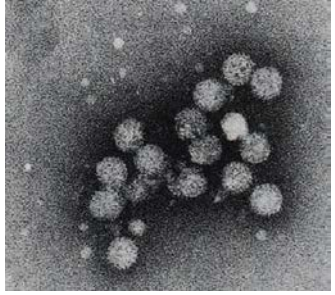
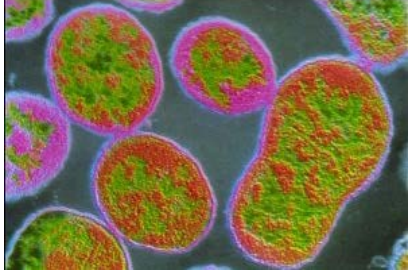
FMD virus

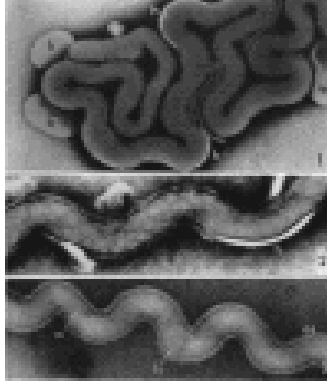
PRRS virus



Hepatitis C virus



Brucella

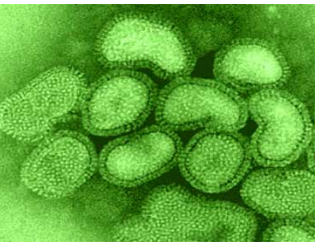


Leptospira

Veterinary Epidemiology: from microbes to Markov

Tim Carpenter, Jackie Benschop, Mark Stevenson

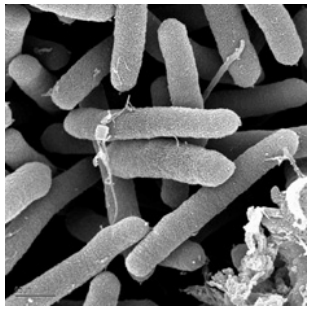
EpiCentre



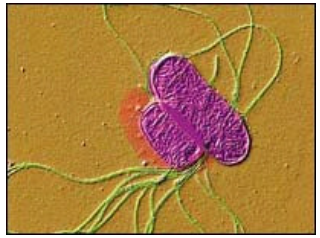
Influenza virus

Toxoplasma

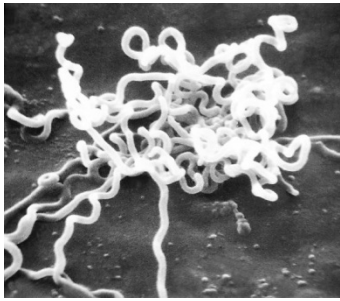
BVD virus



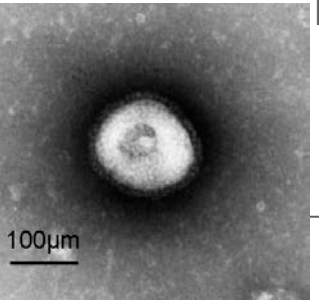
Pseudomonas (Psa)



Salmonella



Trepronema



ISA virus

Mycobacterium

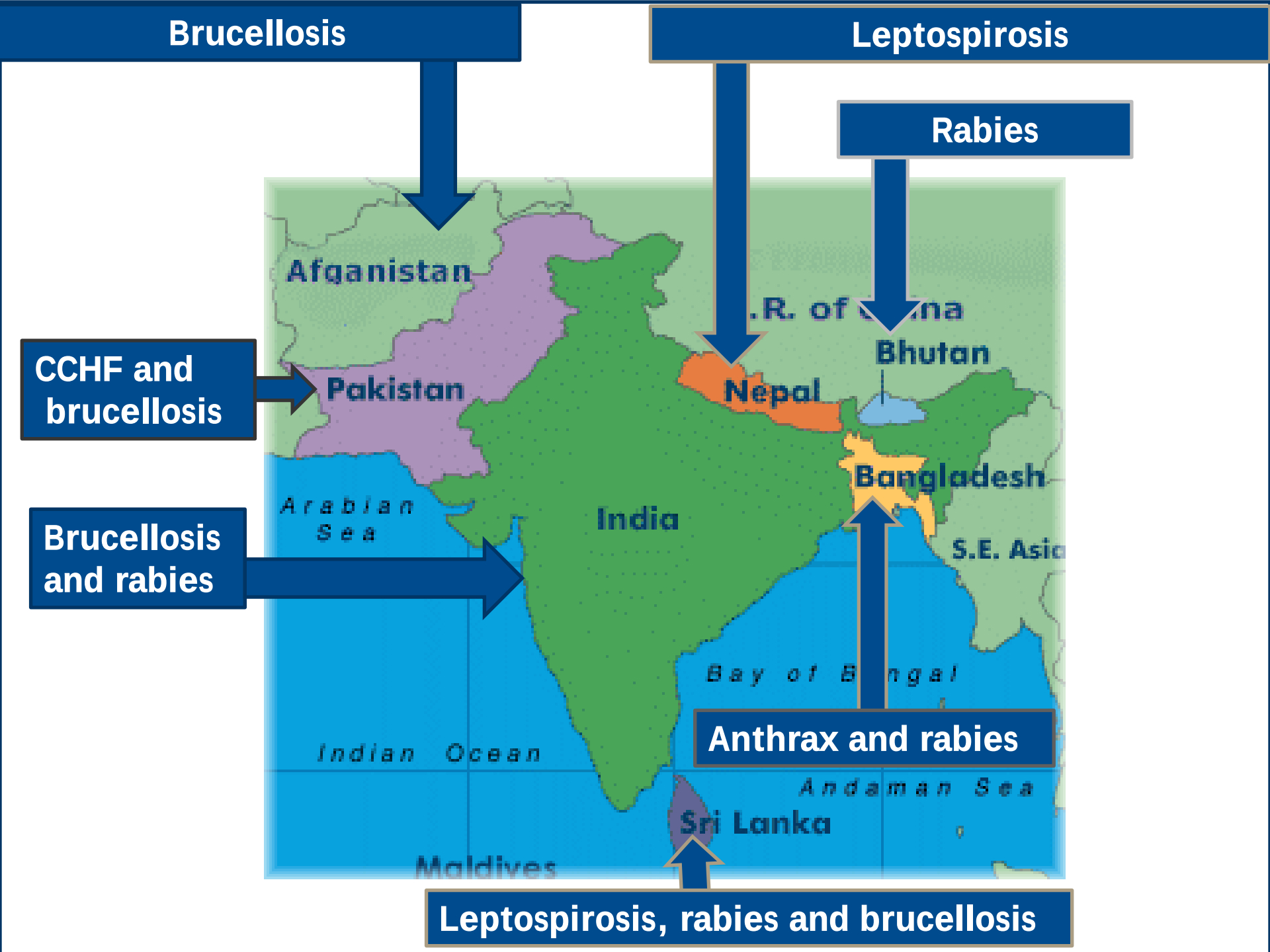
Mannheimia

Sea lice

One Health: Asia

Collaborative investigation projects (CIPs)

- Coordinated by EpiCentre, World Bank grant
- 12 CIPs on 7 zoonoses in 7 countries in South Asia
- Integrated studies in human and animal populations, implemented by combined animal and public health teams
- Provide: epidemiology training, experience of One Health collaboration, contribute to national and regional disease control policy


Brucellosis
Leptospirosis
Rabies
CCHF and brucellosis
Brucellosis and rabies
Anthrax and rabies
Leptospirosis, rabies and brucellosis
Afganistan
Pakistan
Nepal
Bhutan
Bangladesh
India
Arabian Sea
Bay of Bengal
Indian Ocean
Andaman Sea
Sri Lanka
Maldives

Part 1: Epidemic modeling and decision making

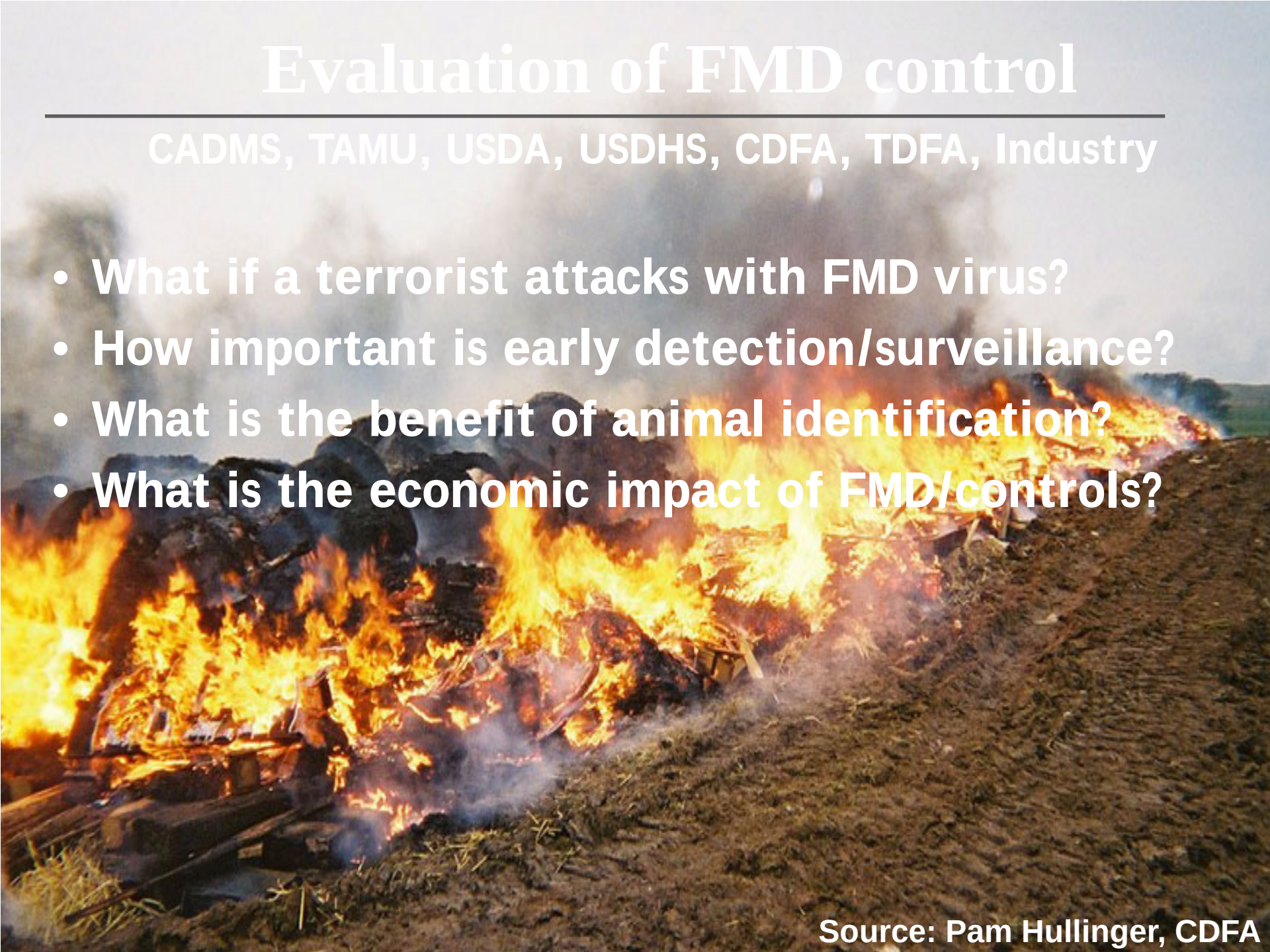
Foot-and-mouth disease (FMD) control

Toxoplasma gondii and sea otters

Evaluation of FMD control

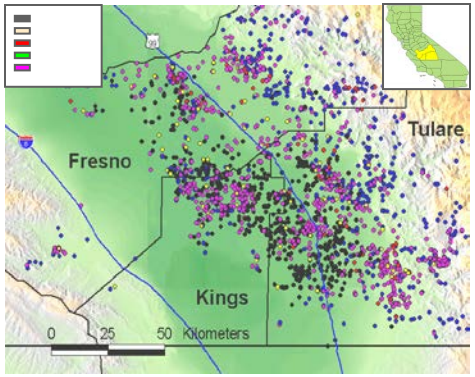
CADMS, TAMU, USDA, USDHS, CDFA, TDFA, Industry

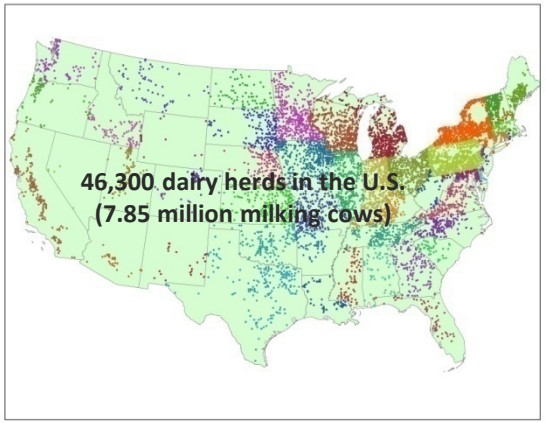
- What if a terrorist attacks with FMD virus?
- How important is early detection/surveillance?
- What is the benefit of animal identification?
- What is the economic impact of FMD/controls?

