Why leptospirosis continues to occur in workers of vaccinated dairy herds

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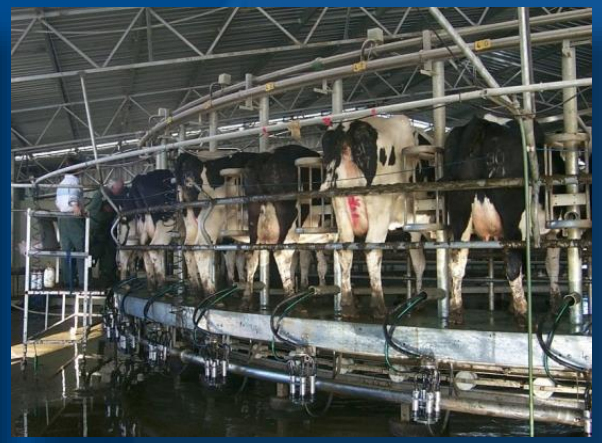


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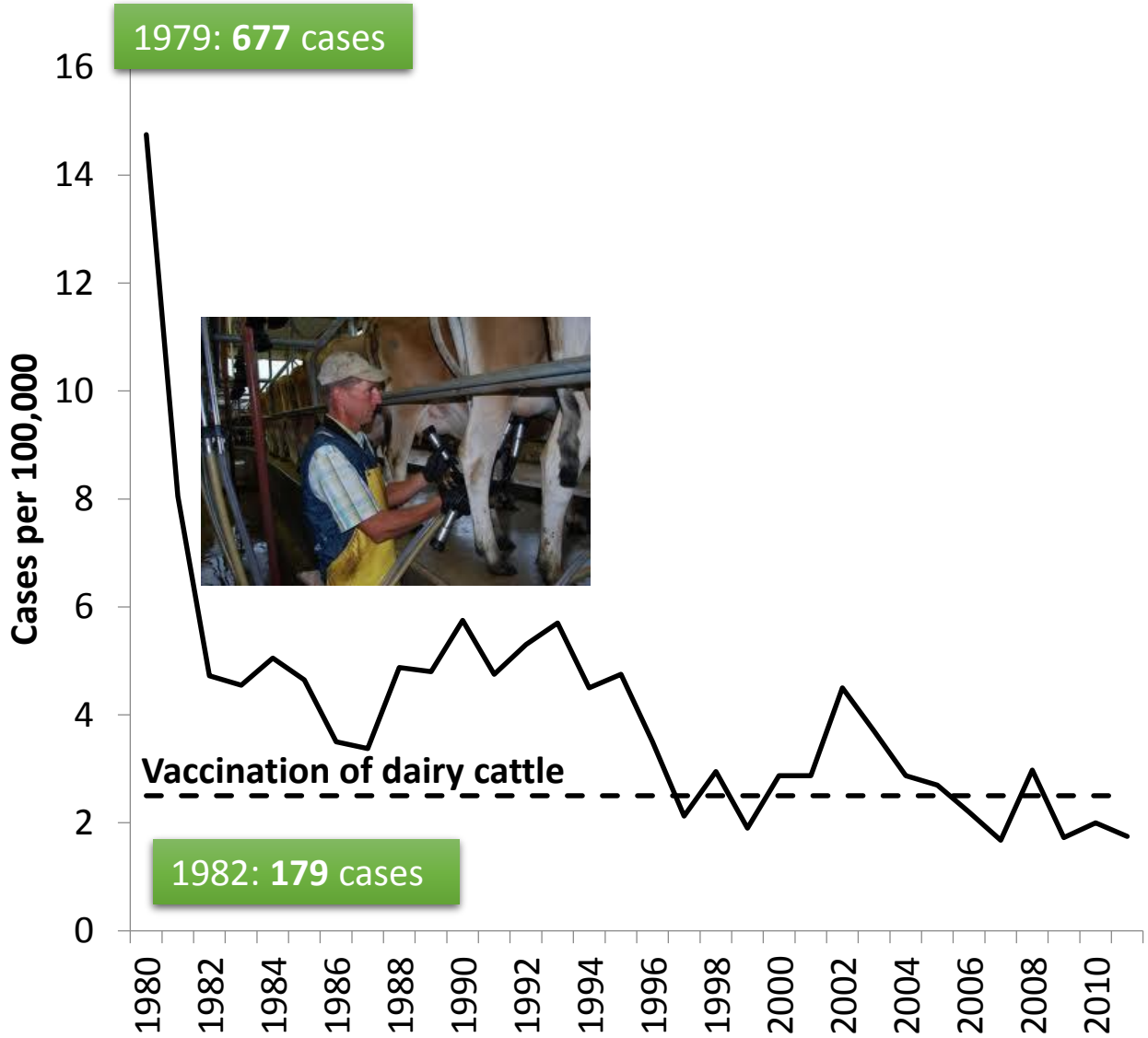
- **Human leptospirosis:**
  - Flu-like signs, kidney colonisation
  - ~100 notified cases per year since 1997
    - 62% farm workers
  - Dairy: high exposure to urine at milking
  - Serovars:
    - **In vaccines:** Hardjobovis, Pomona, Copenhageni (~ Icterohaemorrhagia)
    - **Other:** Tarassovi, Ballum, 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

