EPI OVERVIEW:
MYCOPLASMA BOVIS
PROGRAMME
August 2019
ACKNOWLEDGEMENTS

Present and past disease control and intel team members and all programme staff
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ROADMAP

Objectives of presentation and background
Streams of surveillance
Data collection
Analyses
Results
Summary
BACKGROUND AND OBJECTIVE

- The first case of *Mycoplasma bovis* in New Zealand was confirmed in mid-2017
- The eradication programme was announced by the government in mid-2018
- Predicted to last around 10 years
- Two years for phased eradication
- Remainder aimed at targets of provisional freedom, absence of infection and proof of freedom
- Update on the ongoing surveillance streams and what we are learning from them
Mycoplasma bovis
Eradication Programme update

To date, there have been **182 Confirmed Properties**

- 40 North Island
- 142 South Island
- 166 Cleared Properties
- 96 Active Properties
- 19 Dairy
- 67 Beef
- Other

there are **263 properties** under a Notice of Direction
and **543 properties** under Active Surveillance

What's changed over time?

- 111,273 Animals have been culled
- 803 Properties released from NoD movement restrictions
- 857,578 Tests completed
STREAMS OF SURVEILLANCE

- Report cases
- Tracing
- Contiguous Farms
- National Bulk Tank Milk
- Abattoir surveillance (pilot)
- Aggregator surveillance
- Testing mastitic milk from vet clinics
LINKING NODES

- No evidence exists that supports multiple incursions – in this context when we talk about unlinked nodes, we are using this as working language to indicate that we are still investigating exactly how a property was infected.

- Sometimes the regular process (EDIRs, re-interviews; on farm censuses, ASDs etc) resolves the issue and we can link the node in a satisfactory way to our known network.

- We expect that there will be cases which we can’t define the infection link, but need to exhaust all the avenues – gives confidence in delimiting and we make sure we understand exactly how disease is spreading.

- So in a highly linked network the problem is often knowing which farm of multiple possible farms infects a new case.
We are conducting this programme given a particular infection hypothesis for New Zealand; a single exotic incursion into a dairy herd in recent history. This hypothesis is supported by current surveillance activities, as revealed by tracing and testing, delimiting surveillance, and phylogeny.
ROADMAP

Objectives
Spring 2018 screening
Autumn 2019 screening
Ongoing screening
FAQs
OBJECTIVES BTM SCREENING

• Determine the presence of *Mycoplasma bovis* outside of our current understanding of the disease risk
- Rationale
- Completed April 2019
- ELISA and PCR test
- 102,757 tests: 33,876 ELISAs, 68,881 PCRs
- 63 positive ELISA results (0.2%), 58 suppliers (0.5%), 57 farms
  - 14 farms already known to the Programme, 5 confirmed as not infected, 9 confirmed as infected (64%)
  - 43 farms unknown to the Programme, 40 confirmed as not infected, 3 confirmed as infected (7%)
- Evaluation of test performance
AUTUMN 2019 BTM SCREENING

• Rationale
• Samples collected for six fortnights from 15 April 2019
• Testing started 10 June 2019. Testing now complete.
• Stored and fresh
• 34,033 ELISA tests, 10,556 suppliers
• 175 positive test results (0.5%), 155 suppliers (1.5%)
• Includes four RP dairies
• Forward movement control restrictions (NODs), census, on-farm sampling
ONGOING BTM SCREENING

• Rationale
• Monthly from July 2019
• July results: 1,520 ELISA tests, 2 suppliers with ELISA positive test result (0.1%)
• August results: to be reported
BTM FAQs

1. **ELISA cut-offs**
2. What does an ELISA positive test result mean for my client?
3. Time from test result to farmer contact
4. Likelihood of true infection
5. False positive ELISA test results
6. Access to negative test results
BTM FAQs

1. ELISA cut-offs
BTM FAQs

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KEY MESSAGES

• The ELISA test is used to screen bulk tank milk samples
• The predictive value of the ELISA test + on-ward transmission risk of dairies indicates importance of placing forward movement restrictions
• Continuous assessment of ELISA test performance
ROADMAP

Transmission
Properties tested under Programme Surveillance
Diagnostic tests
Movement restrictions
Recent changes to sampling
Supporting farmers though the Programme
TRANSMISSION OF INFECTION

Movement of infected cattle

OR

Movement of milk containing the bacteria
PROGRAMME SURVEILLANCE

• Forward trace farms – farms that received cattle from a confirmed case farm during the infection window for the confirmed case farm

• Forward trace farms in the ‘buffer’ – farms that received cattle from a confirmed case farm but prior to the infection window for that confirmed case

• Back trace farms – farms that supplied cattle to a confirmed case farm during the infection window and in the ‘buffer’

• Contiguous farms – farms that share a common boundary with a confirmed case farm

• ‘Owner other’ farms – farms owned or managed by a person who also owns or manages a confirmed case farm
No ‘perfect’ diagnostic test

- ELISA on serum
  - First BioVet, then BioX, since July 2018 IDVet
  - Detects antibody to *M. bovis*
  - Sensitivity 0.79 and specificity 0.98 on serum based on an S/P% $\geq 90\%$
  - Not all exposed animals mount an immune response or become infected
  - Doesn’t detect all infected animals = false negative animals
  - Potential for cross reaction with other ‘stuff’ = false positive animals
  - Majority of cattle in NZ do not have *M. bovis*, therefore more false positive *individuals* than truly positive *individuals*

A very, very good herd-level diagnostic test
ELISA performance

✓ Even better now that IDVet has come on board and we have 1000s of results to analyse to determine performance

✓ High degree of confidence in a negative herd-level result if a sufficient number of cattle are sampled from a group of cattle

✗ What about small groups?
Isn’t PCR better?