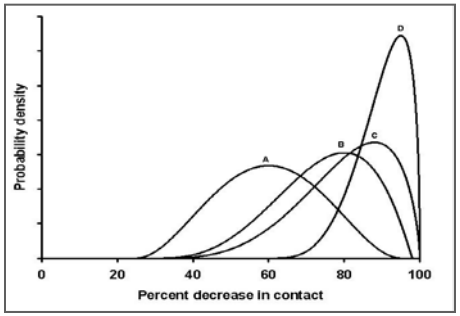


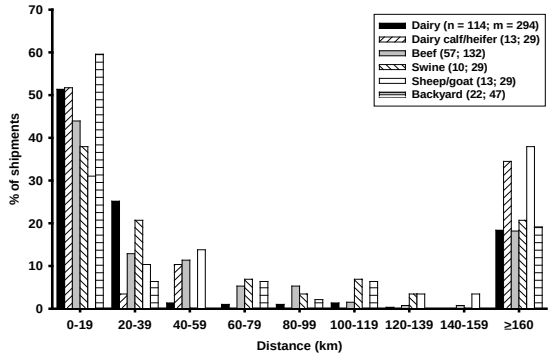
Source: Pam Hullinger, CDFA

Davis Animal Disease Simulation (DADS) Model

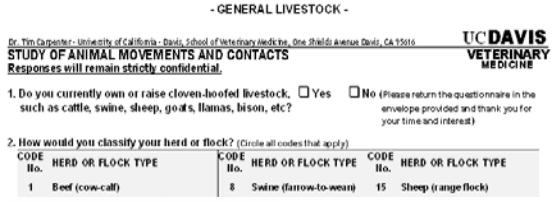








- Spatial
- Stochastic
- Data dependent
- Individual animal based
- National level spread & control
- Transmission levels
  - LAS
  - Direct
  - Indirect (HR and LR)


- GENERAL LIVESTOCK -

Dr. Tim Carpenter - University of California - Davis, School of Veterinary Medicine, One Shields Avenue Davis, CA 95616

UC DAVIS VETERINARY MEDICINE

STUDY OF ANIMAL MOVEMENTS AND CONTACTS

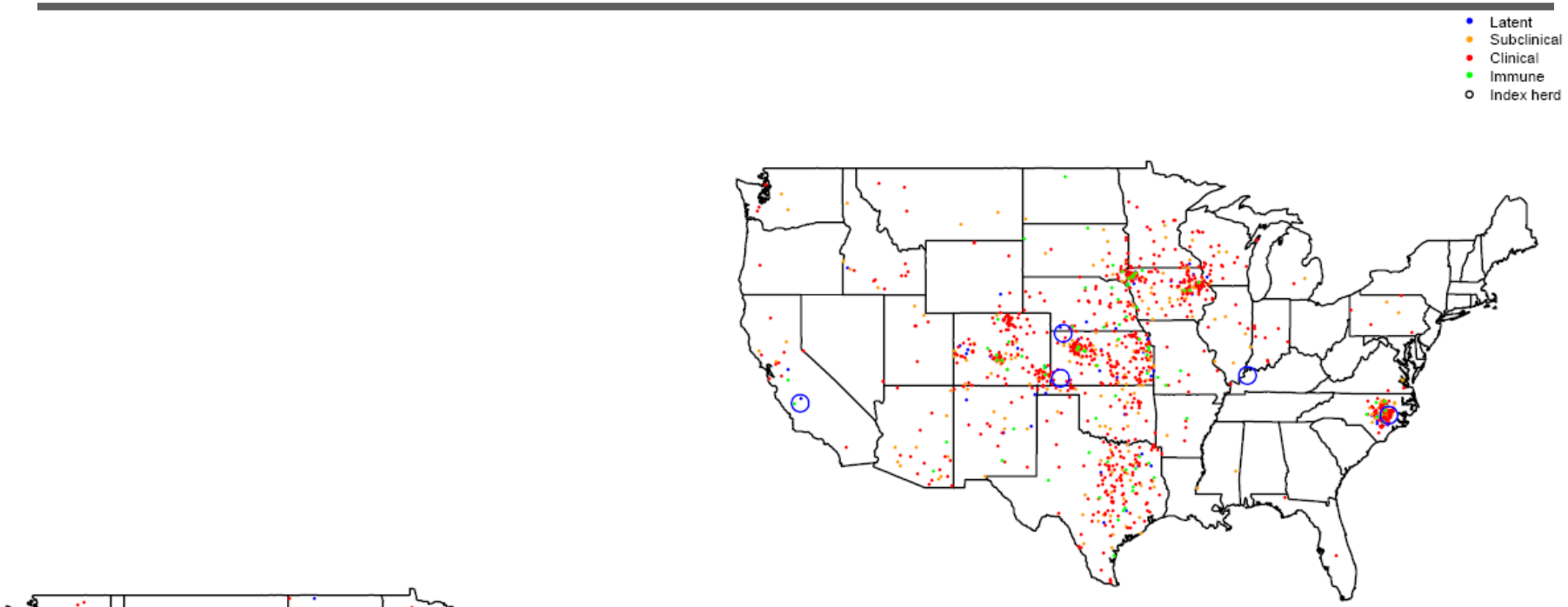
Responses will remain strictly confidential.

1. Do you currently own or raise cloven-hoofed livestock, such as cattle, swine, sheep, goats, llamas, bison, etc? ☐ Yes ☐ No (Please return the questionnaire in the envelope provided and thank you for your time and interest)

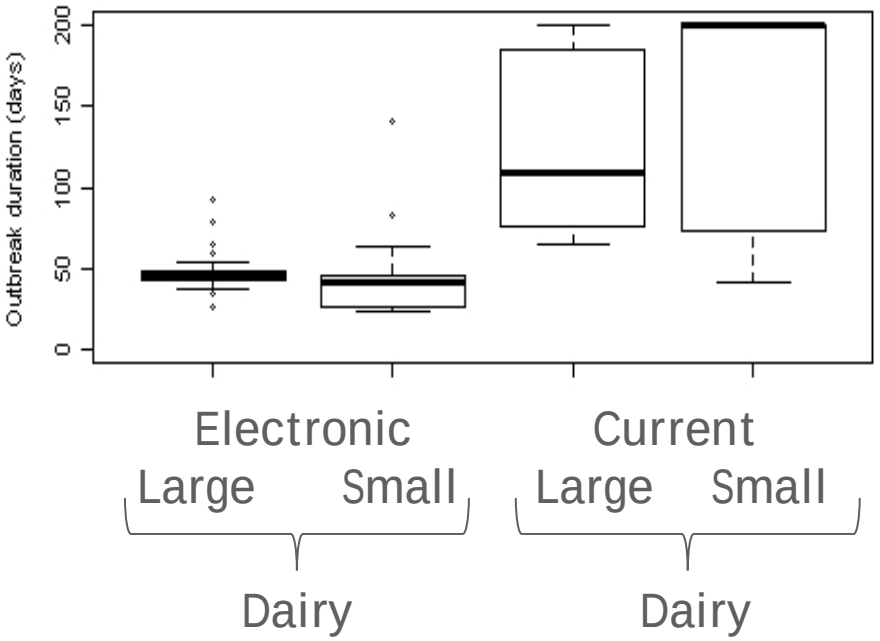
2. How would you classify your herd or flock? (Circle all codes that apply)

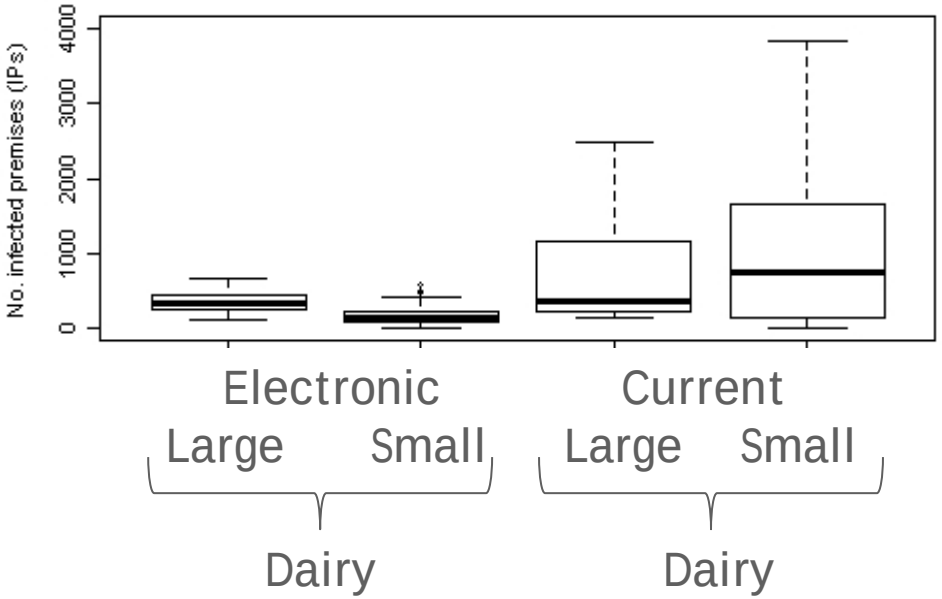
CODE No.	HERD OR FLOCK TYPE	CODE No.	HERD OR FLOCK TYPE	CODE No.	HERD OR FLOCK TYPE
1	Beef (cow-calf)	8	Swine (farrow-to-wean)	15	Sheep (range flock)

Simulated "Terrorist" Outbreaks at 20 days Post Introduction

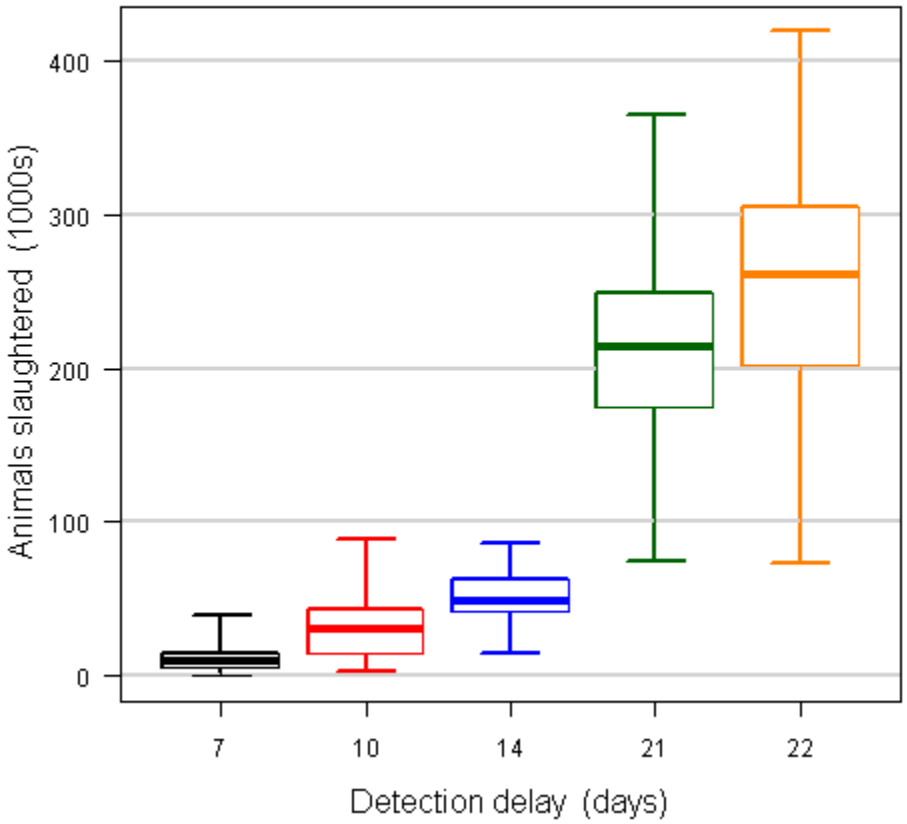


Expected benefit from an individual animal identification system



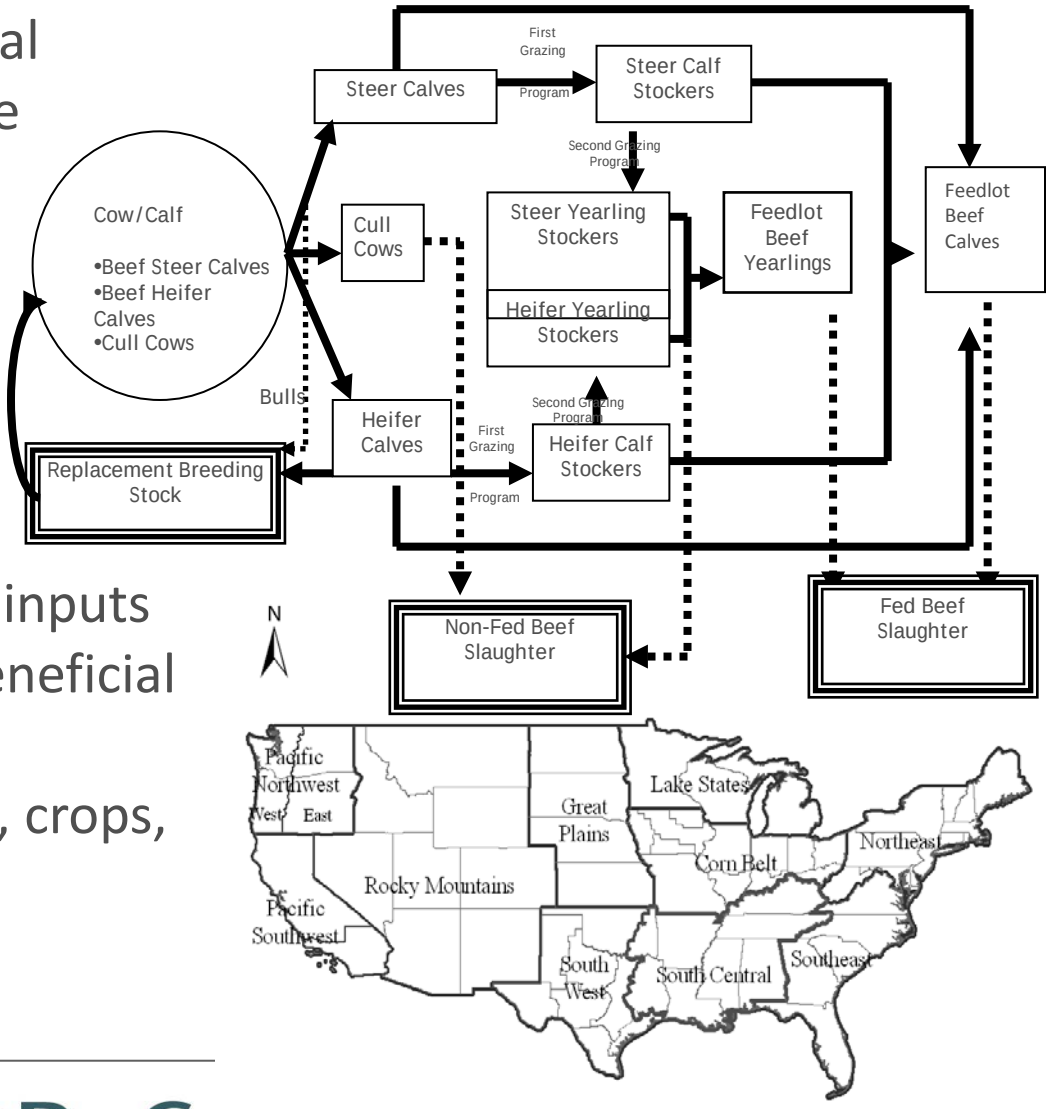


Number of Animals Slaughtered vs. Detection Delay (no vaccination)

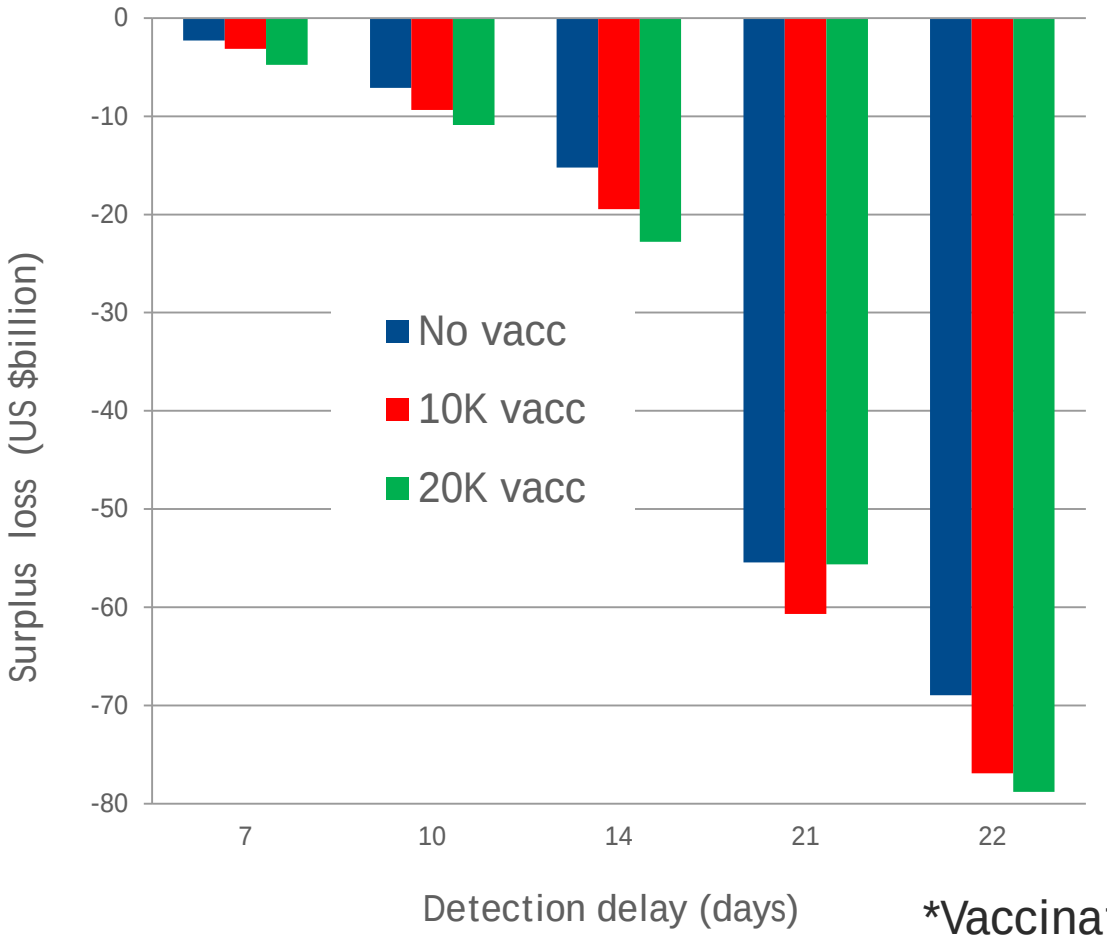


Agriculture Sector Model (ASM)

- National analysis over a regional structure: can simulate disease shock in a single region and system resilience is reflected with readjustments in consumption and locus of production
- Price endogenous
- Models the diverting of sector inputs (such as feed) to alternative beneficial uses
- Supports multiple sectors (e.g., crops, animals, feed, milk etc.)



