

Cattle Health and Welfare Group

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Mycoplasma bovis Information note

What are Mycoplasmas?

Mycoplasmas are very small bacteria that belong to the class *Mollicutes* (meaning soft skin). More than 125 *Mycoplasma* species are known, infecting a wide number of animal species, although in general each *Mycoplasma* species infects only one species of animal. For example, those that occur in cattle are rarely found in other animals. More than twelve different mycoplasmas and related species occur in cattle but few result in disease. Mycoplasmas are totally dependent on the animals they infect to provide the nutrients they require.



Animal &
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Mycoplasma bovis causes the most concern to GB farmers because it can be difficult to treat. The organism has a number of its own defence mechanisms, which includes

- The lack of the cell wall so that certain widely-used antibiotics are not effective.
- An ability to change the surface proteins so it can evade the cow's immune response.
- An ability to produce a sugar matrix (biofilm) so that it can temporarily hide from both the immune system and antibiotic treatment.

What diseases does *Mycoplasma bovis* cause?

Mycoplasma bovis causes several diseases in cattle in GB.

- The commonest is respiratory disease in calves, and less commonly ear infections (otitis media) resulting in head tilt.

DairyCo

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- In older animals it can also cause arthritis, mastitis and pneumonia, but these are much less commonly diagnosed; eye infections (infectious keratoconjunctivitis) and abortion have been recorded.
- Although much material has been published in the UK information and literature available on the internet comes from other countries so caution is needed in interpretation - the disease can and does manifest differently in the UK.
- *Mycoplasma bovis* does not cause disease in humans. It is not a notifiable disease.

Respiratory disease in calves (BRD)

- Bovine Respiratory Disease (BRD) is a complex disease caused by a range of bacteria, viruses and other pathogens including *Mycoplasma bovis* and other mycoplasmas.
- It is the commonest form of disease associated with *Mycoplasma bovis*.
- *Mycoplasma bovis* often causes respiratory disease associated with other organisms but it can also be the sole cause of pneumonia in some outbreaks.
- *Mycoplasma bovis* is often suspected when cattle with pneumonia do not respond to treatment.

Mastitis

- *Mycoplasma* mastitis is a rarely diagnosed cause of mastitis in GB, and of these *Mycoplasma bovis* is the most frequently isolated cause; it may be underestimated due to difficulties in diagnosis; although recent improvements in diagnostics and increased awareness have the potential to increase the numbers diagnosed.
- Research from the USA suggests that the likelihood of *Mycoplasma* spp mastitis increases with increasing herd size.
- *Mycoplasma bovis* behaves as a contagious mastitis pathogen, and spread at milking is probably the commonest means of transmission.

Arthritis

- *Mycoplasma bovis* causes a rarely diagnosed severe arthritis in calves and adult cattle. Animals are very lame, with one or more swollen lower limb joints in which damage rapidly occurs.

- This form of the disease in adults can occur by itself or together with mastitis.
- Antibiotic treatment in the early phase of the disease provides the best opportunity to control disease.

Pneumonia

- A very rare form of severe pneumonia in adults is also recognised. This is frequently fatal, and poorly responsive to antibiotic treatment.

Transmission

- The organism is usually transmitted by close and repeated contact over short distances; untreated infected milk can also be a source of infection to calves.
- Transmission of *Mycoplasma bovis* 'within cow' is thought to be possible both from the udder to other organs and vice versa.
- Transmission between cows is probably generally from classical contagious spread at milking time but may also be via shedding of the pathogen through external mucosal surfaces of a clinically or subclinically infected animal. Once infected, the bacteria are thought to be shed at a variety of mucosal surfaces including eyes, nose, vagina, and rectum and through milk. Calves can become infected.
- There are asymptomatic carriers of *Mycoplasma bovis*; their role in the disease is not clear, but when considering buying in cattle, purchasers should ensure they are aware of this potential when sourcing animals.
- It appears that in situations when herds have concurrent problems (other diseases such as Salmonellosis or BVD) or very poor nutrition/environments, *Mycoplasma* species outbreaks can be severe both in terms of numbers of cows affected and severity of clinical signs.

Diagnosis

- Classically diagnosis has relied on the use of selective culture media and prolonged incubation in an environment enriched with carbon dioxide.
 - Whilst culture may only take a few days, in some cases it can take up to 21 days for growth to become apparent.
 - Species identification is important as some *Mycoplasma* species are thought to be part of the normal bacterial population and less pathogenic than others. Options for speciation include molecular methods, including specific PCR's, PCR with denaturing gradient

gel electrophoresis (PCR/DGGE), DNA sequencing, MALDI-TOF MS.

- More recently, as an alternative to culture methods, PCR based techniques have been developed, though most commercially available kits are only designed to detect *Mycoplasma bovis*. Specialist laboratories use the PCR/DGGE method which offers advantages in detecting and identifying *Mycoplasma* species including mixed mycoplasma infections in one test.
- Each of the diagnostic techniques has its own inherent advantages and disadvantages. Culture based techniques offer a 'broad scan', but are difficult to perform and results can be slow to obtain. In contrast PCR is quicker, but tends to be very specific and does not offer the same 'broad scan' as culture.
- Bulk tank culture and PCR have been advocated as ways of monitoring and screening herds for the presence of *Mycoplasma bovis* mastitis. However, successful bulk tank culture is reliant on a clean milking routine to minimise contamination with environmental organisms
- Serology is an established method of detecting disease in a herd and can provide evidence of active infection.

Prevention is better than cure

- The largest risk is considered to be from the purchase of cows or heifers, clinically or subclinically infected with *Mycoplasma bovis*.
- Maintaining a strictly closed herd policy is the best method to minimise the risk of introduction of *Mycoplasma bovis*.
- If cows or heifers have to be purchased, there is always a risk of buying in infection. This risk can be minimised by a collection of a detailed history, only purchasing from low somatic cell count herds, and by screening the herd from which animals have been purchased, or individuals quarantined before they enter the main herd, by serology.
- Feeding of waste milk to calves is not recommended where *Mycoplasma bovis* has been diagnosed.
- Although no commercial vaccines are licensed in Europe for *Mycoplasma bovis*, the APHA and other companies are licensed to produce an autogenous vaccine.

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