

Leptospirosis vaccination best practice: Let's get real.

Julie Collins-Emerson

Yuni Yupiana, Peter Wilson, Jackie Benschop, Emilie Vallée, Jenny Weston, Cord, Heuer.

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OIE Collaborating Centre for
Veterinary Epidemiology
and Public Health

Background



- Two studies
 - Firstly, - vaccination practices for leptospirosis on dairy farms in NZ
 - Secondly, disease management of a leptospirosis outbreak on a local dairy farm.
- From both these studies we learnt valuable lessons about the practicalities of implementing vaccination programmes and they highlighted complexities of “One Health”

- Pomona and Hardjobovis
historically main lepto strains in dairy in NZ



- Copenhageni associated with rats therefore incorporated into some cattle vaccines as seen as a risk (aka Weil's disease)
- Cattle vaccines either Hardjo/Pom or Hardjo/Pom/Cop



Vaccine types used in NZ dairy

- Different brands available
- Types:
 - bivalent (Hardjo/Pomona)
 - trivalent (Hardjo/Pomona/Copenhageni)
 - 7 in 1 (5x Clostridial + Hardjo/Pom)
- NB: Vaccines are serovar-specific

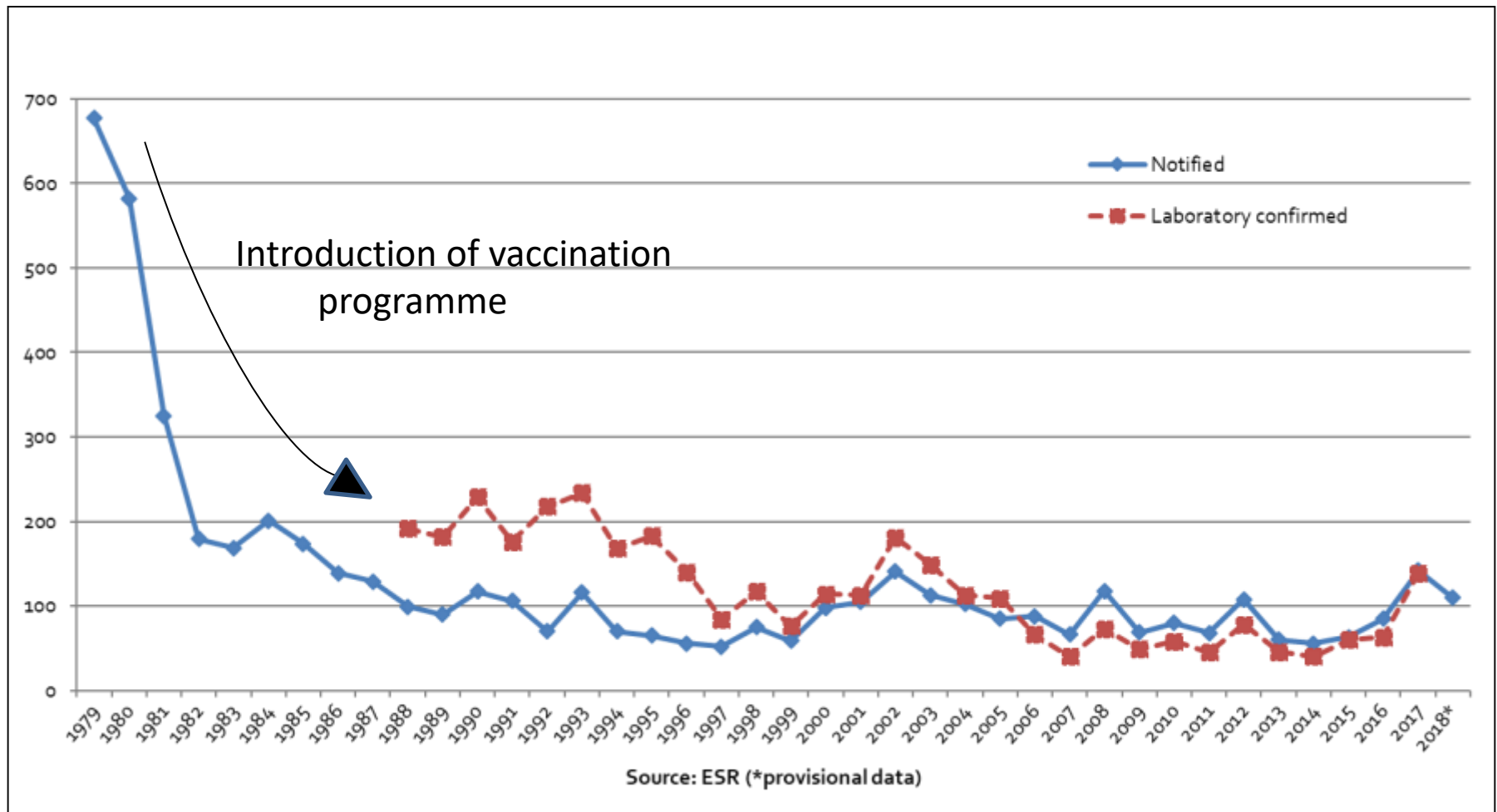


One health approach...

Vaccination of livestock in New Zealand will protect against stock/reproductive losses and environmental contamination, but...

...the primary driver is still to vaccinate animals in order to protect people

Human cases after vaccination programme introduced – example of effectiveness of campaign



Commissioned report 2012

- Our group produced a report for the New Zealand Veterinary Association
- Covered **BEST PRACTICE (BP)** recommendations for the use of lepto vaccines

Leptospirosis in New Zealand – Best Practice Recommendations
for the use of vaccines to prevent human exposure

