Predictive assessment of the potential impact of *Mycoplasma bovis* on the New Zealand beef sector

INTRODUCTION

1. Growing evidence supports that *M. bovis* is contained to the known infected properties and, possibly, those under movement restrictions awaiting confirmation of status.
2. There is no reason to believe *M. bovis* is more widespread and, therefore movement of animals between other properties presents no greater risk than it did previously.
3. We have limited experience with *M. bovis* in New Zealand which makes it impossible to be certain what the impacts of the disease would be, **if it became established**.
4. This predictive impact assessment has been developed from industry and veterinary technical experts' consideration of the epidemiology of *M. bovis* and New Zealand's farming systems. It is predictive and not founded on actual observations of the how *M. bovis* behaves in New Zealand, because such information is unavailable at the time of writing. Consideration will be given to updating this assessment if/when further information becomes available.

IMPACT ON TRADITIONAL NEW ZEALAND BEEF FARMS

5. The scientific literature includes some reports of disease impacts on beef production overseas, but these are in very different management systems to the extensive grazing operated here (e.g. in feedlots, European style winter barns).
6. The reason this is relevant is that *M.bovis* in beef animals overseas presents as a respiratory problem that is exacerbated considerably by keeping animals confined and in close proximity. It is also relevant because, like many other diseases, clinical signs may only become apparent when animals are stressed, which occurs less for cattle reared extensively.
7. The opinion of experts we've talked to from Massey University and from Australia, where the disease has been present for years, is that *M. bovis* would be unlikely to cause any significant production or animal welfare impacts on extensive sheep and beef farms, i.e. it may even go unnoticed.

IMPACT ON CALF REARERS

8. Farms that purchase calves from dairy farms and rear them together in close proximity take a bigger risk of animal health issues caused by *M. bovis* than extensive farms. The main issue seen in calves infected with *M. bovis* is respiratory disease, although arthritis (seen clinically as joint swelling and lameness) is also seen. This is usually at the same time or subsequent to respiratory disease.
9. There are two main routes of infection in calves – via milk of infected cows (including via fomites contaminated from this milk (e.g. calfeterias) and from other calves. Both of these can be significant routes of infection for calf rearers.
10. Calves can be infected via the milk in two ways:

- First, if infection is present on the farm of origin, milk fed from an infected cow either through sucking an infected dam or by being fed unpasteurised, pooled colostrum or bulk, unpasteurised whole milk can transfer disease. The latter two practices can result in the infection of large numbers of calves, even if the number of infected cows is low.
- Second, if calf rearers source and feed unpasteurised whole milk from infected farms (either home produced or purchased) then calves can become infected after arriving on the rearing farm.

beef+lamb new zealand
DairyNZ
DCANZ Dairy Companies Association of New Zealand
Federated Farmers of New Zealand
NZVA New Zealand Veterinary Association
Dairy Cattle Veterinarians The Society of Dairy Cattle Veterinarians of the NZVA
Ministry for Primary Industries Manatū Ahu Matua

September 2017

11. It is important to realise that infection does not mean disease. Cattle can become infected without developing disease.

- Clinical disease requires the presence of *M. bovis* and environmental conditions that precipitate the disease.
- The bacteria need to multiply and move, in sufficient numbers, from the upper respiratory tract to the lower respiratory tract.
- This is very unlikely to occur unless there is an additional trigger or precipitating stress factor allowing lower respiratory tract colonisation and proliferation.
- The most important of these triggers is a poor environment.

12. Damp, humid, poorly ventilated environments with high levels of ammonia (from the breakdown of urine) greatly decrease the defences of the calf's respiratory system and allow *M. bovis* to colonise the lungs and cause pneumonia (especially if other respiratory pathogens are present such as viruses). Thus if calves are housed in a poor environment then *M. bovis* infection is likely to be associated with disease.

13. This (stressor + exposure + colonisation) scenario is an extremely common finding in respiratory disease.

    New Zealand has many of the major respiratory pathogens seen in the Northern hemisphere (e.g. IBR, PI3, *Histophilus somni* and *Mannheimia haemolytica*).

    Nevertheless, respiratory disease is very uncommon in calves in New Zealand.

