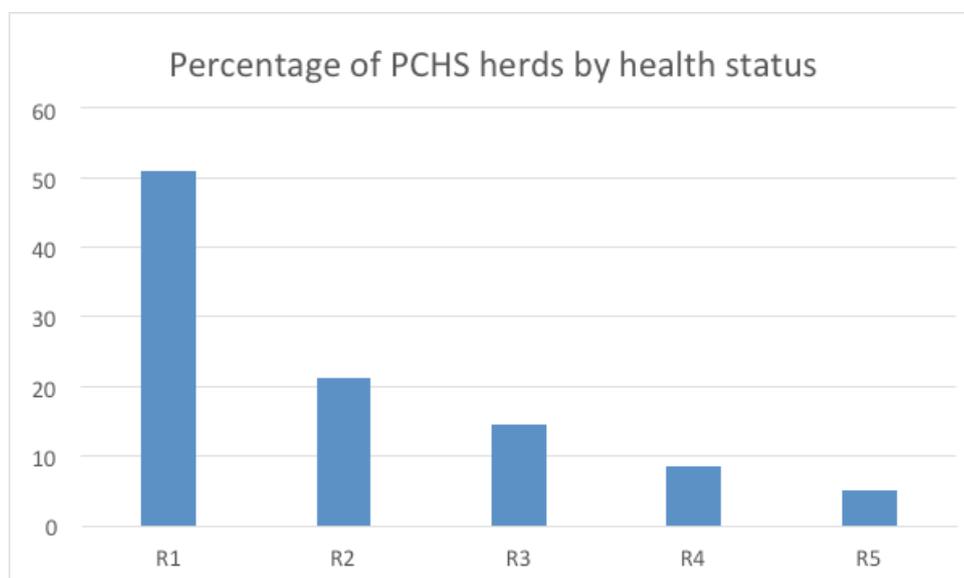


Table 2: Control elements for Johne's health plan

Mandatory control elements	Advisory control elements
Annual testing must be carried out following the rules in the CHeCS technical document.	Herd specific instructions should be implemented to reduce stock exposure to faecal contamination. This should focus on cow hygiene in the pre-calving period, the calving area and young calf accommodation.
Unless from an R1 herd, all added animals must be quarantined and tested for Johne's disease, by both blood and faecal testing, regardless of age.	A gap of at least 12 months should be left between spreading slurry/ manure on pasture and using it for grazing young calves.
Test positive animals must be separated from calves, seronegative animals and animals intended for breeding until follow up testing is carried out.	Faecal contamination of feed and water sources should be reduced.
Reactors must be removed from the herd as soon as is practical. Whilst they are retained, they must remain isolated and their dung must be kept away from other cattle. Any pasture used by reactors must not be grazed by other animals within the herd until at least 12 months has elapsed.	Mains water should be provided for grazing cattle where possible. Non-flowing natural water sources should be fenced off to prevent access.
Any calf at foot of a reactor must not be retained or sold as a breeding animal.	Co-grazing with other ruminants should be avoided as they may act as a reservoir of infection. Rabbits should also be considered as potential reservoirs of infection.
A health plan, covering the control of Johne's disease, must be signed off by both vet and farmer annually. This must cover both the essential elements and guidelines associated with the programme.	The last two calves born to a reactor should not be retained for breeding or sold as breeding animals.

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