A Report by Massey University Prepared for the
Zealand Veterinary Association


June 2012

Authors: Cord Heuer, Jackie Benschop, Leslie Stringer, Julie Collins-Emerson, Juan Sanhueza, and Peter Wilson

Institute of Veterinary, Animal and Biomedical Sciences, Massey University

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What we did know: vaccination efficacy

- Vaccines used in NZ:
 - ~89% effective in preventing Hardjobovis shedding²
 - Vaccine use  human infection.
- **Best Practice Report** finding:
 - failure to vaccinate at the right time may contribute to protection failure.



Contents lists available at ScienceDirect

Preventive Veterinary Medicine

journal homepage: www.elsevier.com/locate/prevetmed



Meta-analysis of the efficacy of *Leptospira* serovar Hardjo vaccines to prevent urinary shedding in cattle

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Cattle



New Zealand Veterinary Journal



ISSN: 0048-0169 (Print) 1176-0710 (Online) journal homepage: <https://www.tandfonline.com/doi/tnvz20>

Growth response and shedding of *Leptospira* spp. in urine following vaccination for leptospirosis in young farmed deer

S Subharat, PR Wilson, C Heuer & JM Collins-Emerson

Deer

Vaccine 35 (2017) 1362–1368



Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine



Effectiveness of a commercial leptospiral vaccine on urinary shedding in naturally exposed sheep in New Zealand



Sheep

What we did not know: how are lepto vaccines used on-farm?



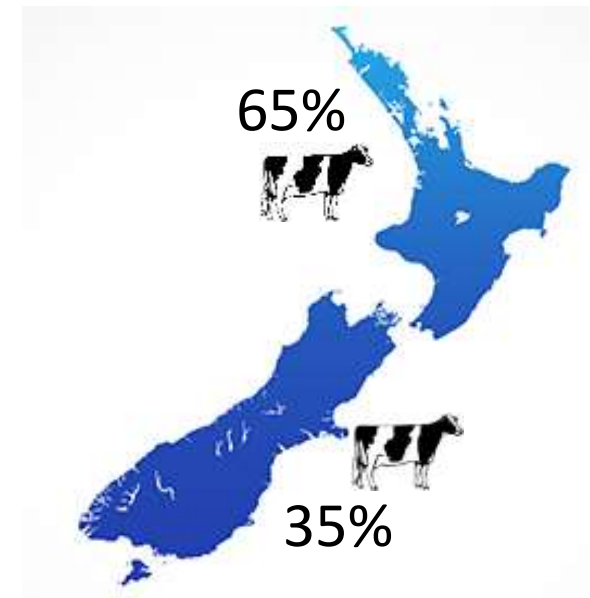
- No comprehensive investigation into lepto vaccination practices in NZ dairy in the last 40 years.
- Therefore, descriptive analysis of dairy vaccination practices was undertaken
- Part of a more comprehensive study investigating leptospirosis in dairy herds.

