Mycoplasma bovis infections are on the rise

How do we manage the steadily spreading disease?

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Recently, the diagnosis of Mycoplasma bovis in previously disease-free countries has increased the spotlight on this pathogen. In the UK Veterinary Investigation Diagnosis Analysis (VIDA) data, there has been a steady increase in diagnosable submissions being attributed to M. bovis. In the period from January 2006 to December 2017, there were 1,102 diagnoses of M. bovis associated with respiratory disease, mastitis and arthritis. Of these diagnoses 86.4 percent were associated with respiratory disease. The proportion of respiratory cases being attributed to M. bovis has increased steadily with the organism being identified in 7.5 percent of cases where a diagnosis was reached.

The full economic cost of M. bovis in cattle is difficult to determine. In the US, one report estimated costs to the US beef industry of $32 million per year as a result of loss of weight gain and carcass value, and $108 million per year to the US dairy industry as a result of M. bovis mastitis. The absence of accurate prevalence figures makes economic analysis difficult, although it is clear that the costs of disease include reduced production, drugs and labour for treatment, death and culling losses as well as the financial impacts of implementation of diagnostic and control measures. Costs per case are typically high, relative to other pathogens. M. bovis can also contribute significantly to antimicrobial usage on-farm and was highlighted as a specific focus area for the Responsible Use of Medicines in Agriculture (RUMA) Targets Task Force Report.

The organism

Mycoplasmas belong to the class Mollicutes and are distinguished by their lack of a cell wall. They are generally host-specific with 13 species having been identified in cattle, although not all are implicated in disease. The ability of M. bovis to produce biofilms and also change their surface proteins allows it to colonise and persist on mucosal surfaces and enables it to evade host immune responses.

M. bovis has been recognised as a pathogen in cattle for over 50 years, and in experimental infection studies it has been demonstrated to cause mastitis, respiratory disease and arthritis. In naturally occurring infections, M. bovis can be isolated in pure culture in cases of mastitis, arthritis, tenosynovitis, abortion, keratoconjunctivitis and pneumonia. In calves, M. bovis is the predominant pathogen isolated from the middle ear of animals with otitis media. Across both experimental and natural infections, variable disease expression is a key feature, which along with the limited sensitivity of some diagnostic methodologies has resulted in a number of knowledge gaps about this pathogen.

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Transmission

The organism can be carried asymptomatically, and the introduction of these subclinical animals is thought to be the primary means by which naïve herds become infected. Once present in a herd, M. bovis can be readily transmitted from infected to uninfected cattle. Transmission is reliant on close contact with aerosol being believed to be the main route of spread. In calves, infection can also occur via maternal contact and also infected milk. Fomite-mediated transmission has been demonstrated to occur and, whilst mycoplasmas are susceptible to desiccation and sunlight, M. bovis can survive for long periods in protected environments with the greatest survival in cool, humid conditions.

Diagnosis

Rapid and accurate diagnosis of M. bovis infections is compromised by the low sensitivity and some cases specificity of available tests and further complicated by subclinical infections and intermittent shedding.