National Agriculture Surplus Loss vs. Detection Delay and Vaccination* Status



*Vaccination = vaccinate "to die"

Conclusions

The US is not prepared for an agroterrorist attack.

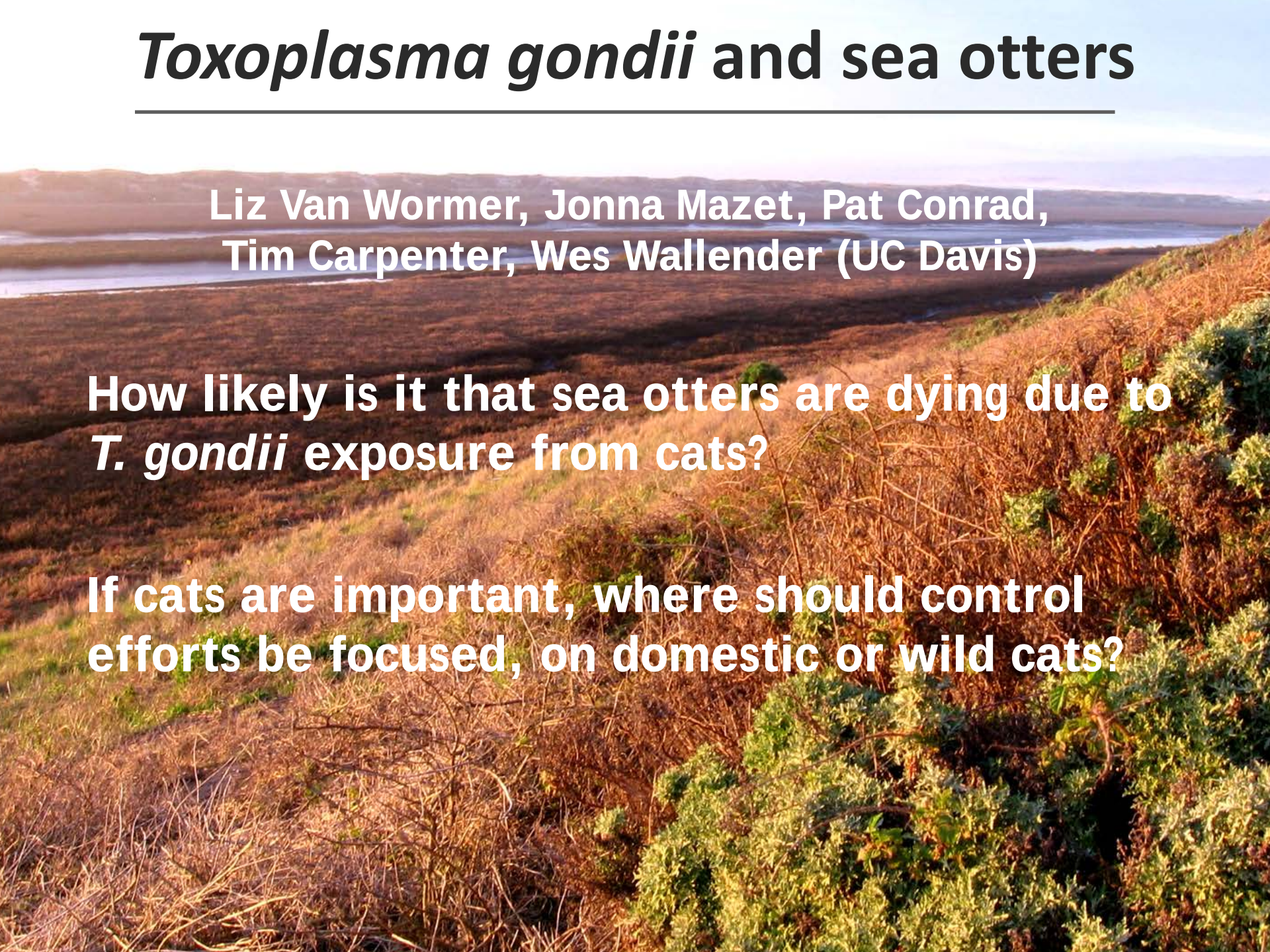
Surveillance should be increased and targeted.

Electronic animal identification can save lives.

Vaccination-to-die is not an economically viable alternative but vaccination-to-live may be (Switzerland).

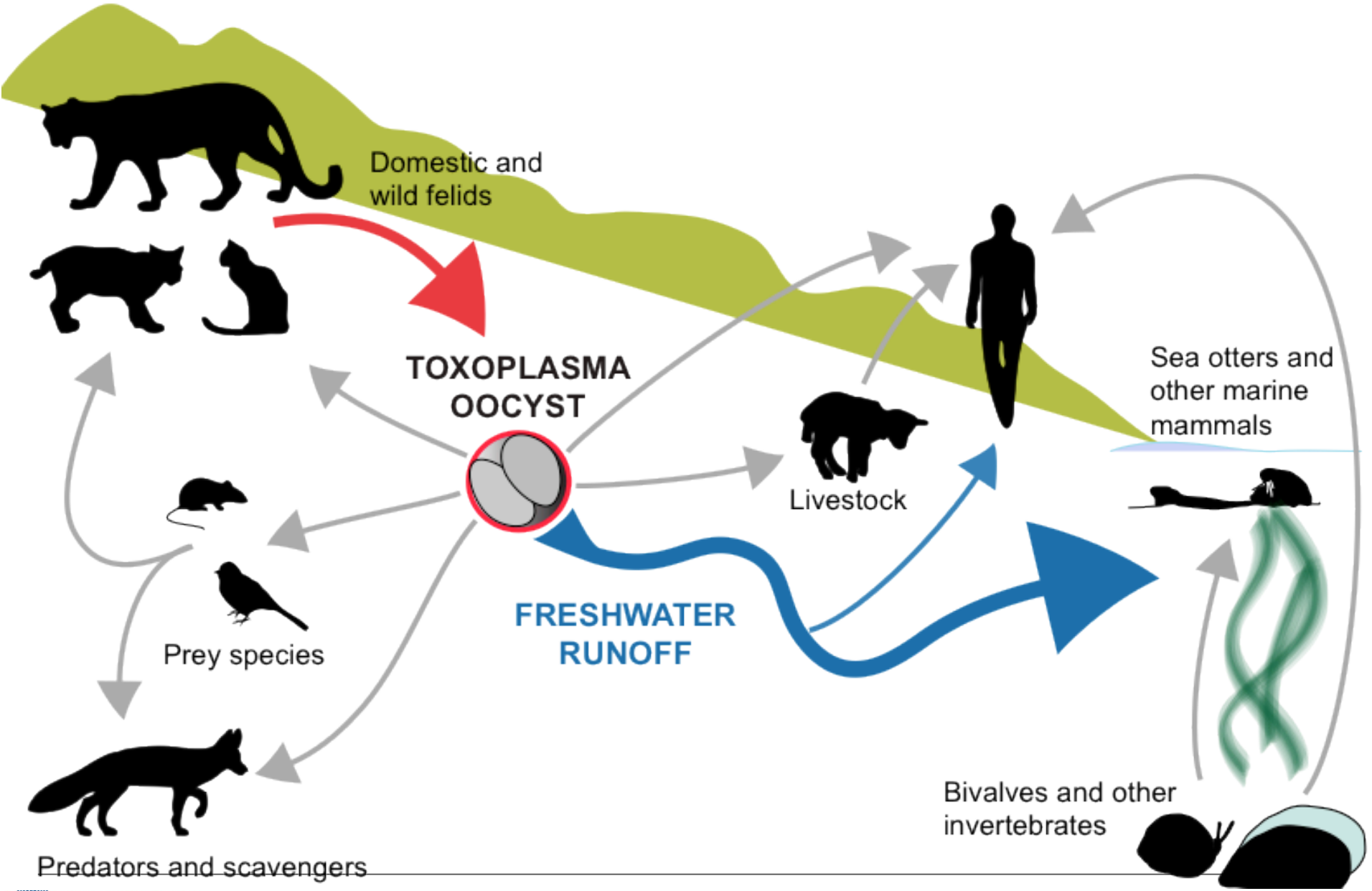
Toxoplasma gondii and sea otters

Liz Van Wormer, Jonna Mazet, Pat Conrad,
Tim Carpenter, Wes Wallender (UC Davis)



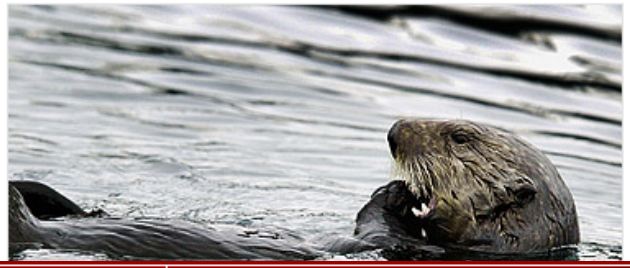
How likely is it that sea otters are dying due to *T. gondii* exposure from cats?

If cats are important, where should control efforts be focused, on domestic or wild cats?


Domestic and
wild felids
TOXOPLASMA
OOCYST
Livestock
Sea otters and
other marine
mammals
Prey species
FRESHWATER
RUNOFF
Bivalves and other
invertebrates
Predators and scavengers

What's Killing the Sea Otters

By DAN CRAY Sunday, Sep.



A sea otter near Valdez, Alaska.

DAVID MCNEW / GETTY

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Americas
Asia-Pacific
Europe
Middle East
South Asia
UK
Business
Health
Science/Nature
Technology
Entertainment
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Have Your Say
In Pictures
Country Profiles
Special Reports
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SPORT
WEATHER
ON THIS DAY
EDITORS' BLOG

Last Updated: Sunday, 19 February 2006, 22:20 GMT

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Cat parasite 'is killing otters'

By Paul Rincon
BBC News website science reporter, St Louis

A parasite carried by cats is killing off sea otters, a veterinary specialist has told a major US science conference.

Sea otters were hunted heavily f their fur in the 1800s

The Californian researcher has called for owners to keep their cats indoors.

Cat faeces carrying *Toxoplasma* parasites wash into US waterways and then into the sea where they can infect otters, causing brain disease.

The parasite is familiar to medical researchers, as it can damage human foetuses when expectant mothers become infected while changing cat litter.

The most likely source of infection for sea otters is the parasite's tough egg-like stage, known as the oocyst, whic is passed in the faeces of cats.

"We need to control the infections in sea otters and reduce the risk to humans by managing our cats more responsibly," said the study author Patricia Conrad of the Wildlife Health Center at the University of California, Davis.

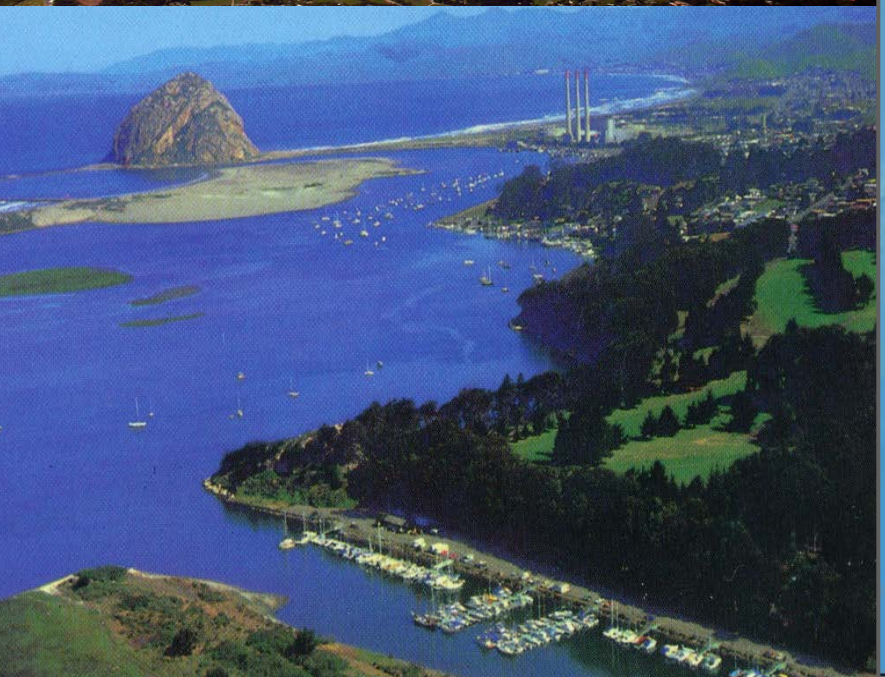
javma News

California sea otters have been dying in alarming numbers for several years, raising concerns about the future of the spe deaths have been blamed on pollution, disease, and human interference. A recent study suggests freshwater runoff conta *Toxoplasma gondii* may be partly to blame.

—Could cat waste be killing sea otters?

