Principles of diagnosis and control of Mycoplasma Mastitis in dairy farms

Author:**Dr.Babak Khoramian**

Department of Clinical Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad

khoramian@um.ac.ir

Keywords: Mycoplasma mastitis, Control, Diagnosis

Take home massage:

- Mastitis caused by *Mycoplasma species* is highly contagious and causes serious disease and economic loss, especially in large dairy herds.
- Herd prevalence has increased over the past decade, and this increase parallels the increase in average dairy herd size.
- Outbreaks mostly originate from introduction of infected cows to a farm and poor hygienic practices that help to maintain cow to cow transmission.
- *Mycoplasma* transmits at milking time from an infected cow to an uninfected cow via fomites, hands of a milker, milking unit liners, or udder wash cloths.
- *Mycoplasma spp.* are frequently resistant to antibiotic treatment, and can result in chronic and subclinical states of infection.

Introduction: *Mycoplasma bovis* is a highly contagious pathogen with multiple clinical presentations in dairy cows such as pneumonia, mastitis, arthritis, keratoconjunctivitis. *M. bovis* infections have been linked to mastitis outbreaks in dairy herds. Infections usually occur after the introduction of infected animal without any sanitary precautions and the most important route of transmission inside herds is milking instruments such as milking machines, teat cups and milker's hands. Even with strict biosecurity measures and good farming practices, the use of *M. bovis*-positive semen in artificial insemination has caused mastitis outbreaks in previously unexposed dairy herds. A genetic analysis of *M. bovis* strains isolated from mastitis cases and bull semen has shown a close relationship between them, showing a direct link between contaminated semen and mastitis cases. This highlights the importance of careful monitoring of biological materials used in breeding programs to prevent such outbreaks. The role of airborne transmission of *M. bovis* is not well understood, and there is limited experimental evidence supporting this mode of infection. However, re-isolation of *M. bovis* from the upper trachea provides further evidence for this route of infection. Recent studies have suggested that colostrum could be a potential source of *M. bovis* infection, as *M. bovis* DNA has been detected in positive samples. Additionally, specific *M. bovis* strains have been isolated from cows with clinical mastitis and calves with respiratory disease, indicating possible transmission through

contaminated milk. However, other important routes of *M. bovis* transmission, such as direct nose-to-nose contact between animals or contamination via fomites like the hands of farm personnel and equipment, should also be taken into consideration, even though they are difficult to directly prove or document.

Mycoplasma Detection: Various methods have been developed to detect *Mycoplasma spp.,* including microbiological culture, PCR, fluorescent-based methods, ELISA, and commercial kits. Culturing *M. bovis* is considered the gold standard and reliable method, but it is time-consuming and requires specific conditions. Molecular methods, such as PCR, are optimized for detecting *M. bovis* in nasopharyngeal swabs and milk samples. The detection can be improved by enriching the samples in culture prior to PCR and increases the chances of recovering Mycoplasma compared to directly plating the samples on agar.

Prevention and control: The high genetic and antigenic variability of *M. bovis* strains, along with their intracellular nature and biofilm production, make them difficult to control and treat, and actually there is no effective therapy for this infection; thus, the best way of prevention and control is to diagnose and cull the affected cows in the herd. Most cases of mastitis caused by *M. bovis* are subclinical, and the economic loss to dairy farms is mainly due to the hidden nature of the disease. Sampling cows with high somatic cell counts in milk is a commonly recommended method to control subclinical infections caused by *M. bovis*. However, studies have shown that cows without clinical signs of mastitis and low SCCs can still be positive for *M. bovis*, indicating that relying solely on SCC screening may not be sufficient. Implementing measures such as separating clinically affected cows from the main milking group and continuously monitoring the herd through bulk tank milk testing are recommended control strategies. Regular monitoring of mastitis cases, screening pneumonia calves and bulk tank milk testing are recommended as part of *M. bovis* control programs.

The process of eradication is expected to take years to achieve. Pasteurization or heat treatment is a preventive measure to eliminate the risk of *M. bovis* transmission through colostrum or raw milk. Commercial on-farm pasteurizers have shown effective in destroying *Mycoplasma spp*., including *M. bovis*. Farm sanitization using effective disinfectants is another option to prevent and eradicate *M. bovis* infections. Teat dips, particularly iodine-based formulations, have also demonstrated germicidal activity against *M. bovis.* Proper disinfection protocols should be established to reduce the risk of *M. bovis* transmission.

Conclusion: Control of mycoplasma mastitis requires testing and culling where possible. When a large number of cows are infected, strict segregation with adequate management is an alternative. However, animals in this group should never re-enter the Mycoplasma free herd.

Selected References:

- González RN, Wilson DJ. Mycoplasmal mastitis in dairy herds. Veterinary clinics: Food animal practice. 2003 Mar 1;19(1):199-221.
- Fox LK. Mycoplasma mastitis: causes, transmission, and control. Veterinary Clinics: Food Animal Practice. 2012 Jul 1;28(2):225-37.
- Okella H, Tonooka K, Okello E. A Systematic Review of the Recent Techniques Commonly Used in the Diagnosis of Mycoplasma bovis in Dairy Cattle. Pathogens. 2023 Sep 19;12(9):1178.
- Dabiri M, Mirshokraei P, Rad M, Khoramian B. Detection of Mycoplasma bovis in bulk tank milk samples by nested PCR in Mashhad, Iran. Iranian Journal of Veterinary Science and Technology. 2017 Jan 1;9(2):28-32.
- Gelgie AE, Korsa MG, Dego OK. Mycoplasma bovis mastitis. Current Research in Microbial Sciences. 2022 Jan 1;3:100123.
- Dudek K, Nicholas RA, Szacawa E, Bednarek D. Mycoplasma bovis infections—Occurrence, diagnosis and control. Pathogens. 2020 Aug 6;9(8):640.