

# *Mycoplasma bovis* in dairy and beef herds

For Irish Farmers, Advisors and Veterinary Practitioners



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AHI gratefully acknowledges the financial and other contributions of our stakeholders.



Contributing to a profitable and sustainable farming and agri-food sector through improved animal health

Animal Health Ireland, 2-5 The Archways, Carrick-on-Shannon, Co. Leitrim, N41 WN27  
 Phone 071 9671928 Email [ahi@animalhealthireland.ie](mailto:ahi@animalhealthireland.ie)

## Introduction

*Mycoplasma bovis* is a bacterium that can affect dairy and beef cattle of all ages and in several different ways. Its presence in Ireland was first reported in 1994 and has since become widespread, making eradication unfeasible. A recent bulk tank survey highlighted evidence of exposure in many Irish herds. It is worth noting that as well as being able to cause disease outbreaks, *Mycoplasma bovis* is often endemic in herds where it can circulate without being detected or without signs of clinical disease. The disease can vary in severity, from no visible clinical signs to severe debilitating disease, which can make diagnosis based on clinical signs alone difficult. It may also have serious consequences for the welfare and productivity of affected animals. Many antibiotics do not work against *Mycoplasma bovis* due to its structure (lack of a cell wall complex). In recent years, the frequency and severity of outbreaks have increased causing devastating consequences in outbreak situations while remaining subclinical in other herds where infection has been present for several years. Herd expansion and buying in cattle is the main way the bacterium gets into a herd. *Mycoplasma bovis* is not a threat to food safety or human health



# 1. Clinical signs of *Mycoplasma bovis* infection

COWS	CALVES
Lameness	Lameness
Pneumonia	Pneumonia
Mastitis	-
Reproductive tract problems	-
-	Middle ear infection /Head tilt

The main clinical presentations of *Mycoplasma bovis* are highlighted in Table 1 above.

Affected animals tend to show one or a limited number of these clinical signs, e.g. mastitis or lameness, rather than all of them.

## Lameness

Swollen joints, with more than one joint or leg often affected. Fetlocks and knees on forelegs are the most commonly affected joints. Variable clinical signs occur depending on the location and severity of infection in the joint, ranging from mild cases with noticeable swellings but minimal lameness to severe non-weight bearing lameness. It can also cause noticeable swelling of the tendon sheath (tenosynovitis), which usually does not cause as severe a lameness as when the joint is infected.

## Mastitis

*Mycoplasma bovis* can cause subclinical, clinical, and chronic forms of mastitis. Often more than one quarter is affected, and the mastitis is usually non-responsive to treatment.



Photo courtesy of Dr. William Byrne, DAFM, Backweston, Co. Kildare

## 1. Clinical signs of *Mycoplasma bovis* infection (cont.)

### **Pneumonia**

*Mycoplasma bovis* can cause pneumonia in both adult cows and in calves from a young age to older weaned calves. It can cause pneumonia on its own, or as part of the bovine respiratory disease complex (BRD complex) where viral infections often cause the initial damage to the lining of the animal's respiratory tract. Diagnosis is difficult without lung samples, taken from either a lung wash or post-mortem. Recent post-mortem findings published in the 2019 All-Island Animal Disease Surveillance Report state that 13.5% of BRD cases involved *Mycoplasma bovis*. *Mycoplasma bovis* can also live in the nose of cattle without causing harm, only becoming an issue if it enters the lungs.



### **Reproductive problems**

Other countries have confirmed that infections with *Mycoplasma bovis* can cause abortions and the birth of premature calves, but it is not known how commonly this occurs in Ireland. Infection of breeding bulls can reduce semen quality which may affect fertilization.

### **Middle ear infection**

This is another common occurrence with *Mycoplasma bovis* infection in calves, causing drooping ears and head tilts.

## 2. Source and Spread of the Disease

### Spread within a herd

*Mycoplasma bovis* can be spread within herds by direct or indirect transmission pathways. Nose to nose contact via nasal secretions and aerosols is the most common direct pathway, but infection can also be spread by a stock bull through infected semen (natural service). It is therefore important to consider the potential role of a bull in transmission within and between herds. Indirect pathways include through food, water, colostrum, milk, shared farm equipment, or in the parlour on milkers hands, equipment etc. Cattle can carry *Mycoplasma bovis* infection without showing any signs of the disease and some carrier animals only shed *Mycoplasma bovis* intermittently, making them difficult to identify.

