OIE Collaborating Centre for
Veterinary Epidemiology and Public Health

Leptospirosis in Pastoral Livestock

Cord Heuer

Prof Veterinary Epidemiology and Infectious Diseases

Director EpiCentre, Massey University, New Zealand

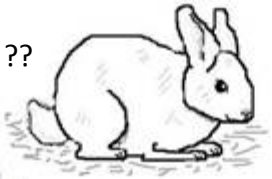
New Zealand

Wild pig: ??

Wildlife

Possum: Balcanica

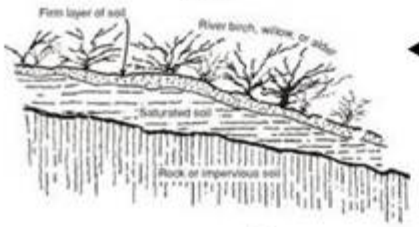
Rabbit: ??

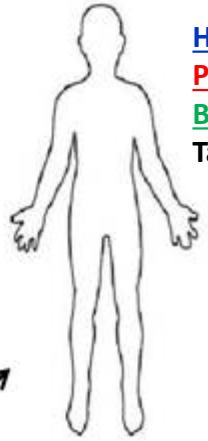


Hedgehog:
Ballum, Pomona

Rat/mouse: Ballum,
Copenhageni

Soil and water



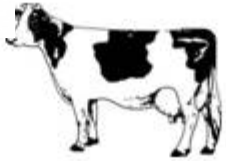


Hardjobovis 46%
Pomona 23%,
Ballum 18%,
Tarassovi 8%

Hardjobovis, Bratislava, (Ballum, Pomona, **Tarassovi**, Copenhageni, Canicola)

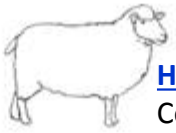
Copenhageni,
Hardjobovis
(Pomona,
Ballum,
Tarassovi,
Canicola)

Hardjobovis, Pomona,
(Tarassovi, Copenhageni,
Ballum, Arborea)



Hardjobovis,
Pomona, **Tarassovi**
(Copenhageni,
Ballum)

Livestock



Hardjobovis, Pomona, **Tarassovi**(
Copenhageni, Ballum)

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

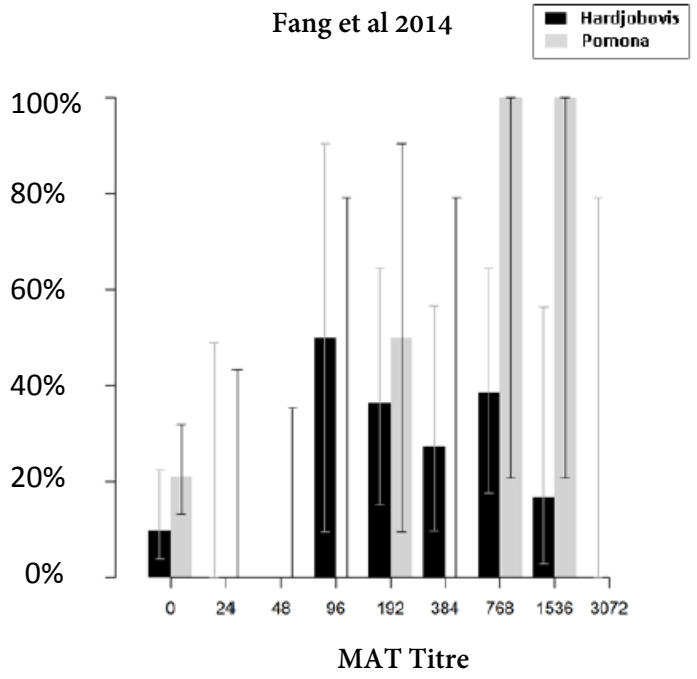
Lepto in livestock

MAT sero-prevalence in adult animals

	Herds	Animals	≥ 96	
Sheep	97%	51%	6%	mona
Deer	76%	34%	6%	mona
Beef	97%	58%	16%	mona
Dairy	81%*	20%*	11%	m

Shedding: cattle urine PCR+

Fang et al 2014



Lepto in livestock

MAT Sero-Prevalence

- Non vaccine serovars

	Tarassovi	Ballum	Copenhageni
Sheep	14%	10%	17%
Deer	4%	7%	16%*
Beef	18%	14%	13%*
Dairy	17%	3%	6%*