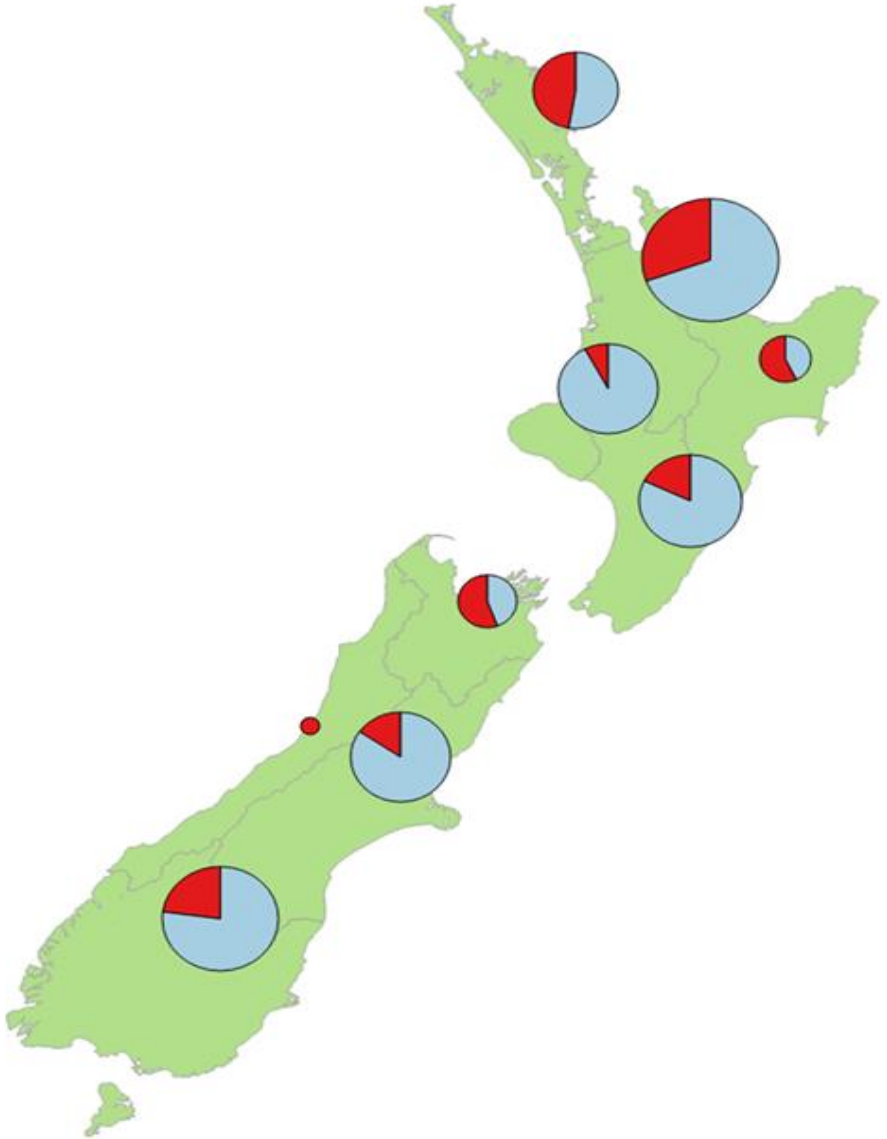


Cross-sectional: 200 farms

- 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%)

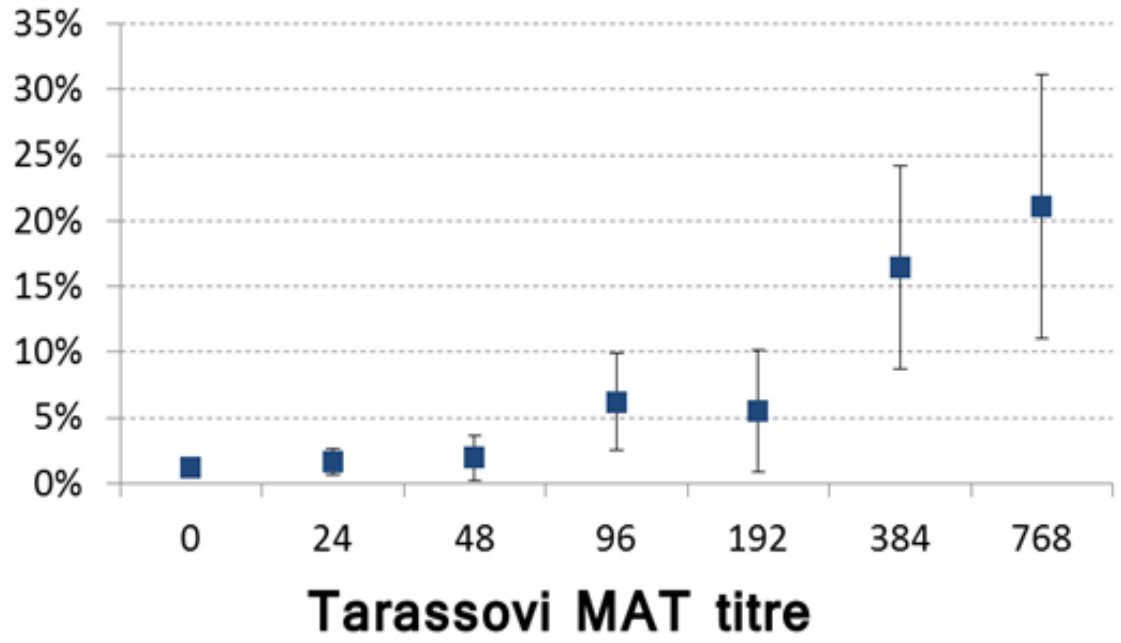
Serovar		Herds	Cows
Hardjobovis	vaccinated	99%	44%
Pomona	vaccinated	96%	28%
Copenhageni	vaccinated	16%	3%
Copenhageni	non-vacc	15%	1%
Tarassovi	**non-vacc**	**74%**	**17%**
Ballum	non-vacc	36%	3%