### Spread into a herd

If an asymptomatic carrier animal is introduced into a herd, this may lead to an outbreak of disease. The period from introduction to the outbreak can be prolonged (from weeks to months) due to the unpredictability of shedding.

Many factors have a role in causing asymptomatic carriers to start shedding *Mycoplasma bovis* and infecting susceptible cattle, including stress, immunosuppression, viral pathogens, changes in environmental temperature, overcrowding, transport, poor air quality and poor nutrition.



### 3. Diagnosis

Laboratory confirmation is critically important for accurate diagnosis of *Mycoplasma bovis* as the clinical signs are not sufficiently distinct to allow a diagnosis to be made on these alone. However, *Mycoplasma bovis* infection should be considered if several animals are showing one or several of the signs listed in Table 1 above.

Laboratory diagnosis of *Mycoplasma bovis* from milk samples (individual quarter, composite, or bulk tank samples), joint aspirates and lung washes (bronchoalveolar lavage samples; BAL) or nasopharyngeal swabs can be done by culture or polymerase chain reaction (PCR). Both methods are available in Ireland. For culture (but not PCR) of BAL samples and nasopharyngeal swabs, a special transport medium may be required and should be obtained in advance from the testing laboratory. Once collected, samples must be sent to the laboratory as quickly as possible. If this is not possible (for example over weekends or holidays) then samples should either be refrigerated if processing within two days or alternatively, frozen.

Any *Mycoplasma* identified by culture needs to be confirmed to be *Mycoplasma bovis*, as other non-pathogenic *Mycoplasma* species do exist. Serology (blood sampling) for *Mycoplasma bovis* is also available in Ireland. However, following infection antibodies can be detected for an extended period (from months to years), and may also be present in calves from colostrum (maternally derived antibodies [MDA]), so blood testing is not particularly useful in clinical diagnosis. Serology is useful as a herd screening tool however and can be used in youngstock screens from around 6 months of age when any colostrum antibodies will have waned, or for surveillance as part of a biosecurity programme.



## 4. Treatment

Successful treatment is very difficult. Many antibiotics are ineffective, as their mode of action is to target the bacterial cell wall, which does not exist in the case of *Mycoplasma bovis*. Potentially effective antibiotics include some tetracyclines, aminoglycosides, chloramphenicols, macrolides and fluoroquinolones. However, as the last two (macrolides and fluoroquinolones) are categorised as 'High Priority Critically Important Antibiotics', they should not be used as a first line of treatment and the use of fluoroquinolones should be based on culture and susceptibility results. *Mycoplasma bovis* also has sophisticated virulence factors which can help it to evade an animal's immune response. Unless treatment is started very early in the course of the disease it is very unlikely to be successful.

Cases of *Mycoplasma bovis* mastitis carry a very poor prognosis and are also extremely infectious. Cases often need to be culled, as the response to treatment is poor, and to prevent further cases occurring.

It is accepted that mycoplasmal arthritis usually has a poor response to treatment if established in the joint with associated severe pathology but should be judged on a case by case scenario.

There is currently no effective licensed vaccine in Europe, although one is available in the United States.