March

2 Sites of High Otter Infection



Feral Cat Sources and Sampling

Animal shelters

Depredation trapping

Blood, fecal, and tissue samples

Terrestrial Carnivore Sources and Sampling

Areas bordering high risk sites for otter infection

- Roads and Depredation

Blood, fecal, and tissue samples

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

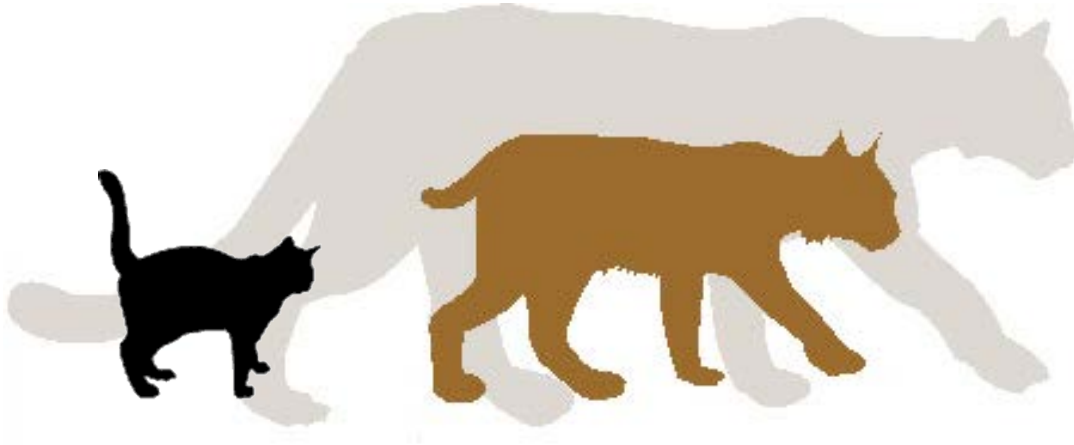
IDReC

Oocyst land-to-sea modeling

- Demographic estimates
  - Domestic cats
    - Pet
    - Managed
    - Unmanaged
  - Wild felids
- Toxo. prev. estimates
  - Infection
  - Shedding

- Precipitation
- Land use
- Vegetation type
- Elevation
- Slope

Comparing infection and oocyst shedding



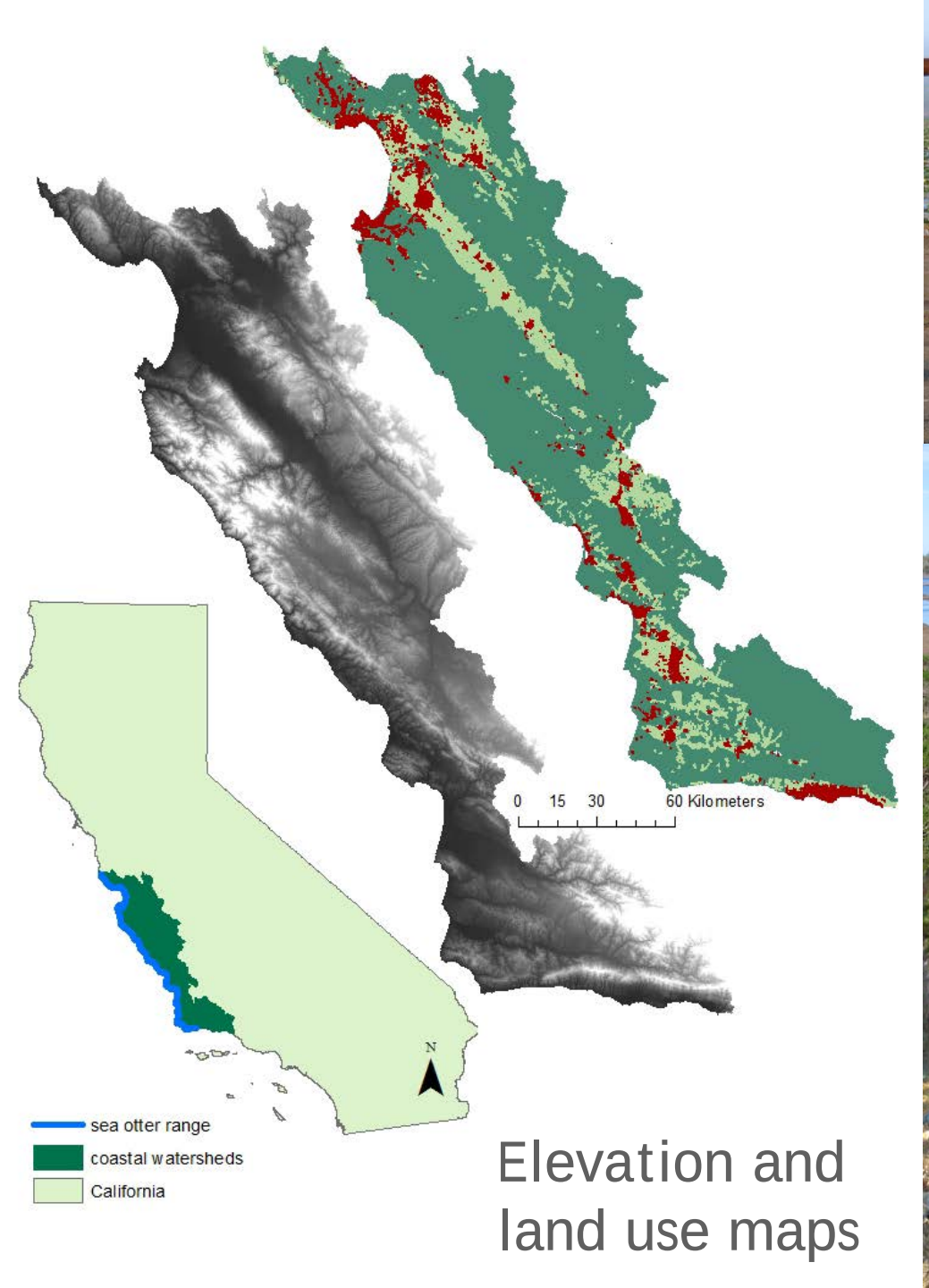
	managed	unmanaged	bobcats	mountain lions
Blood Samples	720	16	22	72
Infection	16.8%	81%	73%	83%
Fecal Samples	435	17	16	50
Shedding Prevalence	1.8%	12%	12%	4%
Est. active shedders	559	~300	~100	1-3

Development of an oocyst loading and land-to-sea transport model

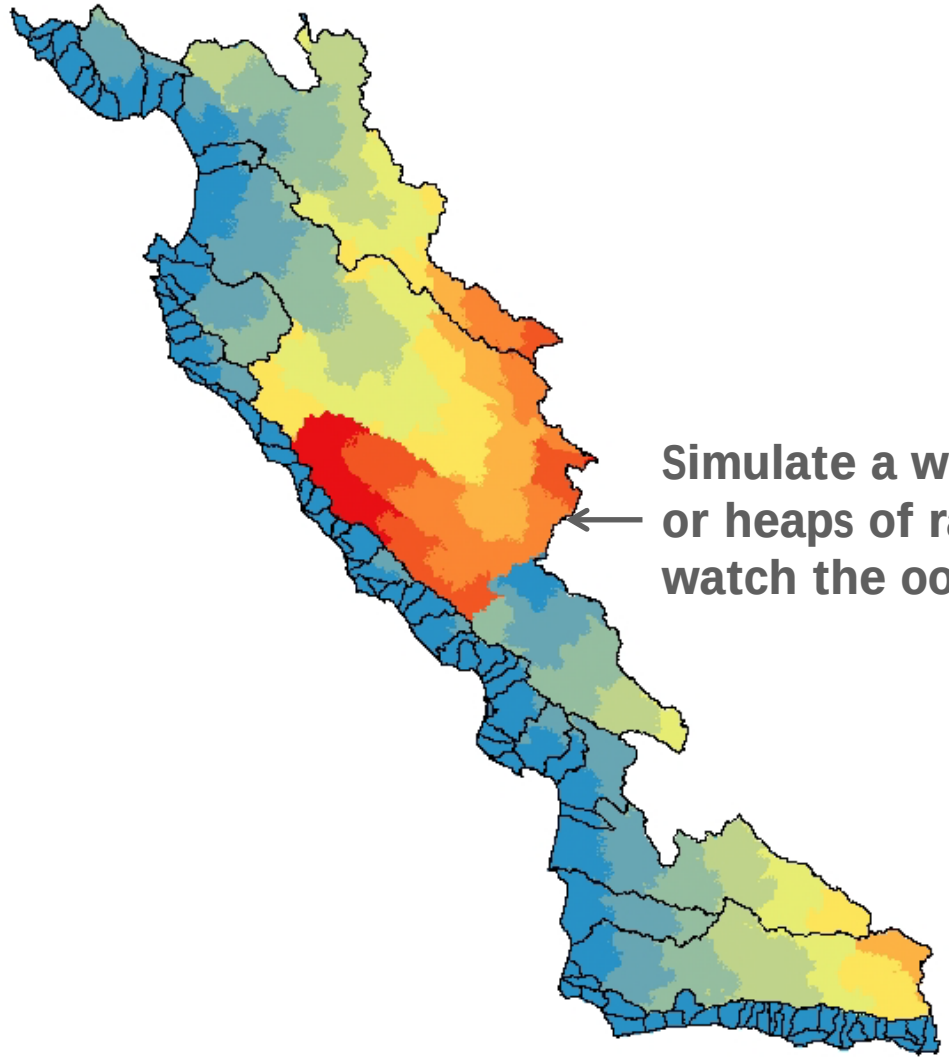
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