Dairy study

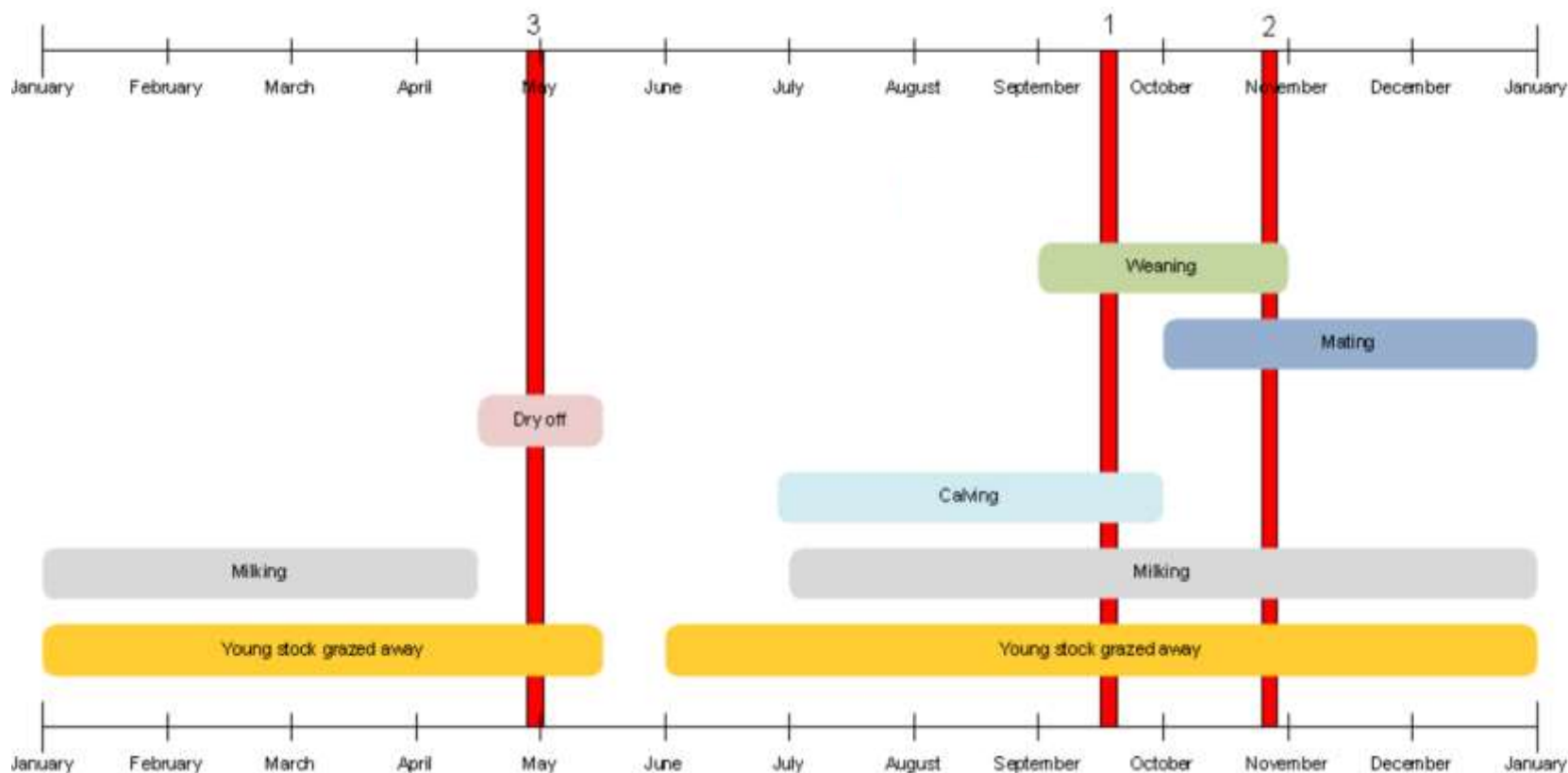
- National sampling of dairy cows 2016
- NZ dairy farms stratified by herd size and region.
- Cross-sectional study of 200 randomly selected farms.
- 20 cows/farm (total 4,000 cows sampled).



Dr. Yuni Yupiana



Typical timeline of farm management events in a New Zealand spring calving dairy herd



- Red bars - Suggested optimal vaccination times as red vertical bars
- *N.B. It was against these recommendations that vaccination timing on farms was assessed in the questionnaire*

Vaccination practices

- Developed and pre-tested the questionnaire
- Administered by farmer's vet or the vet tech.