Herd level shedding

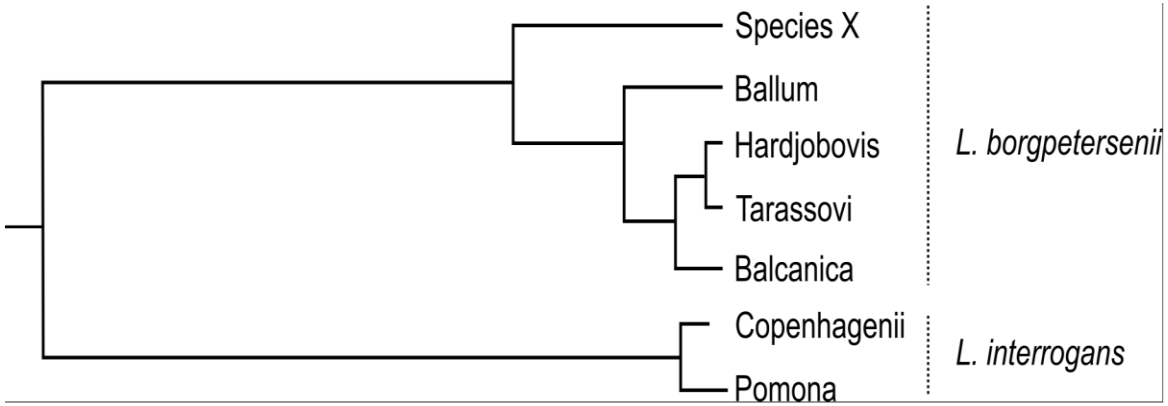


MAT type ‘Tarassovi’