*some vaccine titres

Dashboard

Database Management for Leptospirosis Vaccination Study

20 cows/farm
200 farms
Yupiana et al 2015

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

- Mapping Tool
- Lepto Individual Report
- Lepto Update Report
- Email Vets
- ELISA Data Entry
- PCR Data Entry
- MAT Data Entry
- Questionnaire Data Entry
- Recruitment Data Entry
- Quit

Sustainable Farming Fund
Ministry of Agriculture and Forestry
Te Manatū Ahuwhenua, Ngāherehere

AGMARDT
THE AGRICULTURAL AND MARKETING RESEARCH AND DEVELOPMENT TRUST

NZVA
New Zealand Veterinary Association

Wairarapa Veterinary

New Zealand Aid Programme

zoetis

MSD

Virbac

Dairy cattle survey 2016 Yupiana et al 2015

Farms	200
Farms shedding (urine PCR+)	53
Prevalence	26.5%
Animals	4000
Animals shedding (urine PCR+)	94
Prevalence	2.4%
Animals in PCR+ farms	1060
Animals shedding/pos. farms	94
Prevalence	8.9%

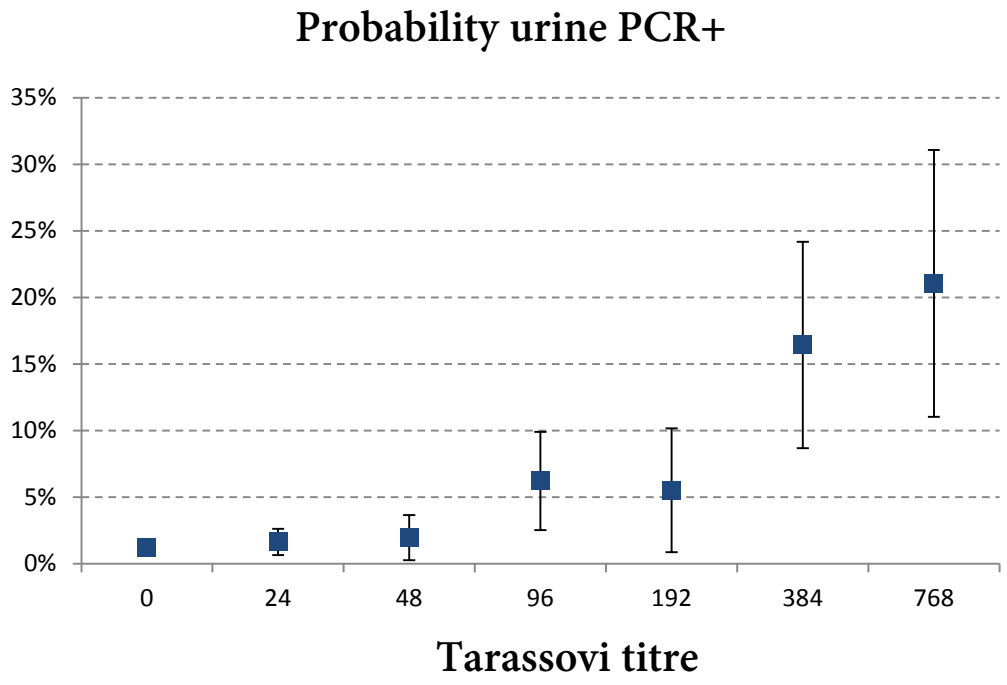
Vaccination works!

No relationship with Har/Pom/Cop or Ballum

Ballum: low impact on human exposure?

Titre *vs.* shedding

- High titres increase the risk of shedding



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

Occupational group	Serovar case numbers (%)						
	Ballum	Copenhageni	Hardjo-bovis	Pomona	Tarassovi	Unspecified	Total
Dairy farmer	5 (20)	1 (4)	5 (20)	0 (0)	11 (44)	3 (12)	25 (100%)
Farmer and farm manager	6 (17.6)	1 (2.9)	7 (20.6)	9 (26.5)	2 (5.9)	9 (26.5)	34 (100%)
Meat processor	0 (0)	0 (0)	5 (29.4)	10 (58.8)	1 (5.9)	1(5.9)	17 (100%)