Herringbone milking shed.

Comparison with Best Practice

- For the study, these data assessed against recommendations in Best Practice Report.
- *The goal was to understand what factors influence compliance or otherwise to the vaccination Best Practice Recommendations with the ultimate aim of improving disease management and reducing risk to humans.*

Key findings:

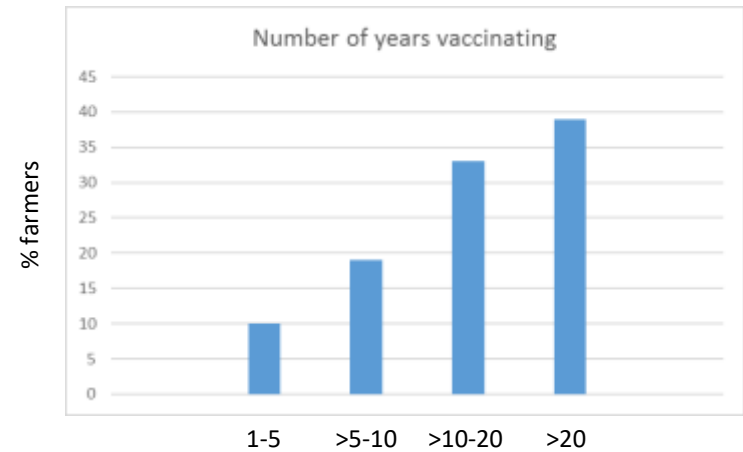
- Almost universal uptake of vaccination (199/200 farms)
& 90% for ≥ 5 years

- *Indicates:*

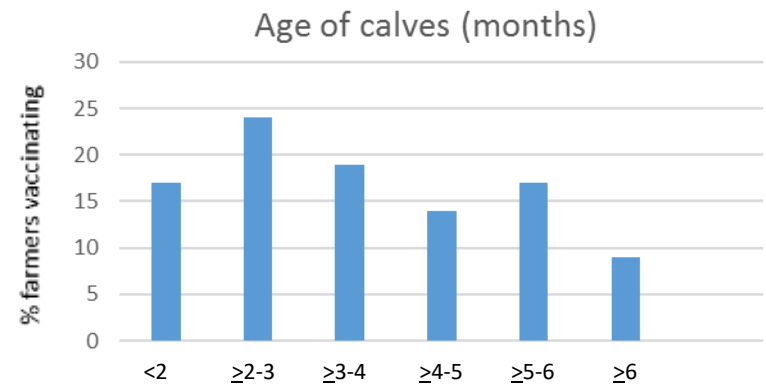
- high level of confidence in vaccination as a control measure and communication about the vaccination has been well received.

- awareness of legal requirement to take steps to protect staff.

- Bivalent vaccine more commonly used
 - more likely the veterinarian's choice and/or availability influencing the vaccine type used



Findings:



- Farmers that had changed their vaccine practices in the last 5 years tended to do so by aligning with the **BP** recommendations on timing and adding booster vaccinations to calves and heifers.
- ~ ½ had given first vaccinated calf by 4 months of age
- Trend of shortening time between 1st vacc. and booster
- *Evidence of the effect of the education campaign.*



Clostridial/lepto vaccine

- The 7-in-1 Clostridial/Hardjo/Pomona vaccine used more commonly in calves than other age groups
- *Possibly combining Clostridia/Lepto vaccine fits in more easily to the farm management calendar – something to consider.*

Timing vs administrators of vaccination

- Found greater conformity to **BP** guidelines for 1st vaccinations for calves and annual boosters for heifers when farmer administered the vaccine rather than contracted veterinary providers.
- *This indicates demands on veterinary practitioners may create a “bottleneck” limiting their availability to administer vaccine at preferred (BP) times to all their clients.*



Brought-in stock

- 60 % of farmers purchased only vaccinated stock.
- 30% however were unsure of the vaccination status of the stock they brought-in.
- ~61% of farmers had non-dairy stock on farm but only 42% vaccinated some/all of their other stock.
- *This is an area where there could be an educational push to improve practice and for real gains in protection.*