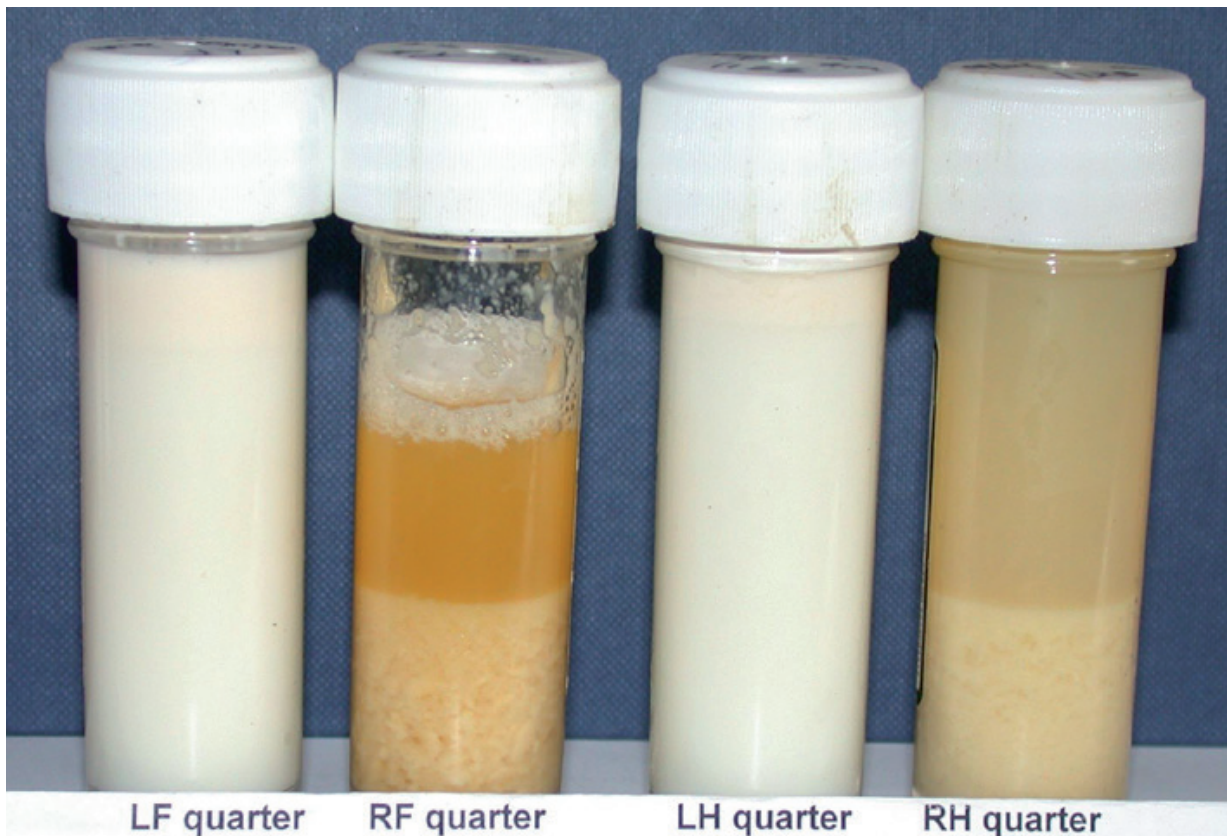


Photo courtesy of Dr William Byrne, DAFM, Backweston, Co. Kildare



## 5. How can I protect my herd from *Mycoplasma*?

### Bio exclusion - keep infection out

*Mycoplasma bovis* is most likely to be introduced by an infected, carrier animal, so good biosecurity is essential to protect your herd. Refer to the steps involved in a bio exclusion plan which have been identified in the 'Purchasing stock: Reducing disease risks' leaflet on the AHI website.

Operating a closed herd and preventing entry of the organism into the herd in the first place is crucial. Ask about the history of farms from which purchase is being considered, including if any cases of suspect *Mycoplasma bovis* associated disease have been identified. It is also very important to ask, if it is a dairy cow, if there is any history of clinical mastitis or high cell count. Buy in as few cows, and from as few separate herds, as possible.



### Biocontainment - limit spread within the herd

Where *Mycoplasma bovis* is already present in a herd, many of the general principles of infectious disease control apply. Ensuring adequate ventilation of sheds where animals are housed, cleaning and disinfection of the sheds and feeding equipment, not feeding colostrum from affected cows, not feeding infected waste milk and regularly observing animals with emphasis on early detection of infection (such as drooping ears) will help control spread of infection. Reducing concurrent stressors e.g. overcrowding, mixing animals of different age groups, addressing other potential causes of immunosuppression e.g. presence of concurrent disease, is also important. Isolation of infected animals (housing them away from the rest of the herd, in a separate airspace and, where relevant, milking them last), will help break the infection cycle whether the main presenting signs relate to pneumonia, arthritis or mastitis.