    This is because most calves in New Zealand do not spend significant amounts of time in the calf house but are turned out to pasture as soon as the weather is suitable (i.e. around 2-4 weeks of age). Despite poor ventilation in some calf sheds, exposure to the environmental stressors related to housing is therefore limited.

    Calf pneumonia does occur in New Zealand, but in contrast to the Northern Hemisphere where it is a continuous problem, it is a sporadic disease in New Zealand.

    One key difference between *M. bovis* and other respiratory pathogens is that disease can be seen in very young calves (from 2 weeks of age,). This is principally due to calves becoming infected via milk, which does not occur with the other respiratory pathogens. Thus respiratory disease due to *M. bovis* is more likely to be seen in New Zealand, should infection become endemic, than is the case for other respiratory pathogens that are already here. However, early respiratory disease due to *M. bovis* is only likely to occur if calves are infected by being fed infected milk at (or soon after) birth, either at source, or on the rearer property.

14. *M. bovis* is spread between calf groups highly efficiently, but direct spread between calves takes longer than those becoming infected by being fed infected milk. This means that in calf management systems typical in New Zealand, calves are far more likely to be infected only a short period of time before (or even after) turn-out. Purchase of infected calves is, therefore, unlikely to significantly increase disease risk in other calves unless they are housed together and kept housed for periods that are longer than is normal in the New Zealand situation.

15. In Northern hemisphere systems, not only are calves housed for prolonged periods, but new calves are brought into the system throughout the year. This means that infection persists within the calf house, allowing the build-up of infection pressure over time.

16. In the seasonal New Zealand-system, there is less increase in infection pressure, as new groups of naïve calves are usually brought on to the farm only during a specific period. As well, older groups (which are the source of infection) are removed from the house and thus cannot spread disease to the younger calves whilst housed.

17. On well-managed farms, spread of *M. bovis* can occur without clinical disease.

18. When assessing the risk of disease, the key risk factors are:

- **Infection status of the source herds**
  - infected milk produces infected calves
- **Infection risk from infected milk being fed**
  - can be nearly eliminated by pasteurization and eliminated by using milk replacer.
- **Age of arrival**
  - The later the calves arrive on farm the less the rearer can do about *M. bovis* risk
- **Mixing policies**
  - mixing calves from multiple farms increases risk of infection
  - mixing older calves with younger ones increases risk of infection
- **Housing policies**
  - calves kept housed for > 1 month have a greater risk of disease
- **Ventilation quality**
  - poor ventilation increases risk of disease

19. The more risk factors that apply, the greater the risk that clinical disease will develop. Disease can occur in infected calves turned out to pasture at two weeks of age (though this is unlikely and fewer calves are likely to be affected), but is much more likely in calves brought on to the farm at 2 days of age, which are fed infected milk, mixed with older infected calves, and kept housed with others for 2 months in a building with poor ventilation.

BEEF "FEEDLOTS"

20. Although still uncommon, finishing beef animals in semi-permanent or permanent "feedlots" is increasing in some parts of New Zealand. These activities, and in some cases, winter break feeding, have attributes which may increase the risk of *M. bovis* disease developing among stock. These include increased stocking density and environmental stress.

IMPACTS OF CATTLE PRODUCTS

21. Producers should also be aware that establishment of *M. bovis* in New Zealand may negatively impact revenue derived from the trade in bovine blood products, as New Zealand products currently command a premium on account of our cattle being free from many diseases, including *M. bovis*. It is also possible that processing costs for blood products may increase to provide extra assurances that these have been derived from *M. bovis* free animals.

A NOTE OF CAUTION

22. Expert opinion and the available scientific literature suggests that *M. bovis*, if established, would not have significant unmanageable impacts on beef breeding herds or calf rearers in New Zealand. However, the New Zealand cattle herd is understood to be immunologically naïve to this bacterium. This, together with some aspects of how our industries are integrated, could contribute towards negating the otherwise protective effects of the management systems described above. We are collectively seeking to understand the disease with a view to eradicating it.

This Predictive Impact Assessment was developed by the *M. bovis* Response Industry-MPI Technical Working Group, September 2017.