Mixed species farming



Conclusions from first study

- Cost difference between bi- and trivalent vaccine is minimal and not a barrier.
- Vaccine choice can depend on what is available on the market at the time or vet's preference.
- A shift towards vaccination timing to those in **BP** recommendations but identified as an area to improve particularly around calf and heifer vaccination timing.
- Only 20% of farms conformed to **BP** recommendation for all ages and livestock.
- *Possibly encourage more farmers to vaccinate their own stock – shift towards optimal timing?*

Second study

Received: 12 August 2018 | Revised: 21 February 2019 | Accepted: 24 February 2019
DOI: 10.1111/zph.12578

ORIGINAL ARTICLE

WILEY

Epidemiological investigation of *Leptospira* spp. in a dairy farming enterprise after the occurrence of three human leptospirosis cases

Yuni Yupiana^{1,2} | Peter R. Wilson¹ | Jenny F. Weston¹ | Emilie Vallée¹ |
Julie M. Collins-Emerson¹ | Jackie Benschop¹ | Tim Scotland³ | Cord Heuer¹

Briefly -

- 3 workers ill with lepto on the one dairy farm
- Was an unvaccinated dairy farm and during the milking season
- Serology showed the cattle were infected and the likely source for human infection.



Rotary milking shed

Decisions around management of outbreak

- When to vaccinate all/some cattle?
- Treat cattle with antibiotics? When/if?
- Prophylactic course of antibiotics for other workers and PPE
- Complications
 - when treating with antibiotics costly & there's a withholding period i.e. the milk can't be used
 - environmental cost
 - production lost/cost to farmer
 - AMR concerns
- Social implications
 - cost of treatment could cause financial pressures risking livelihoods possibly



Advice

- Vaccinate milking herd first (decrease shedding)
- Suggest workers receive prophylactic antibiotics
- Treat milking herd with antibiotics at dry-off
- Extra PPE for workers and education around risks e.g. effluent spreader

Practical considerations around vaccination

- Need to understand what are barriers to vaccination in relation to work cycle around the farm over the year
- **Convenience plays a part in the equation**
- Importance of being able to fit in with farmers' work cycles to improve likelihood of compliance. (e.g. ~2/3 of farmers often administered lepto vaccine at the same time as other treatments)
- Combining multivalent vaccines to ease workload e.g. clostridal/lepto multivalent vaccine
- Customisation for different farming cycles/climates
 - not a case of “one size fits all”

Education

- <http://leptospirosis.org.nz/News/VideoSeries.aspx>
- Our challenge re continued education - important to improve national lepto management particularly around cows/bulls brought-in or other stock classes.
- The effectiveness of vaccination
- Improving vaccination programmes
- & emphasis on PPE as well



Social factors vs science in our lepto management strategies

Lessons from these studies:

- Any management plan needs to take into consideration human factors for best effectiveness.
 - i.e. what is optimal scientifically may not necessarily be the best course of action.
- Therefore, many factors to consider around protection of workers/treatment of stock/ effectiveness of PPE and economic and environmental when developing a management plan