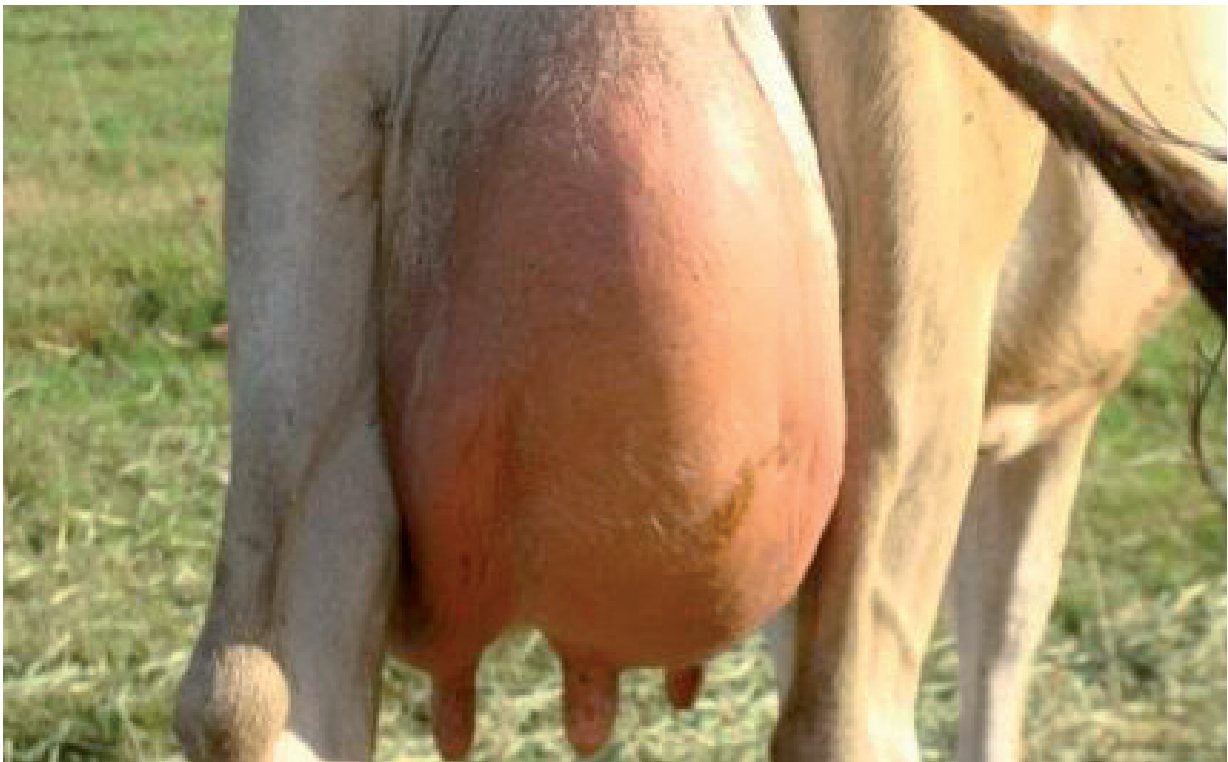


## 6. Mastitis

Control of *Mycoplasma* mastitis is difficult and tends to be farm-specific and depends on the presentation. There is no blueprint for control, but some necessary measures may include:

- Pay the utmost attention to in-parlour milking routine to minimise the risk of spread.
- Check cows regularly for mastitis by forestripping and using CMT for suspect mastitis cases.
- Post milking teat disinfection is essential. Follow AHI's Cell Check Farm Guidelines [click here](#), ensuring adequate amounts of products are applied after every milking.
- Milk infected cows last, to prevent the spread of infection.
- If a *Mycoplasma* mastitis outbreak is suspected, affected cows' milk needs to be aseptically sampled and selective culture or PCR must be specifically requested from the laboratory. Remember to change gloves between cows.
- During an outbreak, bulk tank samples (preferably before and after milking the segregated, infected batch) can be submitted weekly for PCR testing (or monthly, as things improve) to monitor the success of the management changes.

