Leptospirosis in New Zealand 2011: the new face of an old disease

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Presentation to the 7th Annual AgResearch Meat Industry Workshop.

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mEpiLab Molecular Epidemiology Public Health Infectious Disease Laboratory

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Background

- NZ is in a unique situation
- Only two native land mammals (bats)
- Pathogenic strains limited

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Background (cont.)

- Dairy and pig farming was the main contributor to lepto in people back in 1970s
- Vaccination programme was introduced
  - drop in lepto cases

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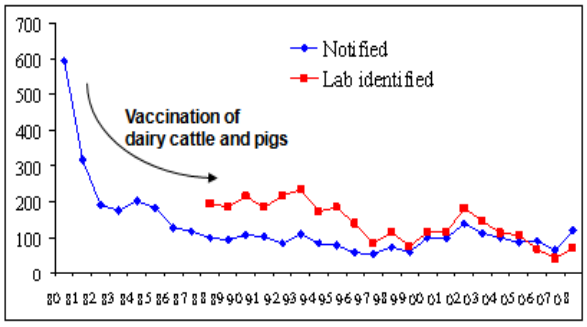
NZ human data 1980-2008

Notified human cases since 1980



Environmental Science and Research Limited; Surveillance Report 2009

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The change in NZ farming practices.

- 1970 - commercial deer farming in NZ
- Change from deer only to mixed species farming
- Transfer of large no.s of dairy cattle to the South Island.
- Disease pattern appears to have altered with the change in farming practice

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Known endemic serovars and maintenance hosts in NZ

Genomospecies	Serovar	Maintenance host
L. interrogans	Pomona	Pig
L. interrogans	Copenhageni	Brown Rat
L. borgpetersenii	Ballum	Mouse, Black Rat, Hedgehog
L. borgpetersenii	Hardjobovis	Cattle, Deer, sheep???
L. borgpetersenii	Tarassovi	Pig
L. borgpetersenii	Balcanica (possum strain)	Possum

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Leptospirosis – a dynamic disease

- Change with differing farming practices
- Vaccination programmes can alter distribution or prevalence of one serovar preferentially.
- Other factors – arrival of new serovars?
- Climate change affecting distribution?

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Current status in NZ

- Increasing number of workers in abattoirs contracting the disease (seroprevalence at 8 abattoirs 5.4-31.3%; aver. 11%)
- These are often sheep or deer abattoirs
- Most important occupationally-acquired disease
- Increasing number of Ballum infections in humans – where from?

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Key research areas.

- **Prevalence**
- **Production effects in stock**
- **Diagnostic tool evaluation and challenge models**
- **Strain variation**

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Prevalence

- in different stock classes on farms (including dogs)
- in meat workers (cross-sectional and longitudinal studies) and risk analysis
- other occupations associated with the meat industry and risk attribution *e.g.* vets, stock truck drivers, AI personnel

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Production effects in stock

- Which classes of stock animals act as hosts?
- Does leptospirosis in its subclinical form have a negative production effect?

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Red deer production data

- Average 6.4 kg higher live weight at 12 months age observed in vaccinated animals in the face of a lepto infection on farm.
- Weaning rate decreased 2-11 % in non-vaccinated adult and primiparous hinds dependent on lepto seroprevalence on farm.

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Economics of deer vaccination

- Financial break-even point for vaccination in relation to growth for 12 month old is when infection is ~ 19%

- Most infected herds exceed this level
- Improvement of ~1.3% weaning rate is economically worthwhile

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Diagnostic tool evaluations and challenge models

- What questions do we particularly wish to answer?

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those questions are...

What is/are the best technique(s) for:

- identifying carrier status in individual animals/herds
- speed
- specificity
- sensitivity
- degree of shedding
- cost.

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Diagnostic tool evaluations and challenge models (cont.)

- evaluating different diagnostic tools (serology [MAT], molecular DNA techniques) for determining disease status at different stages of the disease.

- Also done in conjunction with developing challenge models for sheep and cattle.

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Strain variation

- Molecular-based techniques for investigating whether there is strain variation between stock classes (is MLST suitable?)

e.g. is the Hardjobovis strain in sheep on a farm the same as the strain in the deer?

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Uses

- Dependent on the answer:

- this could inform farming practices for control of disease

- and human health management (ACC)

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Future research directions....

- Re-evaluating vaccination protocols in NZ in the light of new knowledge *i.e.* evidence of shedding in vaccinated herds
- Source of Ballum titres
- Spread of Copenhageni

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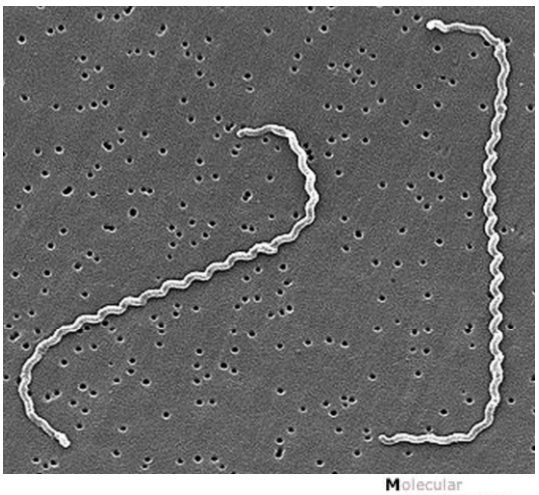
Thank you



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