- **Strong impact of Tarassovi on shedding**

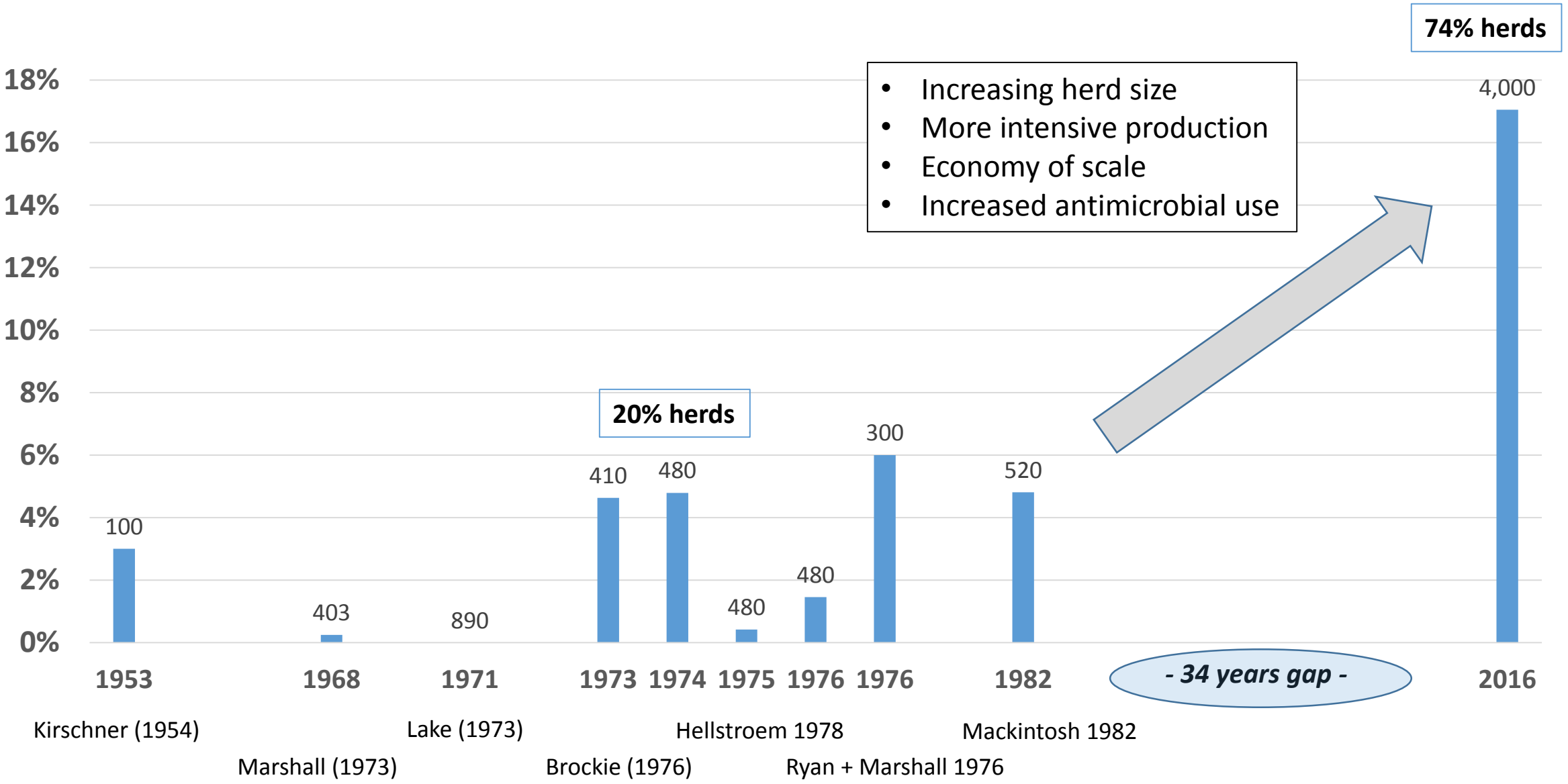


- **75 pos. urine samples:**
  - PCR sequencing
  - gyrase B amplicons



Wilkinson et al. 2018

Emergence? Crude prevalence of Tarassovi in dairy cattle (n)



Tarassovi in notified human cases 2005 - 2010

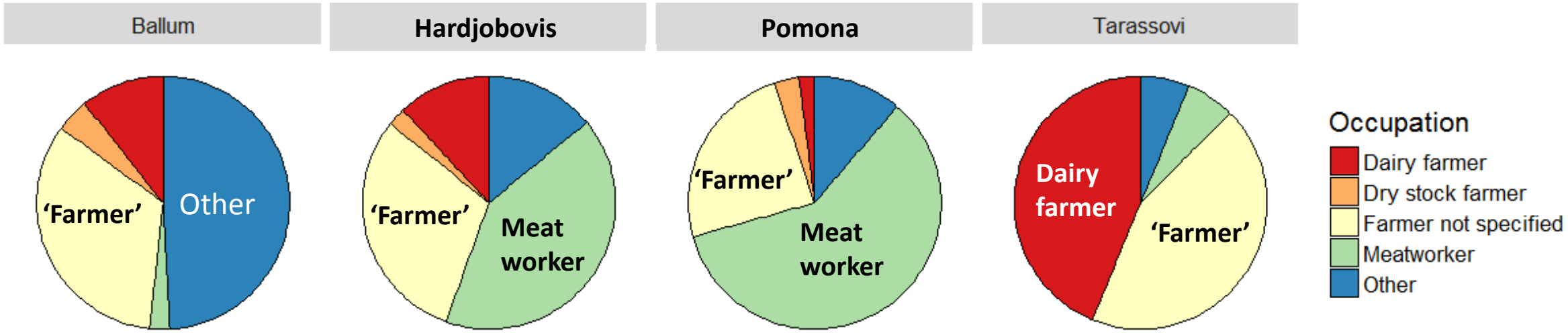
- Cowie and Bell: NZMJ 27 July 2012, Vol 125 No 1358

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	33%
Farmer and farm manager	6 (17.6)	1 (2.9)	7 (20.6)	9 (26.5)	2 (5.9)	9 (26.5)	34	45%
Meat processor	0 (0)	0 (0)	5 (29.4)	10 (58.8)	1 (5.9)	1(5.9)	17	22%

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

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- 150 veterinary colleagues and vet-tecs sampling
- Dairy Farmers compliance
- DairyNZ random selection
- mEpiLab/EpiCentre Ahmed Fayaz, Neville Haack

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