*Mycoplasma* mastitis cases often need to be culled, as the response to treatment is poor and often clinical cases become culture-negative and but can remain as intermittent, clinical shedders.



## 7. PNEUMONIA

In herds infected with *Mycoplasma bovis* one of the goals should be to prevent pre-weaned calves from becoming infected. The animal's immune status is important in the development of *Mycoplasma bovis* pneumonia: failure of passive transfer from colostrum increases the risk and severity of respiratory disease in young calves.

The following strategies can help this by reducing the level of exposure to *Mycoplasma bovis* and maximise calf immunity:

- Use best practice regarding colostrum - feed adequate volumes of good quality colostrum soon after birth; see AHI colostrum leaflet for more details.
- Feed enough pasteurised milk or milk replacer to ensure the calves are well nourished.
- Feed the youngest calves first.
- Don't exceed the recommended stocking rate for calf housing; the house design should maximize air quality, to reduce the risk of housing factors contributing to disease.
- Prompt treatment and isolation of sick calves to an alternative airspace.
- Keep calf pens and feeding equipment clean and disinfected – review current practice.
- Isolate any suspect case and do not share feeding equipment or buckets between suspect cases and other calves.



## 8. REPRODUCTION

Stock bulls have the potential to spread *Mycoplasma bovis* thus highlighting the importance of good biosecurity measures. Ask about the history of any Mycoplasma-associated disease in the source herd if stock bulls are purchased. All abortions should be investigated to give an accurate picture of Mycoplasma-associated abortions in Ireland.

Given the varying presentation of *Mycoplasma bovis* in dairy and beef animals, intermittent shedding, subclinical infection, and the technical difficulties associated with isolation of *Mycoplasma bovis*, a close working relationship with an experienced veterinary practitioner to confirm diagnosis and successfully manage suspected clinical outbreaks is essential to alleviate the stress farmers can experience with managing outbreaks.



#### TECHNICAL WORKING GROUP MEMBERS INVOLVED IN THE DEVELOPMENT OF THIS LEAFLET

##### CALFCARE TWG

**Catherine McAloon (Chair)** - University College Dublin, **Charles Chavasse** - Zoetis, **Muireann Conneely** - Teagasc, **Christine Cummins** - Bonanza Calf Nutrition, **Bernadette Earley** - Teagasc, **Liam Gannon** - Volac, **John Gilmore** - Veterinary Practitioner, **Ian Hogan** - DAFM, **Emer Kennedy** - Teagasc, **Mark Little** - Trouw Nutrition Ireland, **John Mee** - Teagasc.

##### BIOSECURITY TWG

**John Mee (Chair)** - Teagasc, **Stephen Conroy** - ICBF Tully Bull Performance Centre, **Bosco Cowley** - MSD Animal Health, **Lawrence Gavey** - Animal Health Ireland, **Pat Kirwan** - Veterinary Practitioner, **Conor McAloon** - University College Dublin, **Luke O'Grady** - University College Dublin, **George Ramsbottom** - Teagasc, **Eoin Ryan** - DAFM, **Michael Sexton** - Veterinary Practitioner.

##### CELLCHECK TWG

**Simon More (Chair)** - University College Dublin, **Willie Buckley** - Veterinary Practitioner, **Don Crowley** - Teagasc, **Brendan Dillon** - Glanbia, **Kevin Downing** - ICBF, **Edmond Harty** - Dairymaster, **Alan Johnson** - DAFM, **Patrick Kelly** - Munster AI, **Catherine McAloon** - University College Dublin, **Finola McCoy** - Animal Health Ireland, **Padraig O'Connor** - Teagasc, **Luke O'Grady** - University College Dublin, **Frank O'Sullivan** - Veterinary Practitioner, **George Ramsbottom** - Teagasc.

#### TECHNICAL WORKING GROUP RAPPORTEUR

**Michelle McGrath** - Animal Health Ireland.

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Email [ahi@animalhealthireland.ie](mailto:ahi@animalhealthireland.ie)

Web [www.animalhealthireland.ie](http://www.animalhealthireland.ie)

