Two-page summary of *Mycoplasma bovis*, the diseases it causes, and its surveillance, diagnosis and control

What are mycoplasmas? Mycoplasmas area group of very small bacteria which have unusual characteristics making them different from most other bacteria. Over 125 species in animals are known; in general each species infects only one type 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 – *Mycoplasma bovis* is the most severe of these infections.

Special characteristics of Mycoplasma bacteria (including *Mycoplasma bovis*) include defense mechanisms including:
- The lack of the cell wall so that certain widely-used antibiotics are not effective.
- An ability to hide away from the immune system so that infections are difficult for cows to fight
- Ability to create conditions that allow evasion from antibiotic treatment (e.g. within large abscesses).

These defences make treatment and detection of the disease difficult.

What is *Mycoplasma bovis*?
A member of the *Mycoplasma* genus of bacteria, found worldwide except (previously) New Zealand. Listed as an Unwanted Organism under the Biosecurity Act 1993.

Causes a chronic disease causing long-term losses to dairy and beef producers, and potentially resulting in severe disease and significant welfare issues. *Mycoplasma bovis* causes a constellation of diseases, including mastitis in dairy cows, arthritis in cows and calves, pneumonia in calves, and various other diseases likely including late-term abortion. Not all infected cows get sick – some shed the disease without becoming ill, allowing for transmission between farms if these cows are moved.

Mycoplasma bovis does not cause disease in humans. It does not cause severe disease in animals besides cattle, although it can cause rare mild infections in sheep, goats, and other related species.

International status:
Mycoplasma bovis is present in most countries in the world, and is not listed by the OIE. New Zealand is special in having been free of this disease until now; this has saved our farmers production costs, disease costs, and farm management costs that other countries have faced for decades.

Diseases caused by *Mycoplasma bovis*:
Major syndromes seen in other countries with *Mycoplasma bovis*:
- Atypical mastitis in cows (both dry and in milk) – (the chance of this disease likely increases with increasing herd size)
- Arthritis in cows and calves
- Atypical, difficult-to-treat pneumonia in calves
- Middle ear infection (otitis media) in calves
- Severe pneumonia of adult cows (usually rare)
- Abortion
- All conditions are difficult to treat once the animal becomes sick

It is important to note that the disease seems to behave differently in some affected countries, with different production systems and other factors playing a role (e.g. cow genetics, stresses, concurrent diseases, environmental factors etc.).

The way this disease has behaved in NZ so far includes: mastitis in dry and milking cows, arthritis in cows, and late-term abortions and premature calves. However the major diseases seen later in the season will likely include disease of calves, including pneumonia.

Disease transmission
- Shedding from infected animals occurs mainly from the eyes, nose, vagina, rectum, semen and milk. Animals do not have to be visibly sick in order to shed the agent. The agent enters the animal's body by ingestion or inhalation, becomes widely distributed (bacteraemia) and establishes a localised infection. In cases of mastitis, the agent may directly invade via the teat canal.
- Spread between cows: Transmission between cows is probably due to spread at milking time, and through repeated direct or environmental contact with a cow shedding the agent (clinically or subclinically).
- Spread between farms: *Mycoplasma bovis* is spread primarily by movement of infected cattle or in-contact equipment (e.g. milking equipment, artificial insemination equipment). Neighbouring farms can be infected by close and repeated contact over short distances (e.g. fencelines); untreated infected milk can also be a source of infection to calves on other properties. Fortunately, wind-borne spread is thought to occur only over very short distances (metres).

Treatment of infected animals and properties
- Treatment for *Mycoplasma bovis* requires very long time periods and does not always result in disease cure
- Cows that recover from mastitis often continue to shed *Mycoplasma bovis* and should be treated as persistently infected. To produce a disease-free property, it is likely that all animals currently or previously infected with *Mycoplasma bovis* require culling.

Disease prevention and control
- Controls on movement of cattle and equipment is the best way to prevent spread of the agent. Since infected cattle do not always appear sick, known "positive" farms must be treated as though every animal could be infected.
- Feeding of waste milk to calves is not recommended where *Mycoplasma bovis* has been diagnosed.
- Cooked meat and pasteurised milk from "positive" farms are non-contagious and should not require movement controls.

Diagnosis methods
- Molecular techniques such as PCR can be used to find disease in individual cows and to screen herds for disease. Screening is important since asymptomatic "Trojan cows" can spread the disease silently to other farms.
- Serology (measuring antibodies in the blood) can be used to detect disease in a herd and can provide evidence of active infection.

Surveillance options
- In New Zealand, very few diseases mimic this one, therefore enhanced passive surveillance by VS meatworks vets, commercial veterinarians and commercial veterinary laboratories should help us keep good surveillance on this disease, and many years of work ensure that these bodies have good awareness of the MPI Exotic Pest and Disease Hotline number.
- Active surveillance for farms identified as having increased risk of disease can be done at many levels and with high level of confidence of detecting disease.