Ngā mihi

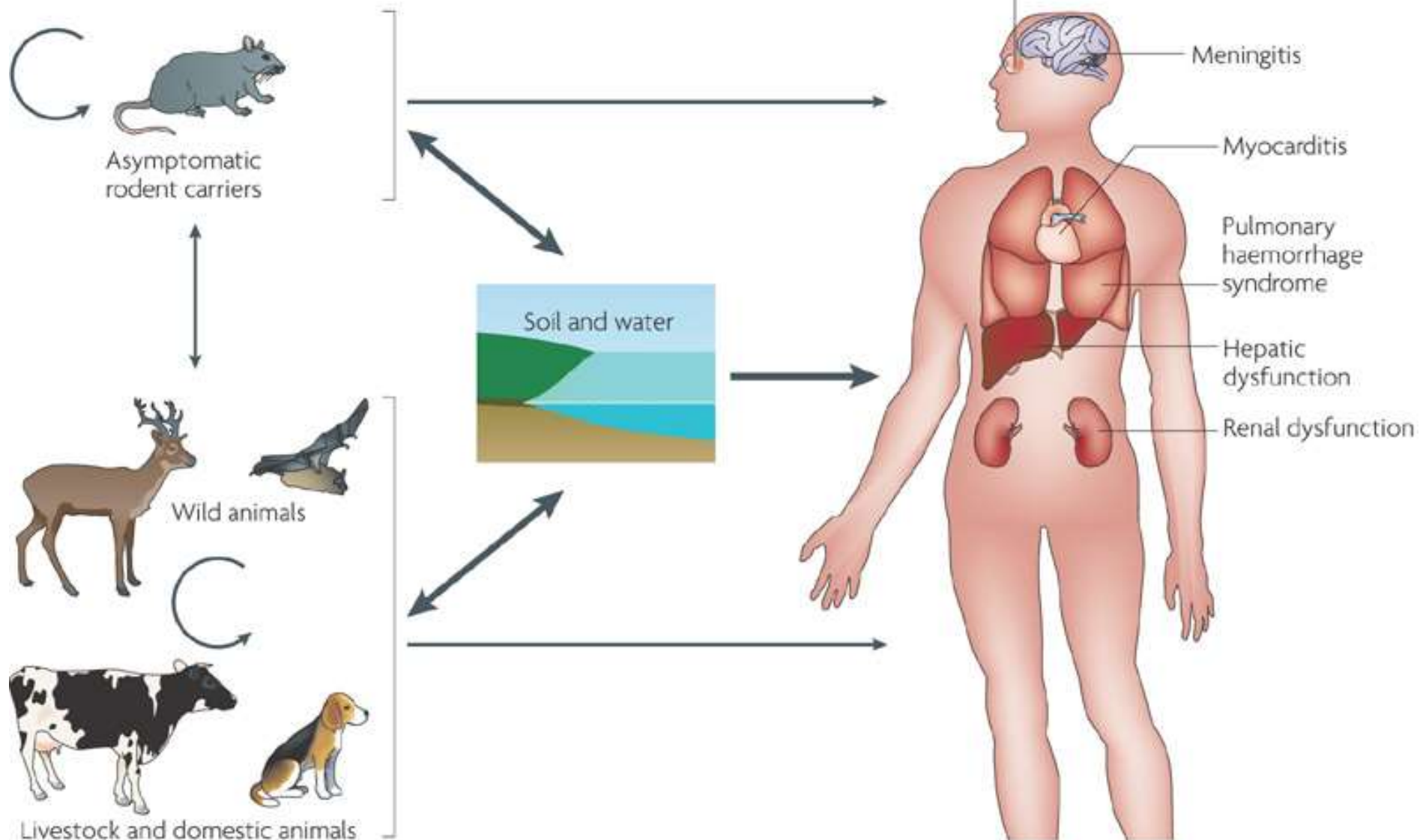
Thank you



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Hosts and cycling



Maintenance hosts for leptospirosis in New Zealand

L. borgpetersenii serovar Ballum: rodents and hedgehogs

L. borgpetersenii serovar Hardjo (subtype Hardjobovis*): cattle, deer, sheep

L. borgpetersenii serovar Balcanica: possums

L. borgpetersenii serovar Tarassovi: rodents and pigs



L. interrogans serovar Pomona*: pigs, ruminants

L. interrogans serovar Copenhageni*: rodents

*animal vaccines available

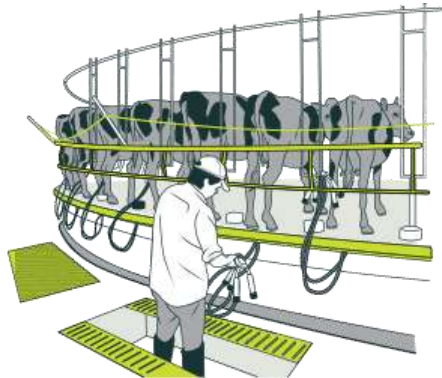




Rotary milking shed



Herringbone milking shed



Milking shed types



Summary of MAT titre in Rotary shed

Titre	Pomona		H bovis		Copenhageni		Ballum	
	6-Mar	18-Mar	6-Mar	18-Mar	6-Mar	18-Mar	6-Mar	18-Mar
24	1	2	0	2	5	8	4	15
48	2	5	5	6	2	5	4	3
96	2	5	4	1	0	7	1	1
192	1	2	4	10	1	2	0	0
384	1	8	1	7	1	2	0	0
768	1	7	2	3	0	0	0	0
1536	4	4	0	1	0	0	0	0
3072	6	2	0	1	0	1	0	0
Total +ve	18	36	16	31	9	25	9	19
Sample size	41	68	41	68	41	68	41	68

Prevalence of Leptospirosis in Rotary herd