	Tarassovi	Other Serovar
Dairy farmer	11	14
Other occupations	3	48

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

Public health burden Sanhueza et al. 2016

- ~ 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

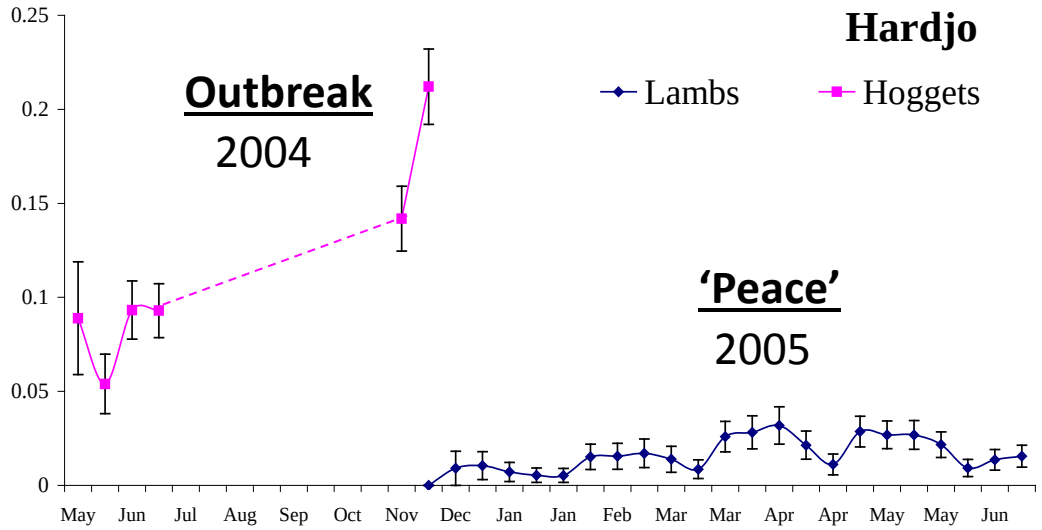
Sero-prevalence of lambs at slaughter (1 plant, 1 year)