- **PCR**
  - Need to be able to get a sample from an infected animal that contains the bacteria
    - Not as easy as it sounds
    - Depends in part on how that animal became infected
  - Even if the animal is infected, doesn’t mean the bacteria is in the place we stick the swab at the time the animal is sampled
  - Even if the bacteria is present, not all samples will test positive
  - Lots of potential for false negatives
  - Advantage: very very few false positives
PCR performance

✔ Tonsillar swabs
  • Sensitivity estimated to be low
  • Significantly more sensitive compared to PCR on nasal swabs and milk
  • Generally collected at slaughter
    • Live animal sampling is possible but requires technical expertise +/- chemical restraint, not be done as part of programme surveillance

✔ Nasal swabs
  • Okay for animals less than a year of age **BUT** nothing older (younger is better)

✔ Milk
  • Better than nasal swabs… If you’ve got an udder that makes it

*Herd-level ELISA and PCR on tonsillar swabs are highly sensitive and specific in combination*
**MOVEMENT RESTRICTIONS**

- Forward trace farms (and any farms subject to programme surveillance with a non-negative serology result)
- s122 movement control NOD – restricts movement of cattle off of the farm
- s121 NOD to examine for trace animal(s) at slaughter
- s121 NOD to census
- For s122 movement control NOD to be revoked
  - On-farm sampling including traces – herd-level serology negative
  - Sampling of traces at slaughter – PCR negative on tonsillar swabs
  - Completion of census with review, no additional trace animals identified
RECENT CHANGES TO SAMPLING

- Thousands and thousands of samples tested
- Refined understanding of IDVet sensitivity and specificity, both at the individual animal and herd level
- One larger sampling ‘round’ is better than multiple smaller sampling ‘rounds’
- Forward trace farms where trace animals are no longer present, back trace farms, contiguous farms, ‘owner other’ farms, BTM ‘detect’ farms – one round of sampling provided sampled group(s) ≥40 cattle and herd-level serology results are negative
- Forward trace farms where trace animals are present – two round of sampling provided all results (on-farm herd-level serology and PCR testing of tonsillar swabs) are negative
RECENT CHANGES TO INTERPRETATION

- Threshold to call an individual animal a ‘reactor’ – $S/P\% \geq 90\%$ (kit classifications are weak positive $80\% > SP\% \geq 60\%$ and positive $S/P\% \geq 80\%$)

- Herd-level serology positive - $\geq 3\%$ ‘reactors’
  - Increasing animal-level specificity
  - Decreasing the percentage of ‘reactors’ for a positive herd-level serology result

- Two positive herd-level serology results for a Confirmed Property

- Vast majority of properties will have their disease status determined after two ‘rounds’ of sampling, many after one round of sampling
  - No new risk events – trace forward animals, BTM ‘detect’ results
  - Sampling performed correctly

- Maximum number of rounds of sampling – four ‘rounds’ (very very few farms)
SUPPORTING FARMERS THROUGH THE PROGRAMME

- Ensure NAIT records are up-to-date
- Identify trace cattle
- Get on-farm sampling completed ASAP
- Get trace cattle valued and sampled at slaughter, either at the works or on farm, ASAP
- Have on-farm testing completed ASAP
- Have the census completed ASAP
WHAT TO DO IF YOU SUSPECT M. BOVIS

August 2019
Clinical signs

- Vary depending on farming type and age and class of stock
- Nothing to distinguish *M. bovis* from endemic diseases…
  - Mastitis
  - Agalactia
  - Lameness due to infectious arthritis
    - Cows, other stock classes and calves
  - Clinical signs of pneumonia
    - Cows, other stock classes and calves
  - Ill-thrift calves
  - Less commonly progressive neurological disease in calves, conjunctivitis, reproductive losses
- Only a few farms have evidence of clinical disease
WHAT TO DO

- 0800 80 99 66
- Will want details of yourself/ animal owner/ land owner/ property address
- Clinical signs and history
- Report case manager will contact you to assess case and need for sampling
- Will detail what samples to obtain
  - Blood – at least 5mls in a “red top” tube
  - Possibly milk, nasal swabs, joint fluid, post-mortem samples
- Samples to the Animal Health Laboratory
- Can invoice MPI (need to be a current supplier)
SAMPLING

- Tonsillar crypt
- Will be PCR
- If positive definitive for disease status on property
- Sampling post slaughter is preferable, “in vivo” difficult
- Nasal swabs – only for animals <12 months
SAMPLING
ANY QUESTIONS?

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