3.41 km

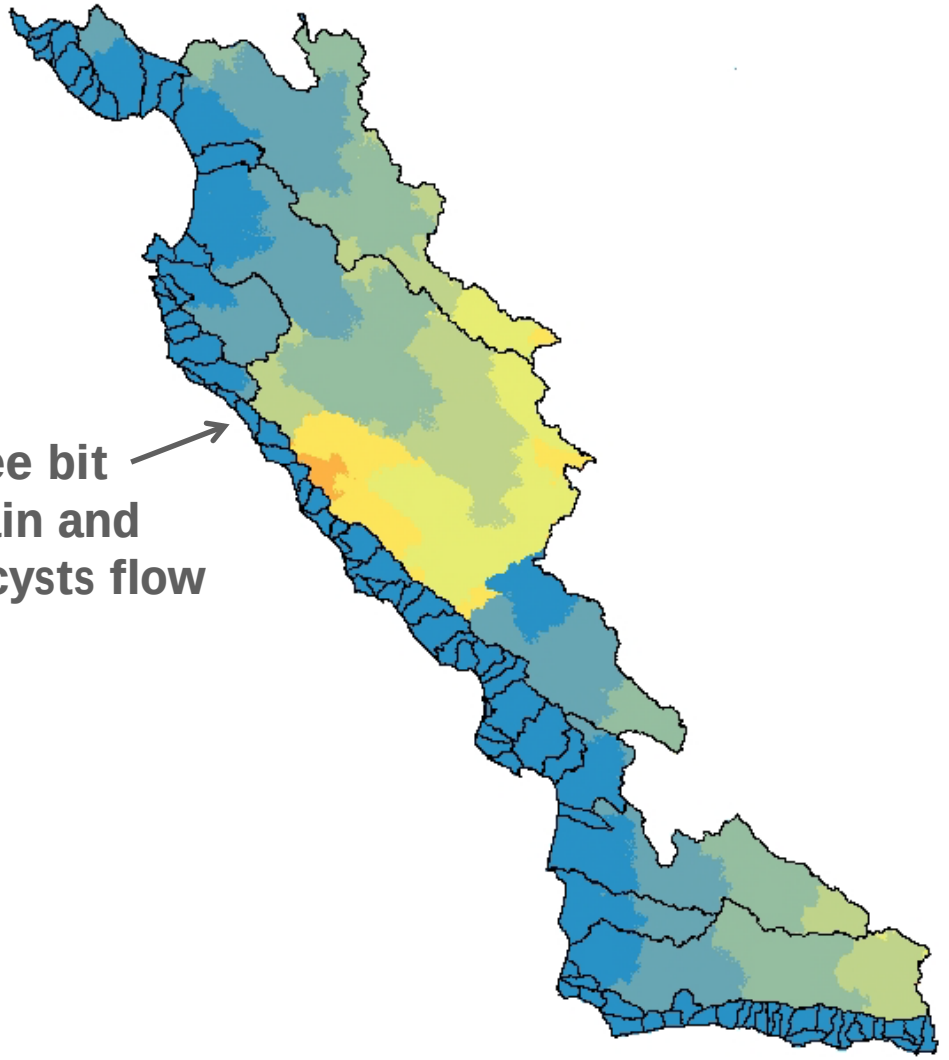
Google

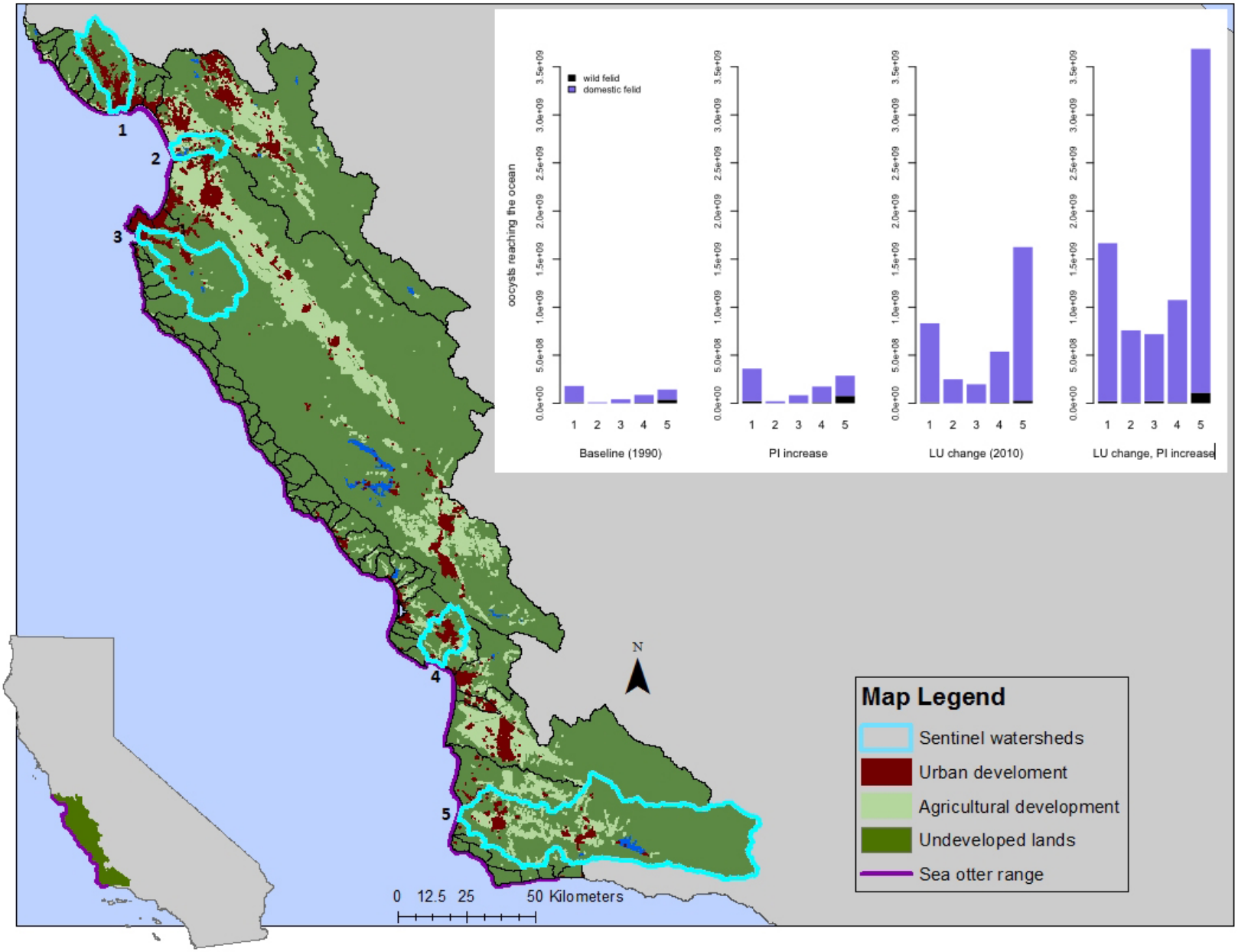


Elevation and land use maps



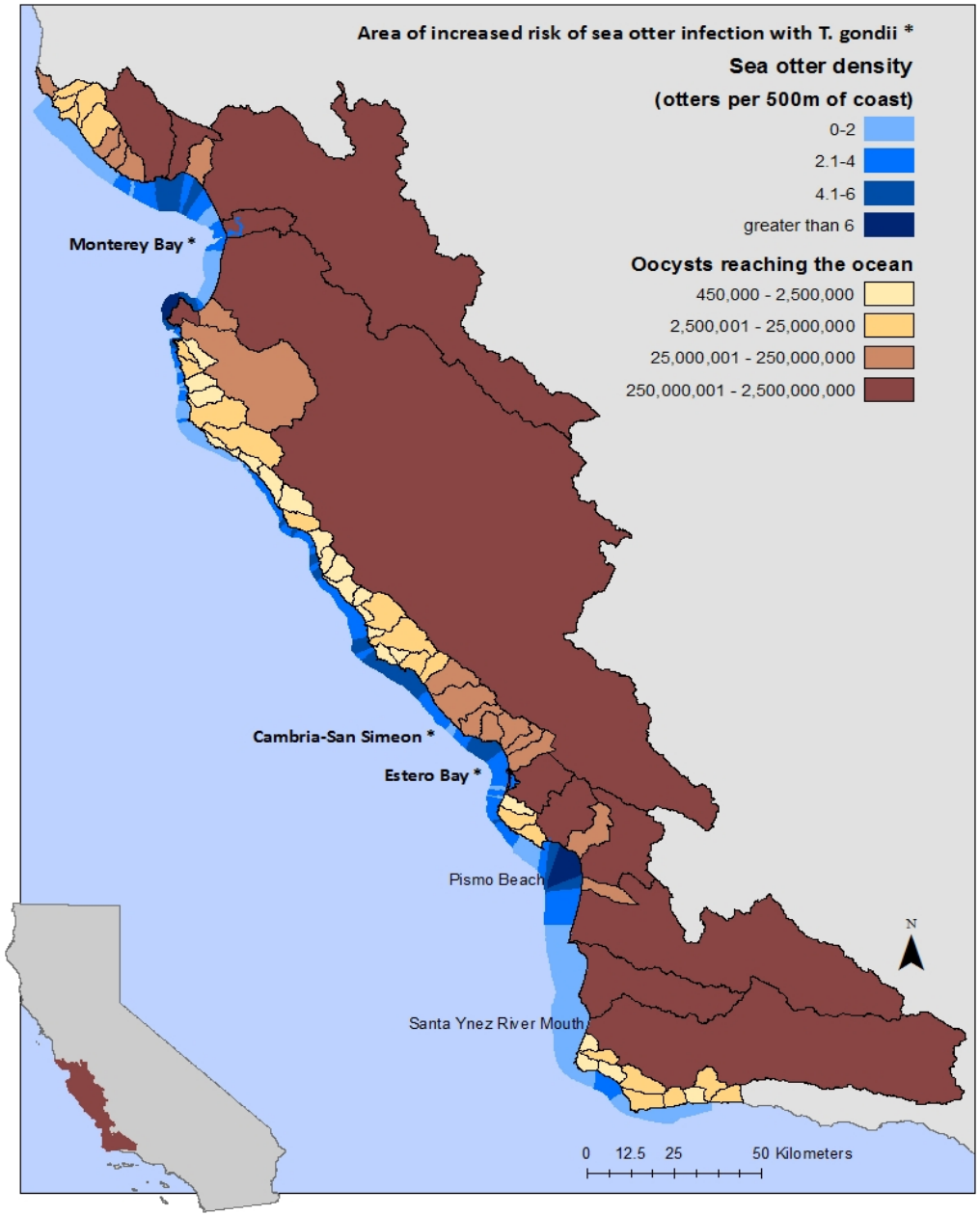
Simulate a wee bit
or heaps of rain and
watch the oocysts flow




1
2
3
4
5
N
0 12.5 25 50 Kilometers
wild felid
domestic felid
oocysts reaching the ocean
0.0e+00
5.0e+08
1.0e+09
1.5e+09
2.0e+09
2.5e+09
3.0e+09
3.5e+09
1 2 3 4 5
Baseline (1990)
PI increase
LU change (2010)
LU change, PI increase
Map Legend
Sentinel watersheds
Urban develoment
Agricultural development
Undeveloped lands
Sea otter range

Conclusions

- Areas of current and future exposure risk can be identified.
- Management actions, e.g. feral cat control, can be more accurately assessed.
- Pop. and LU changes are not good news for the sea otter.



Part 2: Leptospirosis in New Zealand

Collaboration at the human-animal disease interface

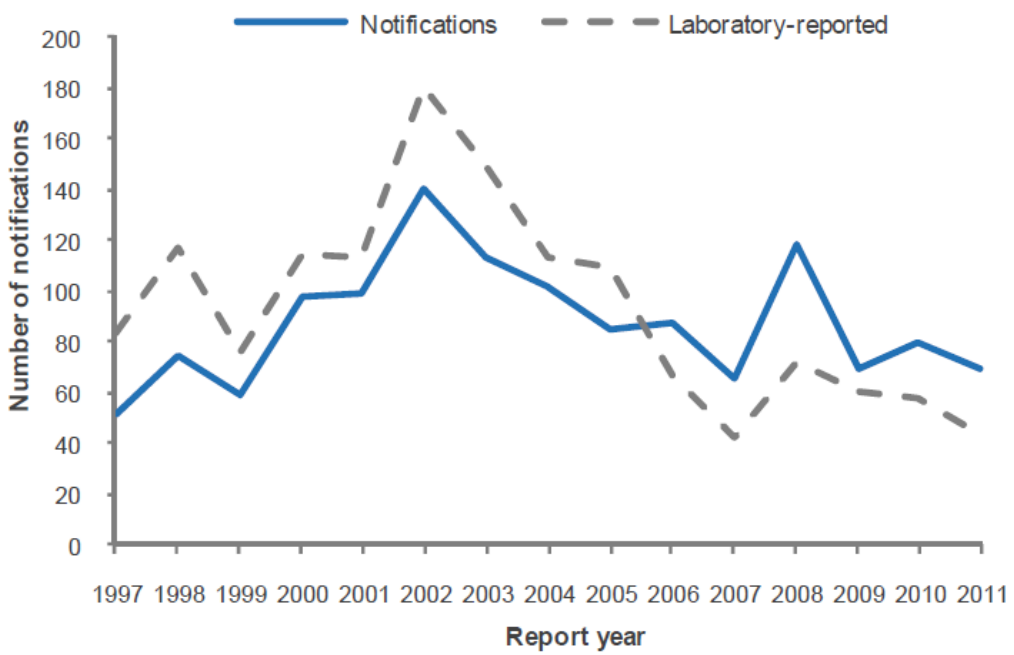
Anou Dreyfus, Fang Fang, Alison Harland, Emilie Vallée

Jackie Benschop, Julie Collins-Emerson, Cord Heuer, Peter Wilson

Leptospirosis continues to place a burden on rural New Zealanders

2011: 70 notified cases

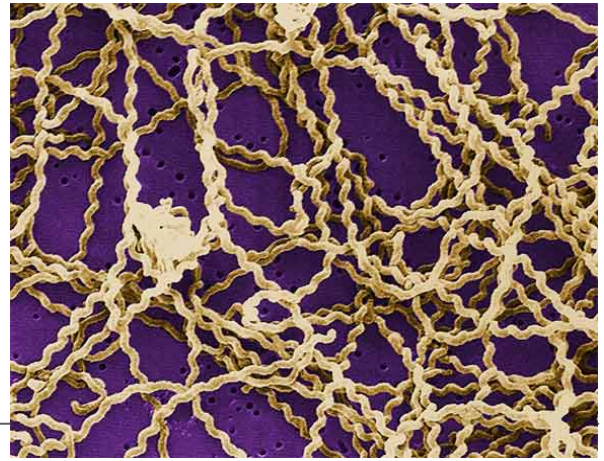
- 62 reported occupation
  - 36 farmers
  - 10 meat industry
- 58% hospitalised



source ESR 2012

Leptospirosis

- Zoonotic, bacterial disease of most mammals
- In NZ ≈ 6 known serovars (of ≈ 300)
- Persist in proximal tubules of kidneys in maintenance hosts
  - Excreted in urine for extended period



Maintenance hosts for leptospirosis in New Zealand

- *L.borgpetersenii* serovar **Ballum**: rodents and hedgehogs
- *L.borgpetersenii* serovar **Hardjo***:cattle, deer, sheep
- *L.interrogans* serovar **Pomona***: pigs, ? ruminants
- *L.interrogans* serovar Copenhageni*: rodents
- *L.borgpetersenii* serovar Balcanica: possums
- *L.borgpetersenii* serovar Tarrasovi: rodents and pigs

*animal vaccines available

Take home messages: lepto in animals

- Our farmed ruminant species are maintenance hosts of serovars that cause disease in humans
- These show a high level of sero-positivity and shedding (Posters: Anou Dreyfus and Fang Fang)
- Clinical disease and losses can occur
- Sub-clinical losses (Poster: Emilie Vallée)
- Vaccination programmes in animals have variable uptake

Collaborators

- Beef and Lamb New Zealand
- Canterbury Health Laboratories
- ESR *Leptopira* Reference Laboratory
- Federated Farmers
- Gribbles Animal Health Laboratory
- Meat workers, farmers, veterinarians and vet students participating in our studies
- Meat workers union Aotearoa
- Michael Baker
- Occupational physicians: Drs. John Kerr and John Reekie
- Rural Women New Zealand
- Silver Fern Farms and other meat companies
- Waikato District Health Board and GPs: Drs. Anita Bell, Keith Buswell, Chris Mansell and phlebotomists

Studies in meat workers

Exposure assessment

Sero-prevalence and risk factors

New infections and risk factors

New Zealand Veterinary Journal 56(4), 164-170, 2008 164

Scientific Article

Prevalence of pathogenic *Leptospira* spp. in sheep in a sheep-only abattoir in New Zealand

S Dorjee[*§], C Heuer[*], R Jackson[*], DM West[*], JM Collins-Emerson[*], AC Midwinter[*] and AL Ridler[*†]

Epidemiol. Infect. (2011), **139**, 797–806. © Cambridge University Press 2010
doi:10.1017/S0950268810002049

Assessment of occupational exposure to leptospirosis in a sheep-only abattoir

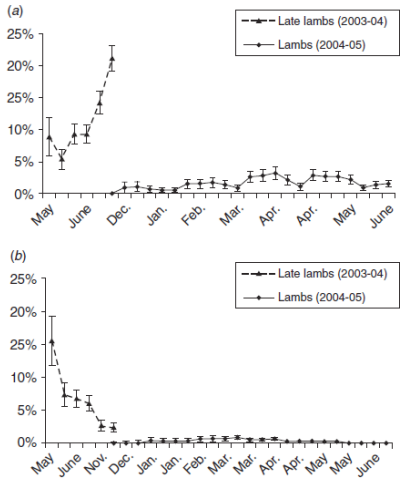
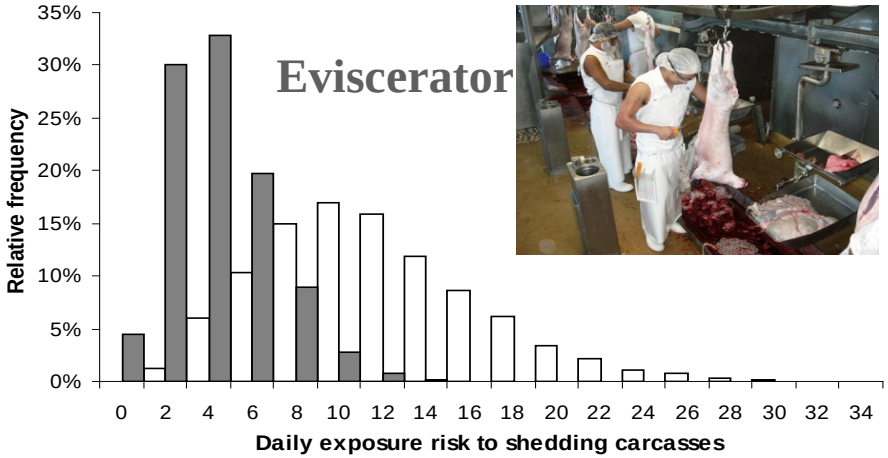
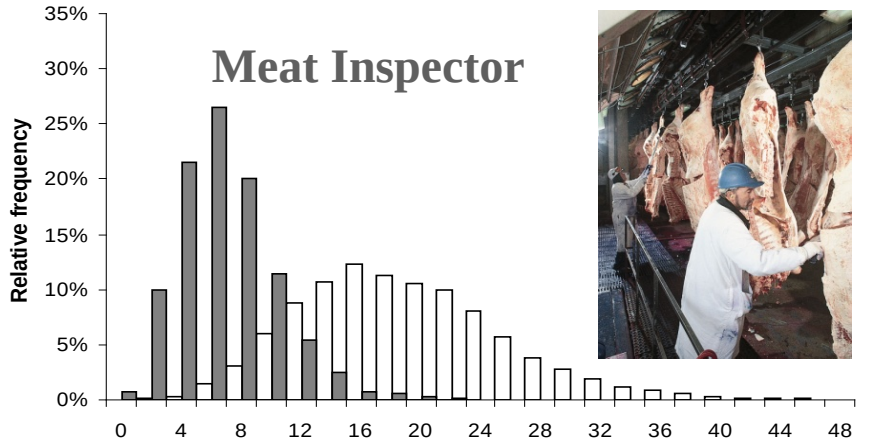
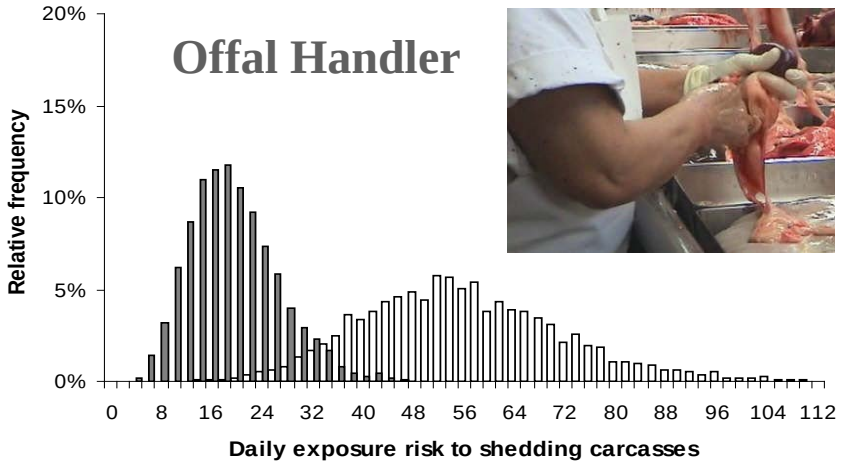


Fig. 2. Monthly carcass prevalence of MAT antibody to (*a*) *Leptospira borgpetersenii* serovar Hardjobovis and (*b*) *Leptospira interrogans* serovar Pomona of 9–14 months old, late-season lambs (study period 1, May–November 2004, and 4–10 months old lambs (study period 2, December 2004–June 2005) in a sheep-only abattoir in New Zealand. Error bars are 95 % confidence intervals of point estimates.