± standard error

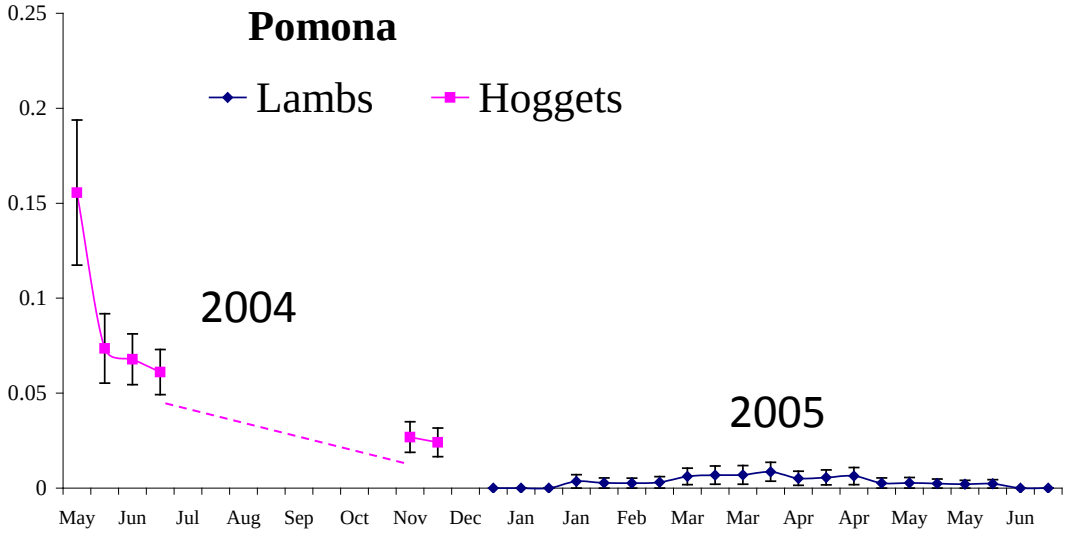
‘peace years’ 2 – 3%

‘outbreak years’ 5 – 15%

February 2004



Dorjee et al. 2008, NZVJ



Dorjee et al. Epid&Inf 139(5), 2011

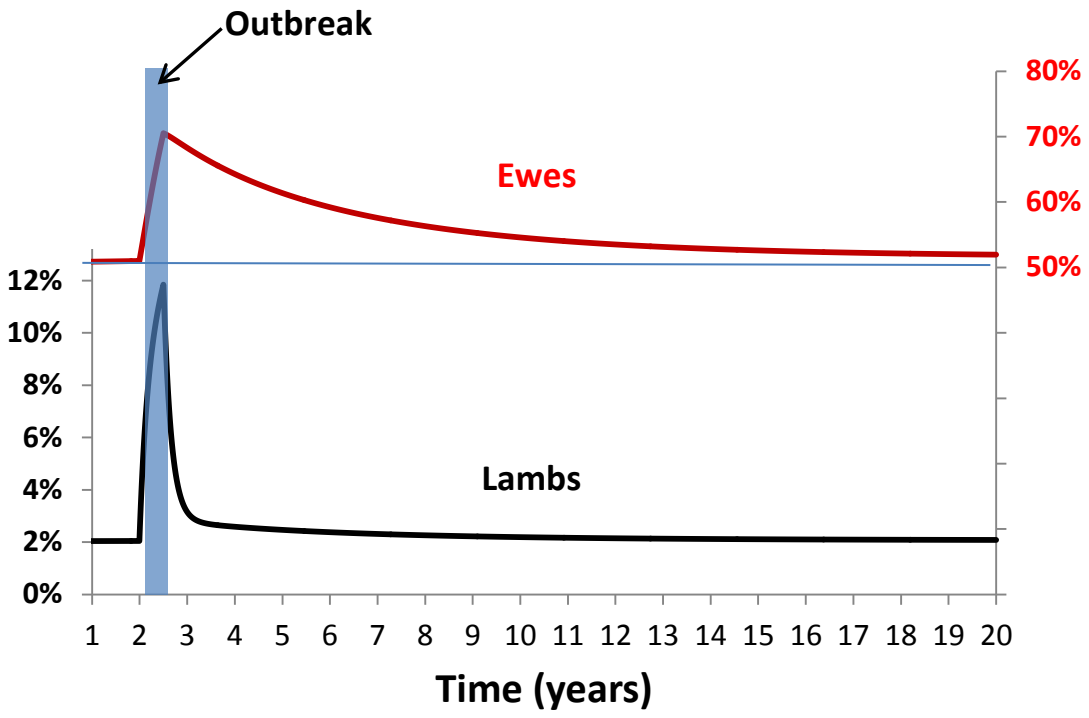
Lag effect of outbreaks

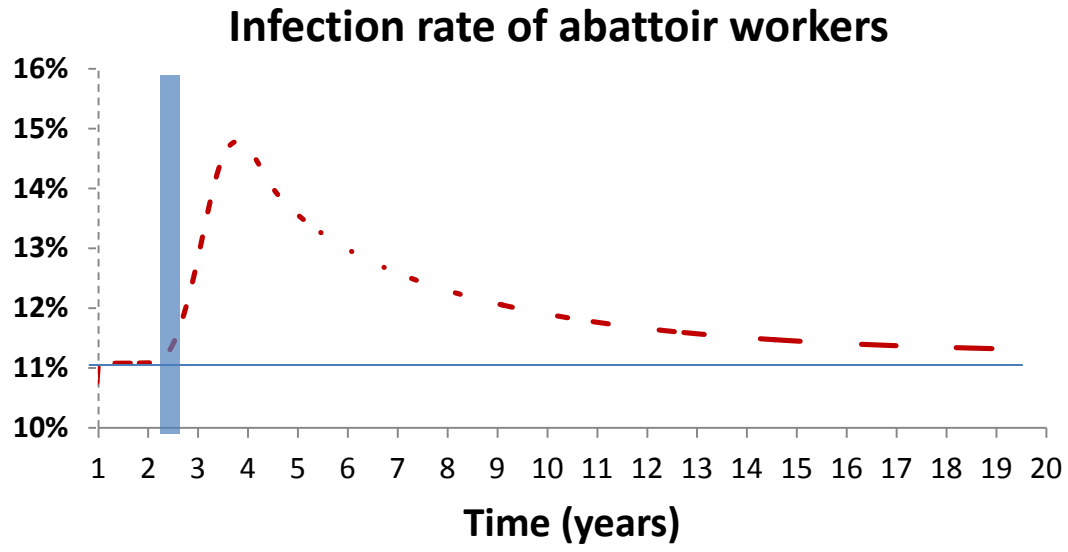
(sheep, abattoir workers)

It takes >10 years to restore the previous level of prevalence <u>in breeding flocks</u>

and

<u>in humans</u>





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