Leptospirosis in Pastoral Livestock

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Wildlife
- Possum: Balcanica
- Rabbit: ??
- Wild pig: ??
- Hedgehog: Ballum, Pomona
- Rat/mouse: Ballum, Copenhageni
- Hardjobovis, Bratislava, (Ballum, Pomona, Tarassovi, Copenhageni, Canicola)

Soil and water
- Hardjobovis, Pomona, (Tarassovi, Copenhageni, Ballum, Arborea)
- Hardjobovis, Pomona, Tarassovi (Copenhageni, Ballum)
- Hardjobovis, 46%, Pomona 23%, Ballum 18%, Tarassovi 8%

Livestock
- Hardjobovis, Pomona, Tarassovi (Copenhageni, Ballum)
- Copenhageni, Hardjobovis (Pomona, Ballum, Tarassovi, Canicola)
- Hedgehog: Ballum, Pomona
Agenda

• How much lepto is out there?
  – serovars x host species x environment
• Effects on animal production
• Public health burden
• Environmental impact
• Conclusion: protecting humans
# Lepto in livestock

**MAT sero-prevalence in adult animals**

<table>
<thead>
<tr>
<th>Herds</th>
<th>Animals</th>
<th>≥ 96</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep</td>
<td>97%</td>
<td>51%</td>
</tr>
<tr>
<td>Deer</td>
<td>76%</td>
<td>34%</td>
</tr>
<tr>
<td>Beef</td>
<td>97%</td>
<td>58%</td>
</tr>
<tr>
<td>Dairy</td>
<td>81%*</td>
<td>20%*</td>
</tr>
</tbody>
</table>

**Shedding: cattle urine PCR+**

![Shedding: cattle urine PCR+](chart.png)
Leptospirosis in livestock

MAT Sero-Prevalence

- Non vaccine serovars

<table>
<thead>
<tr>
<th></th>
<th>Tarassovi</th>
<th>Ballum</th>
<th>Copenhageni</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep</td>
<td>14%</td>
<td>10%</td>
<td>17%</td>
</tr>
<tr>
<td>Deer</td>
<td>4%</td>
<td>7%</td>
<td>16%*</td>
</tr>
<tr>
<td>Beef</td>
<td>18%</td>
<td>14%</td>
<td>13%*</td>
</tr>
<tr>
<td>Dairy</td>
<td>17%</td>
<td>3%</td>
<td>6%*</td>
</tr>
</tbody>
</table>

*some vaccine titres
Database Management for Leptospirosis Vaccination Study
20 cows/farm
200 farms
Yupiana et al 2015
## Dairy cattle survey 2016
Yupiana et al 2015

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Farms</strong></td>
<td>200</td>
</tr>
<tr>
<td>Farms shedding (urine PCR+)</td>
<td>53</td>
</tr>
<tr>
<td><strong>Prevalence</strong></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><strong>Prevalence</strong></td>
<td>2.4%</td>
</tr>
<tr>
<td><strong>Animals in PCR+ farms</strong></td>
<td>1060</td>
</tr>
<tr>
<td>Animals shedding/pos. farms</td>
<td>94</td>
</tr>
<tr>
<td><strong>Prevalence</strong></td>
<td>8.9%</td>
</tr>
</tbody>
</table>

Vaccination works!

No relationship with Har/Pom/Cop or Ballum

Ballum: low impact on human exposure?

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Titre vs. shedding

• High titres increase the risk of shedding

Probability urine PCR+

‘Serology may be used to identify cows to treat’
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>
<thead>
<tr>
<th>Occupational group</th>
<th>Serovar case numbers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ballum</td>
</tr>
<tr>
<td>Dairy farmer</td>
<td>5 (20)</td>
</tr>
<tr>
<td>Farmer and farm manager</td>
<td>6 (17.6)</td>
</tr>
<tr>
<td>Meat processor</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Dairy farmers 7 times as likely to have Tarassovi as other farmers or meat workers (p=0.004)
Production effects

Subharat 2012, Vallee 2016

- **Beef cattle:**
  - 2.4% farmers observed clinical disease
  - 1/7 farms lost 14kg/animal at slaughter
  - 8.3% foetal loss due to lepto

- **Sheep:**
  - 1.2% farmers observed clinical disease or lamb deaths
  - 1/8 farms lost 0.6kg/lamb at slaughter
  - ~1% flocks loose 75% foetuses due to Pomona exposure

- **Deer:**
  - 4.7% farmers observed clinical disease
  - 75% farms lost 3kg/animal at slaughter
  - 75% farms had 6% lower weaning rates

• ~ 100 (severe) cases notified
  – ~ 1,600 mild [86%] + severe [14%] cases per year estimated

• ~ 80-90% in rural populations
  – 22 DALYs per 100,000 in rural population
    • Tbc 717, campylobacter 109, cholera 65, ... , rabies 21, dengue 12

• Cost: 23 million NZ$/year
  – 4m human disease, 6m production loss, 13m vaccination
Sero-prevalence of lambs at slaughter (1 plant, 1 year) ± standard error

‘peace years’ 2 – 3%
‘outbreak years’ 5 – 15%

February 2004

Dorjee et al. Epid&Inf 139(5), 2011
Lag effect of outbreaks (sheep, abattoir workers)

It takes >10 years to restore the previous level of prevalence in breeding flocks and in humans.
Conclusions: protection against human exposure

- More serovars? Australis, Canicola … Bratislava, Arborea
- Confirm / explore ‘Tarassovi’ in dairy cows
- Understand reservoirs host(s) for ‘Tarassovi’ [Dairy cattle?]

- Keep vaccinating!
- Awareness: early test&TX of human illness
- Reduce exposure
  - PPE, wildlife (rodent) control, environment
- Test for Tarassovi & TX