Sero-prevalence of leptospirosis in workers at a New Zealand slaughterhouse

Jackie Benschop, Cord Heuer, Patricia Jaros, Julie Collins-Emerson, Anne Midwinter, Peter Wilson

NZMJ 11 December 2009, Vol 122 No 1307; ISSN 1175 8716
URL: http://www.nzma.org.nz/journal/122-1307/3909/

Flow of sheep

Odds 22x higher

Meat inspection

Odds 53x higher

Popping kidneys

Pulling Kidneys

Gutties

Pelting

Odds 85x higher

Pulling Shoulders

Stunning and sticking

Yard

hter Board

ring

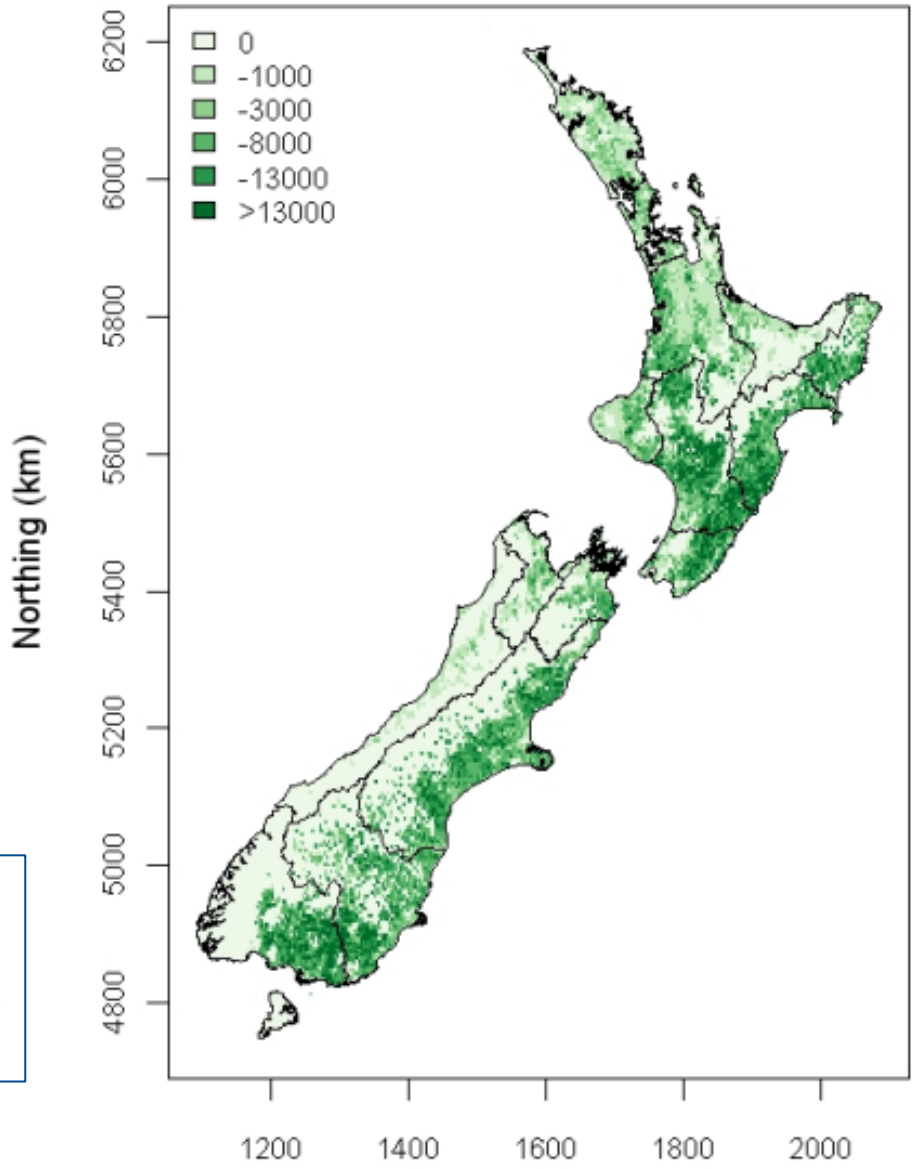
NZ-European vs other	x	5 odds
Home slaughter of cattle	x	15 odds
Home slaughter of pigs/sheep	x	4 odds

New Infections: cohort study estimate..

Dreyfus PhD in prep

- Annual risk of infection with Har &/or Pom in abattoir workers in NZ
- Risk factors for new infection related to occupational and non-occupational activities
- Incidence of confirmed clinical leptospirosis
- Proportion of ‘flu-like’ illness cases among all workers attributed to *Leptospira* infection (PAF)
- Economic impact
- Under-ascertainment in the official notification system

South Taranaki
cattle, sheep



Sheep numbers 2008 (Agribase)

Hawkes Bay
cattle, 3 sheep

Canterbury
deer

Otago
deer

8 meat-plants
592 workers
1. Nov 2009-March 2010
2. Nov 2012-May 2011

Interview

- Work
  - Positions (155)
  - Time
- Exposure to livestock/wildlife
  - Farming
  - Hunting
  - Slaughter at home
- Age, gender, ethnicity, smoking
- Disease history
  - Lab/doc confirmed clinical leptospirosis
  - 'Flu-like 'symptoms
- Use of Personal Protective Equipment (PPE)
  - Facemask/goggles
  - Gloves

Sero-conversion or anamnestic response

- = new infection
- 49 of 592 persons sero-converted or had an anamnestic response (8.3%, 95% CI 6.2-10.9)
- 47 worked in sheep abattoirs

Sero-prevalence & new infection risk

Abattoir	N tot	Sero-positive %	95% CI	N tot	YAR	Annualized Infection risk %	95% CI
Sheep1a	104	11.5	6-19	82	1.17	11.5	6.2-19.8
1b	242	9.5	6-14	135	1.15	8.4	4.7-14.1
2	97	11.3	6-19	68	1.07	16.4	7.6-22.9
3	32	31.3	16-50	21	1.13	12.6	3.3-32.9
4	92	9.8	5-18	78	0.96	10.7	5.1-20.6
Deer5	21	19.1	5-42	18	1.01	0.0	0.5-21.6
6	36	16.7	6-33	32	1.00	0.0	0.3-13.3
Beef7	73	5.5	2-13	58	1.12	1.5	0.1-9.3
8	112	5.4	4-20	100	1.02	1.0	0.1-6.1
Total	567	10.9	17-23	592	1.07	7.7	5.8-10.1

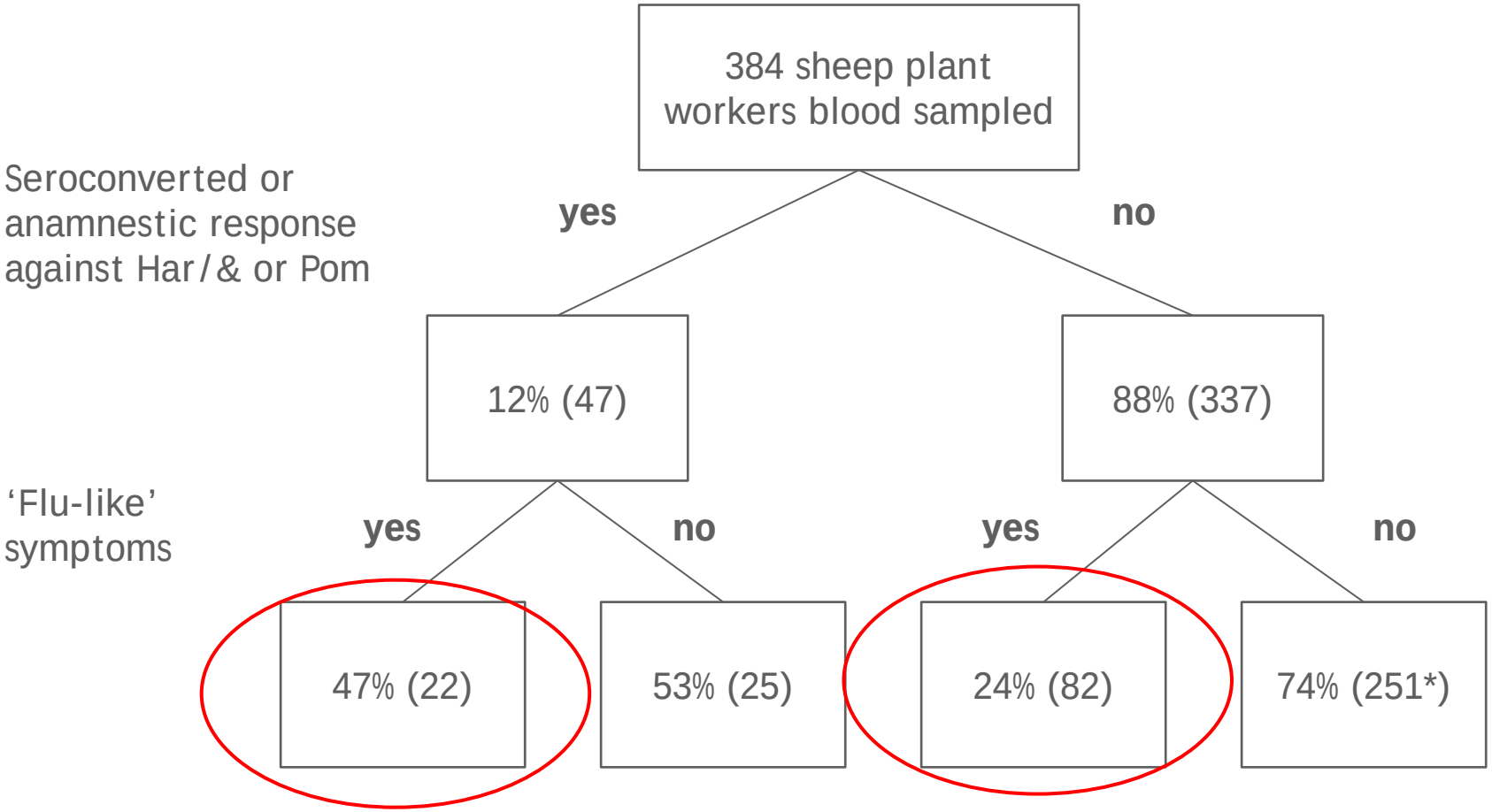
Risk factors for new infection (sheep plants)

Variable	Category	RR	95% CI	P-value
Work position	Boning, chillers, office	Ref		
	Offal, pet food	4.1	(1.0-16.4)	0.048
	Gut removal, meat inspection, pulling kidneys	5.2	(1.7-16.0)	0.004
	Yards, stunning, pelting	7.5	(2.5-22.4)	<0.001
Months worked in meat industry	<=72	Ref		
	>72 - 180	3.0	(1.1-7.9)	0.032
	> 180-324	1.3	(0.4-3.9)	0.643
	>324	3.0	(1.1-7.9)	0.026
Abattoir	1,3,4,5	Ref		
	2	2.0	(1.0-3.9)	0.046

Clinical disease

- 3 men from sheep abattoirs had confirmed clinical leptospirosis within study period
  - 2 sero-converted against Pom, 1 remained sero-positive against Pom
  - Age 43-67 years
  - Worked on slaughter board (2) and offal room (1)
- How many were ill but without confirmed diagnosis (probable leptospirosis)?

New infection and flu-like illness in sheep abattoir workers



New infection with Har and/or Pom was associated with a 2-fold higher risk of 'flu-like' illness

Disease impact

Outcome	Exposure	RR (95% CI)	PAF (95% CI)	p-value
Flu-like symptoms	Seroconversion -Yes	**1.90** (1.32-2.71)	**0.10** (0.02-0.16)	0.007
	-No	Reference		

Relative risk: new infection with Pom and/or Har increased the risk of illness with 'flu-like' symptoms 1.9-fold

PAF: 10% of 'flu-like' cases in the study population were attributable to a new infection with Pom and/or Har (assuming causality)

Under-ascertainment & economic impact

- Under-ascertainment of officially notified cases with leptospirosis in last five years
  - Between 16 and 56 times
  - Comparison of proportion of notified leptospirosis cases from meat industry with proportion of probable and confirmed leptospirosis cases in the sheep abattoir worker study population
- Economic impact
  - average number of days away from work due to illness per newly infected worker
  - 4.4 days (95% CI 2.7 - 6.1)

Summary

- Sheep plants: high prevalence & incidence
  - Sheep urinate spontaneously when stunned, more animals processed
- Deer plants: high prevalence, low incidence
  - workers from highly exposed areas already positive!
- Beef plants: low prevalence & low incidence
  - Different slaughter procedure, less animals processed
- Work position: main risk factor
  1. Stunning, pelting
  2. Gut removal, pulling kidneys
  3. Processing of offal and intestines

Summary

- PPE?

- 10% of ‘flu’ cases in sheep abattoirs are lepto cases
  - Limitation: timing of sampling was at variable distance from disease

- Under-ascertainment: many lepto cases are not captured

Funders

- AGMARDT
- C. Alma Baker Fund
- Department of Labour
- Health Research Council
- Meat workers union Aotearoa
- Pharmaceutical companies: MSD, Virbac and Pfizer Animal Health
- Rural Women New Zealand
- Sheep & Beef and Dairy branches NZVA
- Sustainable Farming Fund
- Tertiary Education Commission: BRCSRA
- Wairarapa Veterinary Association
- William Barlow Estate

$87,500 raised for Lepto!

Rural Women New Zealand presented a jumbo-sized cheque to the value of $87,500 to Massey University at our national conference in Blenheim on 19 May for further research into Leptospirosis, New Zealand's most important occupationally-acquired disease.

Assoc Prof Cord Heuer and Dr Jackie Benschop of Massey University with RWNZ national president Margaret Chapman

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

IDReC

Part 3: Emerging infectious disease response

A case study to show what can be done in a short period of time with good collaboration

Salmonellosis in dairy herds

- Telephone call from Taranaki veterinarian Peter Morgan 12 December 2011
  - increase in the number of dairy herds with acute salmonellosis
  - many affected herds known to have used a particular type of pelletised magnesium supplement

TARANAKI DAILY NEWS online
taranakidailynews.co.nz

Salmonella outbreak in dairy herds

SUE O'DOWD

Last updated 09:27 20/10/2011

An outbreak of salmonella has occurred in a few dairy herds in the Opunake area.

In the past 12 months there had been more salmonella outbreaks in dairy herds than normal, Coastal Veterinary Services senior vet Greg Hollway said.

The number of outbreaks was small - less than five - but there had also been some isolated cases of the disease on other farms.

