Emergence of a New *Leptospira* Strain Causes Public Health Concerns

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• **Human leptospirosis:**
  • Flu-like signs, kidney colonisation
  • ~100 notified cases per year since 1997
    • 62% farm workers
  • Dairy: high exposure to urine at milking
  • Serovars:
    • In vaccines: Hardjobovis, Pomona, Copenhageni (~ Icterohaemorrhagiae)
    • Other: Tarassovi, Ballum, Canicola, Australis
  • **Cases in dairy farmers despite vaccination**

• **2011 pilot study in vaccinated dairy herds**
  • 30% herds and 4% cows PCR+ (shedding)
  • No serovar information
Cross-sectional: 200 farms

- January – March 2016
  - Random selection of herds
    - stratified by region and herd size
  - 20 cows per herd; MAT serology; urine PCR

- Results:
  - Herds: 27% shedding (CI: 20 – 33%)
  - Cows: 2.4% shedding (CI: 1.9% – 2.8%)

<table>
<thead>
<tr>
<th>Serovar</th>
<th>Herd Level</th>
<th>Herds</th>
<th>Cows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardjobovis</td>
<td>vaccinated</td>
<td>99%</td>
<td>44%</td>
</tr>
<tr>
<td>Pomona</td>
<td>vaccinated</td>
<td>96%</td>
<td>28%</td>
</tr>
<tr>
<td>Copenhageni</td>
<td>vaccinated</td>
<td>16%</td>
<td>3%</td>
</tr>
<tr>
<td>Copenhageni</td>
<td>non-vacc</td>
<td>15%</td>
<td>1%</td>
</tr>
<tr>
<td>Tarassovi</td>
<td>non-vacc</td>
<td>74%</td>
<td>17%</td>
</tr>
<tr>
<td>Ballum</td>
<td>non-vacc</td>
<td>36%</td>
<td>3%</td>
</tr>
</tbody>
</table>
MAT type ‘Tarassovi’

- Strong impact of Tarassovi on shedding

- 75 pos. urine samples:
  - PCR sequencing
  - gyrase B amplicons

Wilkinson et al. 2018
Emergence? Crude prevalence of Tarassovi in dairy cattle (n)

- 34 years gap -

- Increasing herd size
- More intensive production
- Economy of scale
- Increased antimicrobial use

Kirschner (1954)
Marshall (1973)
Lake (1973)
Brockie (1976)
Hellstroem 1978
Ryan + Marshall 1976
Mackintosh 1982

20% herds

74% herds


- 4,000
**Tarassovi in notified human cases 2005 - 2010**

- Cowie and Bell: NZMJ 27 July 2012, Vol 125 No 1358

<table>
<thead>
<tr>
<th>Occupational group</th>
<th>Serovar case numbers (%)</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Ballum</td>
<td>Copenhageni</td>
</tr>
<tr>
<td>Dairy farmer</td>
<td>5 (20)</td>
<td>1 (4)</td>
</tr>
<tr>
<td>Farmer and farm manager</td>
<td>6 (17.6)</td>
<td>1 (2.9)</td>
</tr>
<tr>
<td>Meat processor</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

- PR dairy vs non-dairy = 7.5 fold (p=0.004)
- PR dairy vs meat proc. = 7.5 fold (p=0.028)
Public Health Surveillance data (ESR):
Occupation of 1,556 human cases 1999 – 2016  Shah et al. 2017
Conclusions:

• Vaccination against Hardjobovis, Pomona, Copenhageni effective

• However, a small percentage of cows (albeit 27% herds) continue to shed *Leptospira* and expose dairy workers
  • Tarassovi = main reason for shedding and disease in dairy workers
  • 75% herds with evidence of Tarassovi
  • More than half of ‘Tarassovi’ shedders are ‘Agent X’

• Emergence of a new Tarassovi strain in cattle [sheep, deer]

• ‘Want’ to add Tarassovi to vaccines
  • Ongoing: isolation and whole genome sequencing
Acknowledgements

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- Dairy Farmers compliance
- DairyNZ random selection
- mEpiLab/EpiCentre Ahmed Fayaz, Neville Haack
- ESR providing access to human case data