WEBINAR:
Leptospirosis on Dairy Farms

The FLAG – Dairy Group
FLAG - Dairy [http://leptospirosis.org.nz/]

- **Group investigating leptospirosis in dairy cattle**
- **Members:**
  - Massey: Yuni Yupiana (PhD), Peter Wilson, Jenny Weston, Emilie Vallee, Jackie Benschop, Julie Collins-Emerson, David Wilkinson, Neville Haack, Sha Nisa, Cord Heuer
  - NZVA: Roger Marchant, Mark Bryan, Neill MacPherson
  - DairyNZ: Nita Harding, Chris Morley
  - Louise Askin (SFF/MPI), Shirley Read (RWNZ), Richard McIntyre (Federated Farmers NZ)
- **Funding:**
  - SFF/MPI, AGMARDT, DCV/NZVA, S&B/NZVA, MSD, ZOETIS, VIRBAC, Wairarapa Vet-Association
Agenda

1. Are dairy farmers protected against LEPTO?
2. Background: why was a large survey done?
3. Findings to date
4. Consequences
5. ‘Other business’
6. Forum discussion / your queries, comments
1 – Are dairy farmers protected against LEPTO?

Notified human cases NZ: ESR Sanhueza et al. 2014

Ballum

- Dairy
- Abattoir
- Farmer
- Drystock
- TruckDriver
- Other/Unknown

Hardjobovis

- Dairy
- Abattoir
- Farmer
- Drystock
- TruckDriver
- Other/Unknown

Tarassovi

- Dairy
- Abattoir
- Farmer
- Drystock
- TruckDriver
- Other/Unknown

Pomona

- Dairy
- Abattoir
- Farmer
- Drystock
- TruckDriver
- Other/Unknown
3 human cases: unvaccinated dairy herd 2015

- Farm with 2 herds
- 3 workers hospitalised within 3 month; one still unable to work today
- Lepto confirmed by MAT: 2 Hardjobovis/1 Pomona

1st case diagnosed  2nd case diagnosed  3rd case diagnosed

January  February  March
WAIKATO 2004 – 2010:

Dairy farmers vs. other farmers and abattoir workers

- Cowie and Bell: A retrospective review of notified human leptospirosis cases in the Waikato region of New Zealand, 2004 to 2010. NZMJ 27 July 2012, Vol 125 No 1358
Reasons for the NZ dairy herd study Jan-Mar 2016

• ‘Parramore’ study
  – 2 Dutch student’s project Jennifer P. (2011) and Ruth Meenks (2010)
  – 44 herds, 10 cows/herd, 30% herds and 3.8% cows urine-PCR positive
  – Early vaccination of calves ~ herds less likely to have shedders (?)
  – No blood taken (serovars??), convenience sample

• Best Practice:
  – 1st vaccination calves <3m; complete 1st course before Xmas
  – whole herd at dry-off in fall

• QUESTIONS:
  – HOW are dairy farmers actually vaccinating their stock?
  – Is vaccination effective in the field?
  – Which serovars are involved with shedding?
  – Are some practices better than others?
    • → Evidence for the need to revise Best Practice recommendations?
Survey design

- 200 dairy farms selected randomly from DairyNZ database
  - Stratified by region, herd size
- 20 lactating cows selected randomly in each herd
  - Blood (MAT), urine (PCR)
- January – March 2016
  - 6 – 12 months after last vaccination:
Serology [vaccine serovars]

**Hardjobovis**
- 44% ≥1:48

**Pomona**
- 28% ≥1:48

**Copenhageni**
- 6% ≥1:48

→ 20% used 3-way vaccine
3 – Findings to date

**Serology** [vaccine + non-vacc serovars]

**Hardjobovis**
- 44% ≥1:48

**Pomona**
- 28% ≥1:48

**Copenhageni**
- 6% ≥1:48

→ 20% used 3-way vaccine

**Ballum**
- 3% ≥1:48

**Tarassovi**
- 17% ≥1:48
### Shedding: PCR+

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Herds</strong></td>
<td>200</td>
</tr>
<tr>
<td>Herds shedding (≥1/20 urine PCR+)</td>
<td>53</td>
</tr>
<tr>
<td>Prevalence</td>
<td>26.5%</td>
</tr>
<tr>
<td><strong>Animals</strong></td>
<td>4000</td>
</tr>
<tr>
<td>Animals shedding (urine PCR+)</td>
<td>94</td>
</tr>
<tr>
<td>Prevalence</td>
<td>2.4% [95%CI: 1.8 – 3.1%]</td>
</tr>
<tr>
<td><strong>Animals in PCR+ herds</strong></td>
<td>1060</td>
</tr>
<tr>
<td>Animals shedding/pos. farms</td>
<td>94</td>
</tr>
<tr>
<td>Prevalence</td>
<td>8.9%</td>
</tr>
</tbody>
</table>
Serology vs. shedding

- No relationship between HAR, POM, COP, BAL with shedding
  - Vaccination works!  
  - BAL/Cop exposure low
- Shedding increases with higher TAR titres:

![Graph showing probability of a positive urine PCR (p<0.0001)](image)
Serology vs. shedding

• ‘Utility’ of MAT-testing cows for TAR?