"Normally we don't have any," he said.

There appeared to be no particular link between the cases, although they had occurred on farms that were close together.

Dr Hollway said there had also been outbreaks in other areas of Taranaki and elsewhere, including Levin and Tokoroa.

The Opunake practice had been unable to track down the cause of the outbreak, so assessing the risk to herds was difficult.

Research was being done by vets around the country to find the trigger. Carrier cows were a possibility.

Vaccination of the entire herd would prevent salmonella, but farmers should first discuss the risk with their vet. Routine vaccination was not recommended.

Initial vaccination of a 250-cow herd would cost $500 for the prescription and administering it would be extra, although some farmers would be able to administer it themselves.

An outbreak occurred when several cows in a herd were affected. Sick cows were treated with antibiotics and sometimes with oral fluids to combat dehydration.

The symptoms were smelly diarrhoea, sometimes with blood and mucus, loss of milk and high temperature. Cows with salmonella were likely to be depressed.

Dr Hollway said the loss of milk was likely to occur first, but the disease could progress to diarrhoea before the

TARANAKI DAILY NEWS online
taranakidailynews.co.nz

Illness hits farmer hard

SUE O'DOWD

Last updated 05:00 16/12/2011

JONATHAN CAMERON

Stratford couple Brian and Marian McDonald have been coping with a costly outbreak of salmonella.

If 180 dairy cows with diarrhoea sounds like your worst nightmare, then you will be horrified to learn that is only part of the story.

Stratford farmer Brian McDonald reckons a salmonella infection in his 280-cow herd has already cost him between $120,000 and $150,000 in veterinary expenses, lost milk production and 11 dead animals.

He is one of about 15 Taranaki farmers whose herds have been infected with salmonella in an outbreak that is also affecting the Waikato, Bay of Plenty and Manawatu. The source has not been identified.

Still unknown is the effect on Mr McDonald's 96ha farm next season.

The infection struck six weeks ago in the middle of mating, so he is yet to find out whether it will stop his cows getting in-calf.

"I'm not looking forward to next spring," he said yesterday.

"Mating's been a disaster. A cow would go from AB (artificial breeding) one day to being crook with salmonella the next day.

"I'm too scared to think about my spring calving pattern at the moment."

In eight days his daily milk production fell from 6000 litres to 1600 litres. It's now back to 4500 litres.

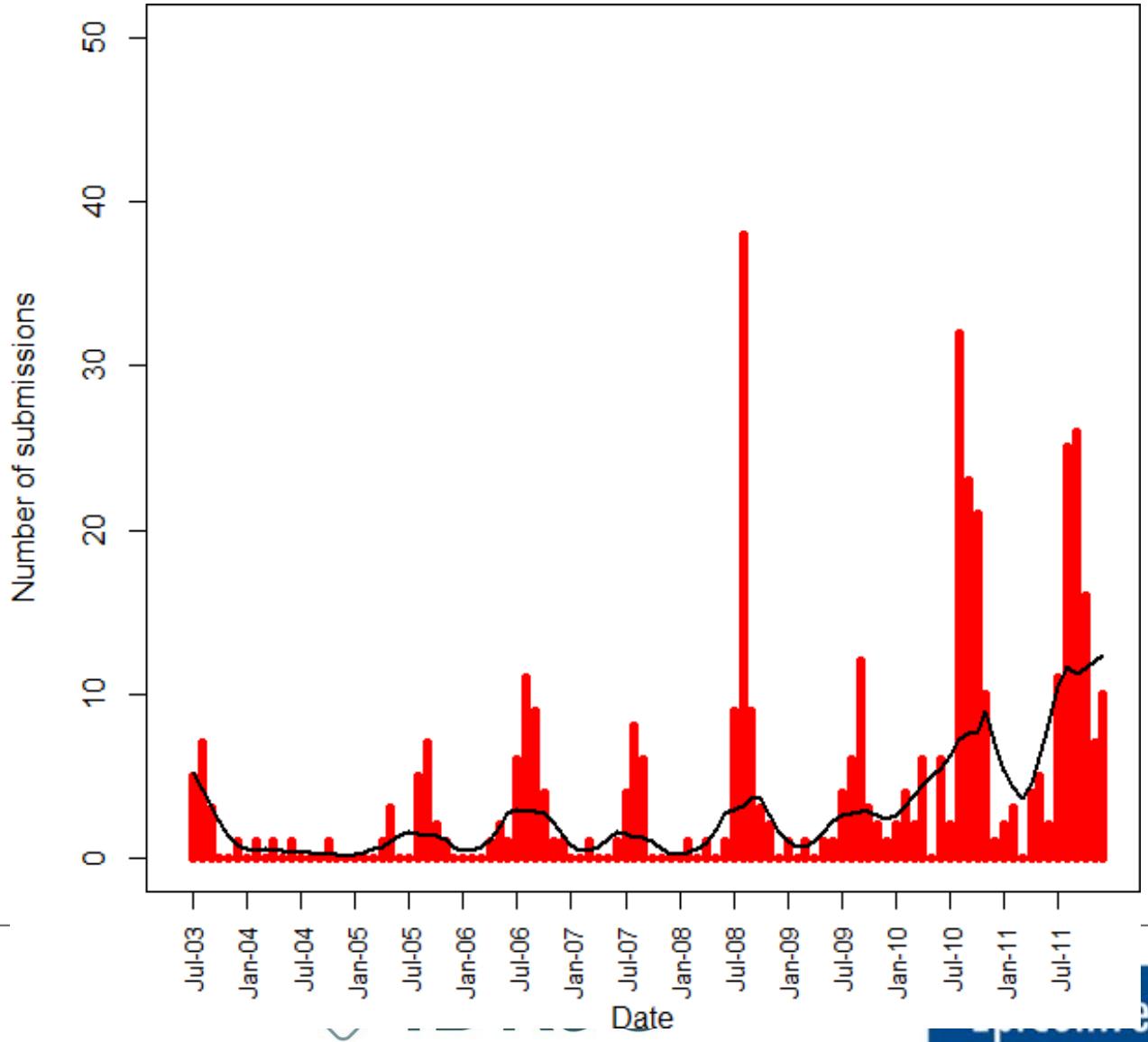
Ten cows have had the disease twice and isolated cases are still occurring.

Dumping milk containing antibiotics when he mistakenly thought it was clear has caused more stress.

Salmonellosis in dairy herds

- December 2011
  - Ministry for Primary Industries reported that the National Animal Health Information Surveillance programme had detected a change in the pattern of diagnosis of salmonellosis in dairy cattle in New Zealand
  - ↑in the incidence of uncommonly reported Salmonella serotypes in cattle; moderate ↑ in laboratory case counts for Salmonella spp. in cattle

Frequency histogram showing monthly counts of laboratory submissions for salmonellosis as a function of calendar time, July 2003 to December 2011. Superimposed is a smoothed plot fitted to the monthly submission counts. Source: Ministry for Primary Industries (New Zealand).



Published Date: 2011-12-20 10:10:05
Subject: PRO/AH/EDR> Undiagnosed disease, bovine - New Zealand (02): (TK)
Archive Number: 20111220.3639

UNDIAGNOSED DISEASE, BOVINE - NEW ZEALAND (02): (TARANAKI), SALMONELLA
****

A ProMED-mail post
http://www.promedmail.org
ProMED-mail is a program of the
International Society for Infectious Diseases
http://www.isid.org

Date: 19 Dec 2011
From: Katie Owen [edited]

In New Zealand's temperate climate, the national dairy herd is predominantly spring-calving and as a result, salmonella has a peak occurrence at this time of year. This New Zealand spring, the National Animal Health Information Surveillance programme detected a change in the overall picture of salmonella in New Zealand dairy cattle: an increase in the incidence of uncommonly reported salmonella serotypes in cattle and a moderate increase in laboratory case counts for salmonella in cattle.

These findings were further supported by anecdotal reports of a more severe clinical expression and reduced vaccination effect in dairy cattle occurring over the last 2 seasons.

All salmonellae isolated in New Zealand animal health laboratories are typed at the National Environmental Science and Research (ESR) Enteric Reference Laboratory, which collates and reports both human and non-human salmonella sero and phagetyping results. The national database of salmonella isolates has not shown any associated rise in human salmonella cases. ESR reports can be accessed at:
http://www.surv.esr.cri.nz/enteric_reference/enteric_reference.php.

Salmonella information is also included in annual reports in the Surveillance magazine:
http://www.biosecurity.govt.nz/publications/surveillance/index.htm.

Salmonellosis in dairy herds

- Salmonella liaison group formed in early January 2012 comprised of representatives from
  - Ministry for Primary Industries
  - Fonterra
  - Dairy cattle veterinarians
  - New Zealand Veterinary Association
  - Massey University

Salmonellosis in dairy herds

- Group's mandate has been to coordinate activities related to learning more about the epidemiology of salmonellosis in New Zealand dairy cattle and development of evidence-based control strategies

Activity	Date	Details
Taranaki case-control study	Dec 2011	Telephone questionnaire administered to 16 case and 16 control herds, Taranaki.
Fonterra cross-sectional study	Dec-Jan 2012	Web-based questionnaire administered to Fonterra suppliers.
National case-control study	Mar-May 2012	Mail-out questionnaire administered to 55 case and 55 control herds. Case herds identified from Fonterra cross-sectional study.

Salmonellosis in dairy herds

- Taranaki case-control study
  - completed in the week before Christmas
  - cases comprised the 16 dairy herds (laboratory) confirmed as salmonella-positive by four Taranaki dairy practitioners
  - controls were dairy herds that received a visit by a veterinarian from the same practice on the day before the index salmonella visit to each case herd

Salmonellosis in dairy herds

- Three factors significantly associated with the risk of a herd being salmonella positive:
  - use of supplementary feeds apart from palm kernel meal [odds ratio 9.0, 95% CI 1.5 to 51]
  - use of pelletised mineral supplements containing MgO [odds ratio 153, 95% CI 6.7 to 3500]
  - home mixing mineral supplements [odds ratio 13, 95% CI 2.0 to 80]

MineralBoost
COMPOUND MINERAL SUPPLEMENTS

Enquiries:
0800 466 736

Friday, 13 January 2012

To whom it may concern,

Temporary Suspension of Supply of MineralBoost

The MineralBoost range of stock feed supplements has been successfully used with PKE and other cattle feeds over the past two years. Our customers, with the use of our MineralBoost products, have achieved improved productivity and greater efficiencies due to accurate measurement of feed rates, balanced nutrient supply and ease of use of dispensing necessary minerals. This is evidenced by the significant increase in the use of our products over the past 2 years without any material health concerns.

However, there has recently been an unusual number of salmonella cases reported amongst cattle and there is currently speculation in the market place as to its cause. The scientific process to determine the exact cause is complicated as there are many variables and contributing factors which can trigger an increase in salmonella, which is a naturally existing and reoccurring bacterium in the environment.

To date based on scientific research, we know that our MineralBoost range of products is not a source of salmonella, and no definitive link has been established between cattle having contracted salmonella and the use of MineralBoost products.

Our primary concern however is the wellbeing of our customers and their herds, and we are ourselves working to establish the cause of these latest outbreaks of salmonella. We have been in lengthy consultation with MAF, Fonterra, the NZ Vet association and various leading ruminant nutritionists. The current advice we have received has been to simply reduce feeding rates, and that advice was communicated to the market and our customers in our previous communication dated 3 January 2012.

In the interests of our customers however, which we consider paramount, we have decided to take the additional and overly cautious step of temporarily suspending supply of the MineralBoost range of products while we investigate the situation further based on credible scientific research. We believe that this is the only prudent course of action for a responsible company to take while unhelpful speculation in the market place exists.

The advice we have received is for farmers currently using our MineralBoost products to gradually reduce rates of feed, as previously advised, until current supplies are utilised. The same advice suggests that it is not advantageous to immediately cease the use of mineral supplements as an abrupt change of diet could have other adverse and unforeseen consequences on stock health. Information on correct feed rates and best practice is available by calling our customer helpline on 0800 466 736.

We are currently engaging leading nutritionists and research institutions to fully understand the current situation. Collaborative trials and further investigation has already begun and we will advise our customers further once more is understood and the advice of our experts is more certain.

The MineralBoost range of products has been popular amongst farmers for its positive attributes and we intend to work with the industry to overcome these issues to ensure we are able strengthen the MineralBoost brand and continue to provide farmers with innovative cost effective solutions.

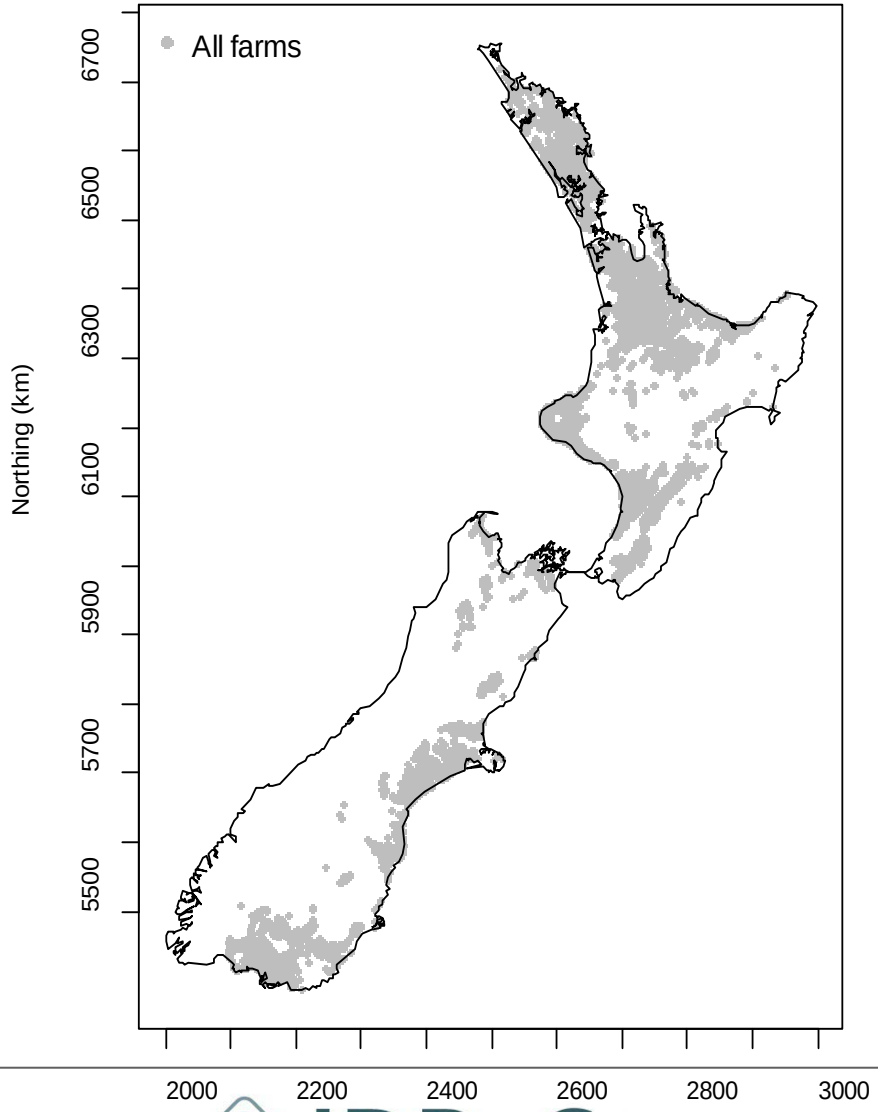
W. Voyce
Chief Executive
Fertco Limited

Salmonellosis in dairy herds

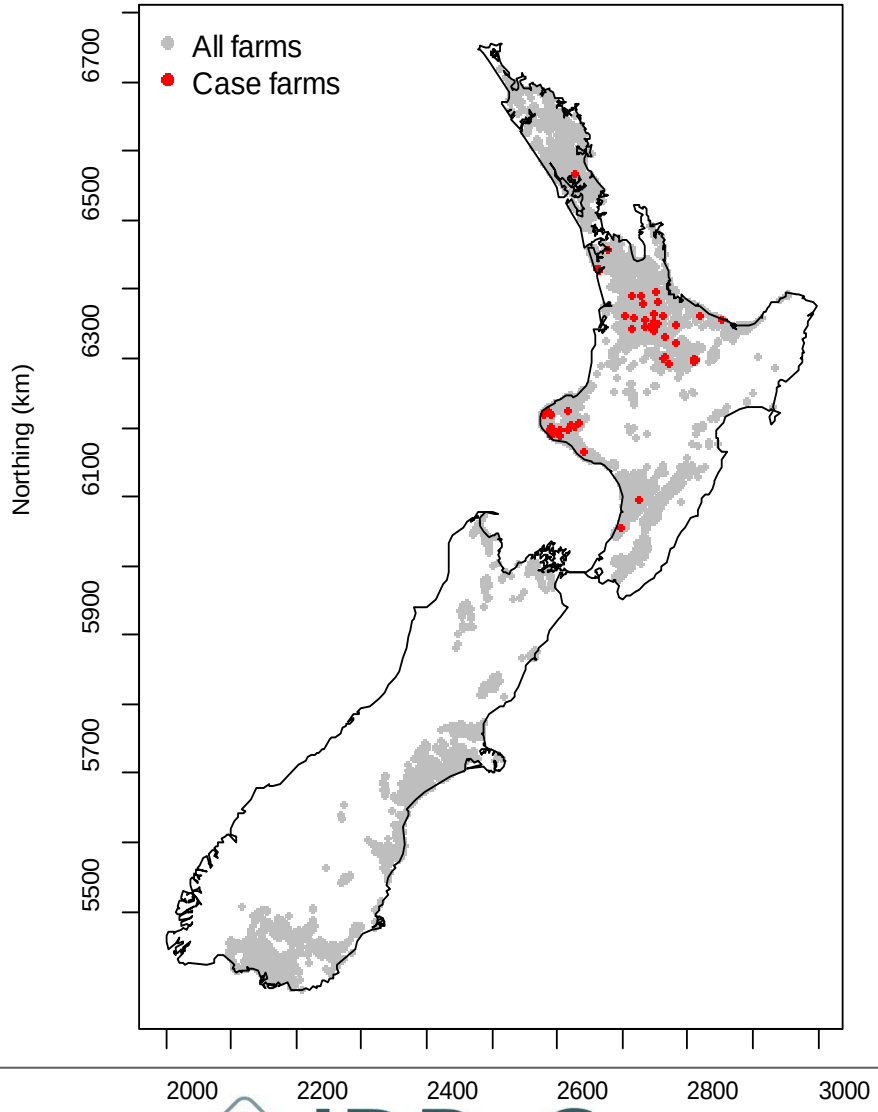
- Limited geographic extent and small number of case herds in Taranaki study meant that only those risk factors strongly associated with disease were detected

- National case-control study funded by MPI, Fonterra and the Society of Dairy Cattle Veterinarians was instigated in April 2012

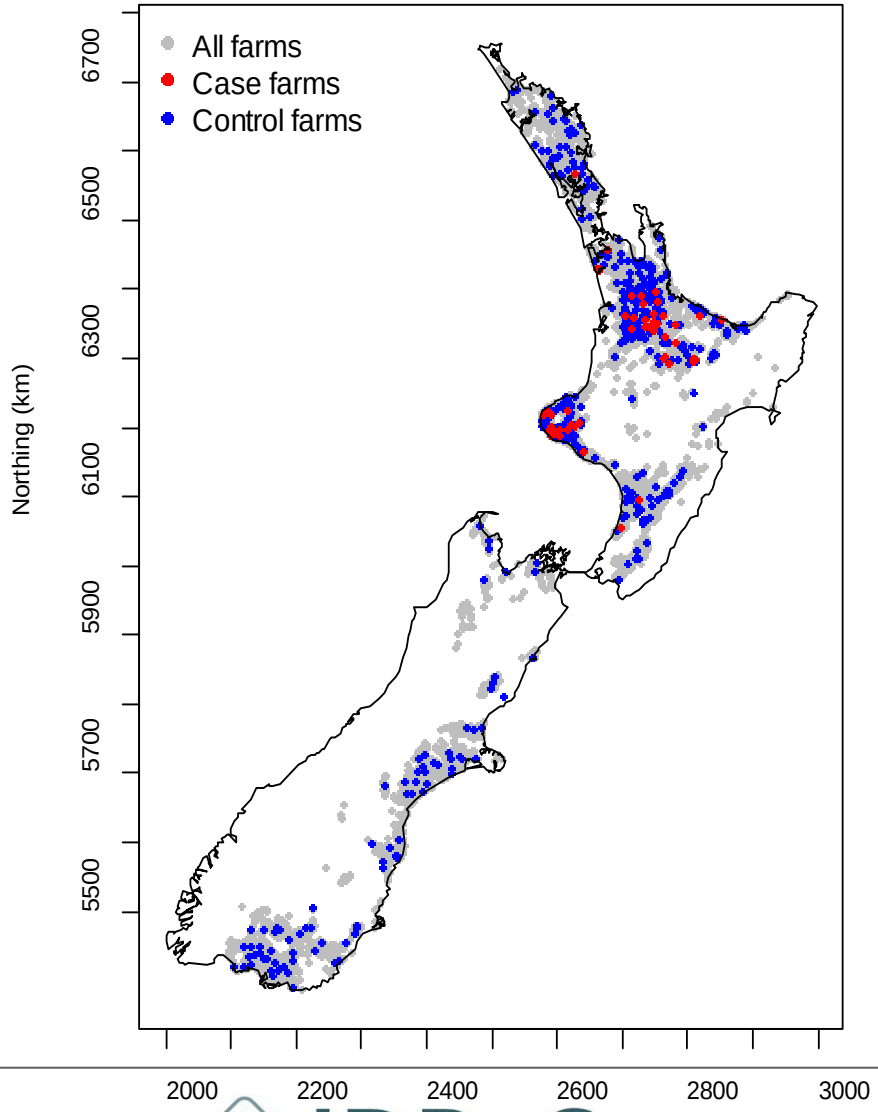
Map of New Zealand showing the location of Fonterra supplier farms.



Map of New Zealand showing the location of Fonterra supplier and case farms.



Map of New Zealand showing the location of Fonterra supplier, case farms and control farms.



National case-control study questionnaire.

Salmonella Questionnaire

April 2012

Fonterra

Dairy for life

Today's date: _____

Internal questionnaire identifier: _____

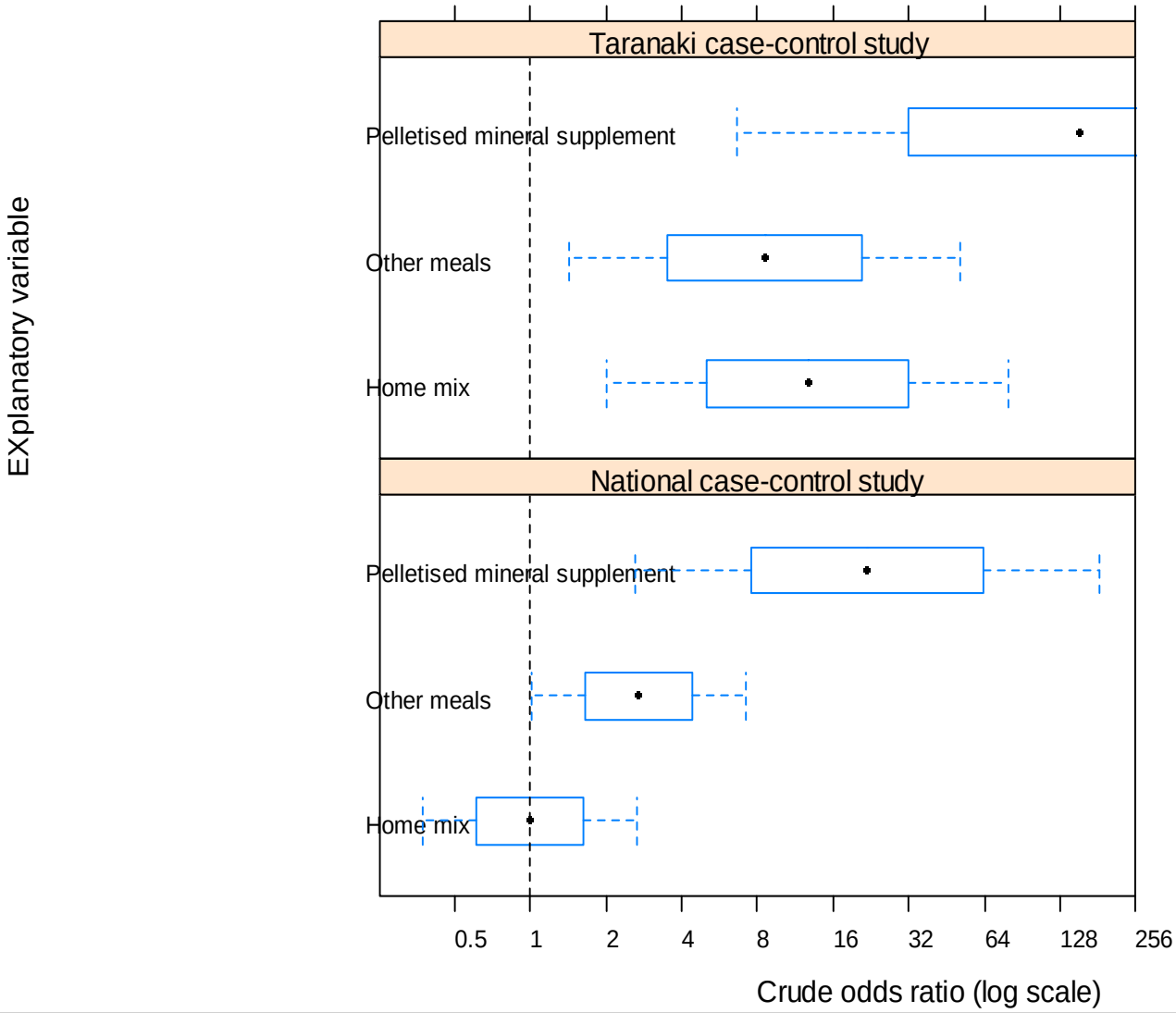
Owner-manager details

1. Name of person answering questionnaire: _____
2. Position Owner, herd manager _____
3. Address: _____
4. Phone number: _____
5. Email address: _____
6. Name of milk company: _____
7. Milk company supply number: _____

Herd details

In the following questions the term 'farm' refers to the main area where cows are milked

Box and whisker plots showing the crude odds ratios for three exposures, Taranaki case-control study and national case-control study.



Salmonellosis in dairy herds

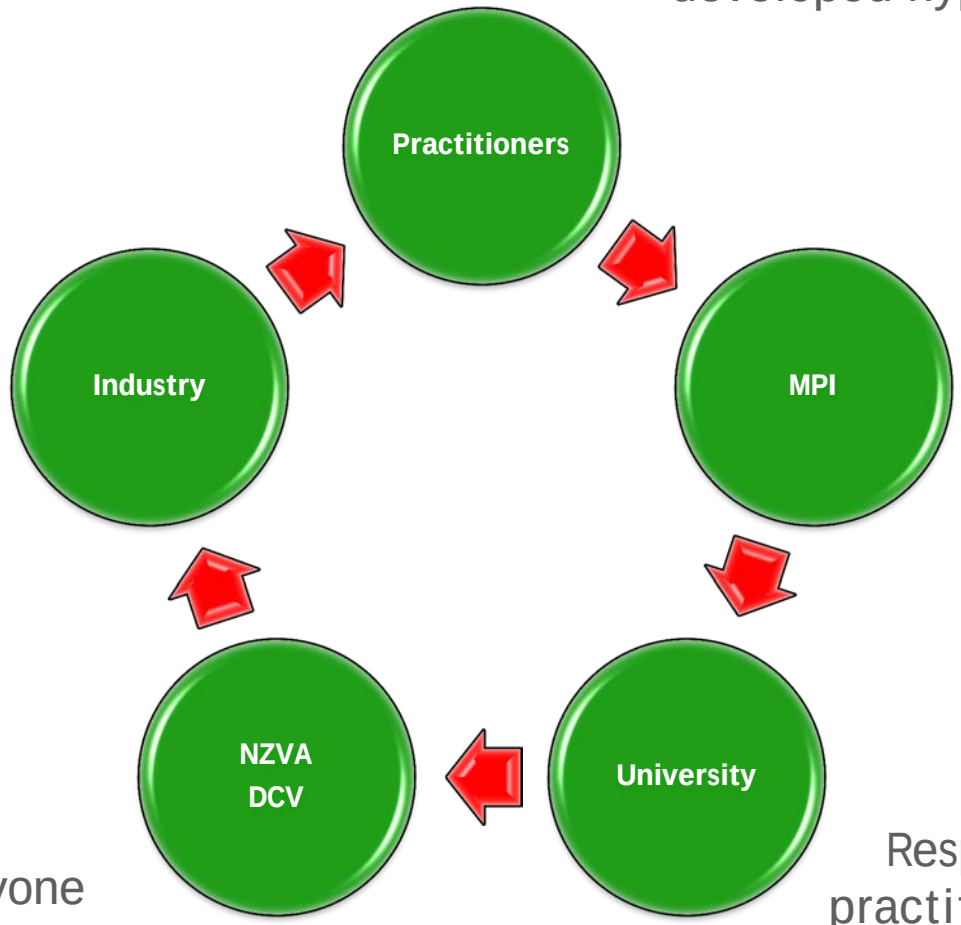
- Supplementary feed use and the way supplementary feed delivery methods were delivered to cattle on-farm were risk factors for acute salmonellosis in New Zealand dairy farms in 2011-2012

- The formulation of magnesium supplementation used on-farm plays a role in the aetiology of this syndrome

Salmonellosis in dairy herds

- This is a nice example of how an emerging disease syndrome (EDS) should be managed
- It's highly likely that this sort of thing will happen again in the future
- The precedents we've set ourselves (in terms of organising the investigatory effort) should serve us well when the next EDS strikes

Blew the whistle; developed hypotheses



Developed and maintained a robust surveillance system

Responded to practitioners when they asked for a hand

Kept everyone organised

Fonterra: infrastructure, logistic support
Mineral supplement manufacturers: fix it attitude

Conclusions

Epidemiology has the capacity to add value to a range of different disciplines.

This symbiotic relationship can provide useful and valuable information to decision and policy makers.