<table>
<thead>
<tr>
<th>PCR-pos / 20 cows</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAR96-neg herds</td>
<td>67</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>80</td>
</tr>
<tr>
<td>TAR96-pos herds</td>
<td>80</td>
<td>22</td>
<td>5</td>
<td>9</td>
<td>3</td>
<td>1</td>
<td>120</td>
</tr>
<tr>
<td>Total herds</td>
<td>147</td>
<td>32</td>
<td>7</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>200</td>
</tr>
</tbody>
</table>

• Diagnostic values for testing individual cows:
  – In a TAR_96 positive herd: if $\text{MAT} \geq 96$ → 89% urine PCR positive
  – In a TAR_96 positive herd: if $\text{MAT} \leq 48$ → 98% urine PCR negative

• **Testing useful in high TAR risk herds – but not if the risk is of TAR is unknown**
Timing of 1st calf vaccination

3 – Findings to date

Calendar months of 1st calf vaccination

Age of calves at 1st vaccination

Best Practice
Does Tarassovi cause illness in dairy farmers?

- Cowie and Bell: A retrospective review of notified human leptospirosis cases in the Waikato region of New Zealand, 2004 to 2010. NZMJ 27 July 2012, Vol 125 No 1358

Table 4. Number of cases (%) for each serovars for the three largest represented occupation groups, Waikato District Health Board, 2004 to 2010

<table>
<thead>
<tr>
<th>Occupational group</th>
<th>Serovar case numbers (%)</th>
<th>Tarassovi</th>
<th>Other Serovar</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy farmer</td>
<td></td>
<td>11 (44)</td>
<td>14</td>
<td>11/25 ~ 44%</td>
</tr>
<tr>
<td>Farmer and farm manager</td>
<td></td>
<td>2 (5.9)</td>
<td>9 (26.5)</td>
<td>3/51 ~ 6%</td>
</tr>
<tr>
<td>Meat processor</td>
<td></td>
<td>1 (5.9)</td>
<td>1 (5.9)</td>
<td>17 (100%)</td>
</tr>
</tbody>
</table>

→ Leptospirosis of dairy farmers is 7-fold as often due to TAR as of other farmers or meat workers (p=0.004)

Northland ‘outbreak’ 2016: 4 TAR + 1 POM with dairy/beef exposure 9 BAL with mainly rodent, possum exposure
Do non-vaccine serovars occur in dry stock?

- **2009/10 survey** Verdugo et al. 2013 (PhD)
  - Alice Mannewald, vet-student from the Swedish University of Agriculture Sciences, tested & reported (2016)

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Tarassovi</th>
<th>Ballum</th>
<th>Copenhageni</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>1,043</td>
<td>18%</td>
<td>14%</td>
<td>13%</td>
</tr>
<tr>
<td>Deer</td>
<td>1,193</td>
<td>4%</td>
<td>7%</td>
<td>16%</td>
</tr>
<tr>
<td>Sheep</td>
<td>1,642</td>
<td>14%</td>
<td>10%</td>
<td>17%</td>
</tr>
</tbody>
</table>
What’s next?

• Please send us **kidneys** from culled cows with evidence of lepto
  – Received 21 kidneys to date
  – No positive culture yet

• Vaccine development: TAR

• Veterinary consultation:
  – the **major risk** remains Hardjo/Pomona
  – Vaccines work, so urge to vaccinate, use **Best-Practice**
  – If **anyone on farm** has flu-like disease - get tested and treated **early**
  – Take precautions: hygiene + PPE, rodent control, control pigs
  – Think of: effluent spray, assisted calving, home kill, hunting
Other Business: **ILS2017**


• Top keynote speakers

• Exciting topics: OneHealth, extension/disease control, vet/med, vaccines, genomics

• 3 workshops (microbiology, genomics, epidemiology) – a farm visit

• Generous hosting, entertainment, wine excursion

Meet Our Keynote Speakers

Professor Ben Adler
Monash University
Professor Ben Adler is interested in the smallest things, which also happen to be among the... More

Doctor Colleen Lau
Dr Colleen Lau is a clinician with special interest in travel medicine and tropical medicine... More

Renee Galloway
Centers for Disease Control and Prevention
Renee Galloway earned a Bachelor of Science degree in Medical Technology from the University of... More

Dr Mathieu Picardeau
Dr Mathieu Picardeau is Head of the Laboratory of Spirochetes, Dpt. Microbiology at the... More

Kathryn Alan
University of Glasgow
Despite recent advances in disease... More

Professor Michael Baker
University of Otago
Professor Michael Baker is public health... More

Jackie Benschop
Massey University - Institute of Vet, Animal and Biomedical Sciences
Jackie's involvement in leptospirosis... More

Dr Julie Collins Emerson
Massey University
Julie’s involvement in leptospirosis... More
WEBINAR

Discussion forum