



ZOOONOTIC DISEASES,
LIVESTOCK DENSITIES,
ENVIRONMENTAL &
SOCIAL FACTORS
IN NEW ZEALAND

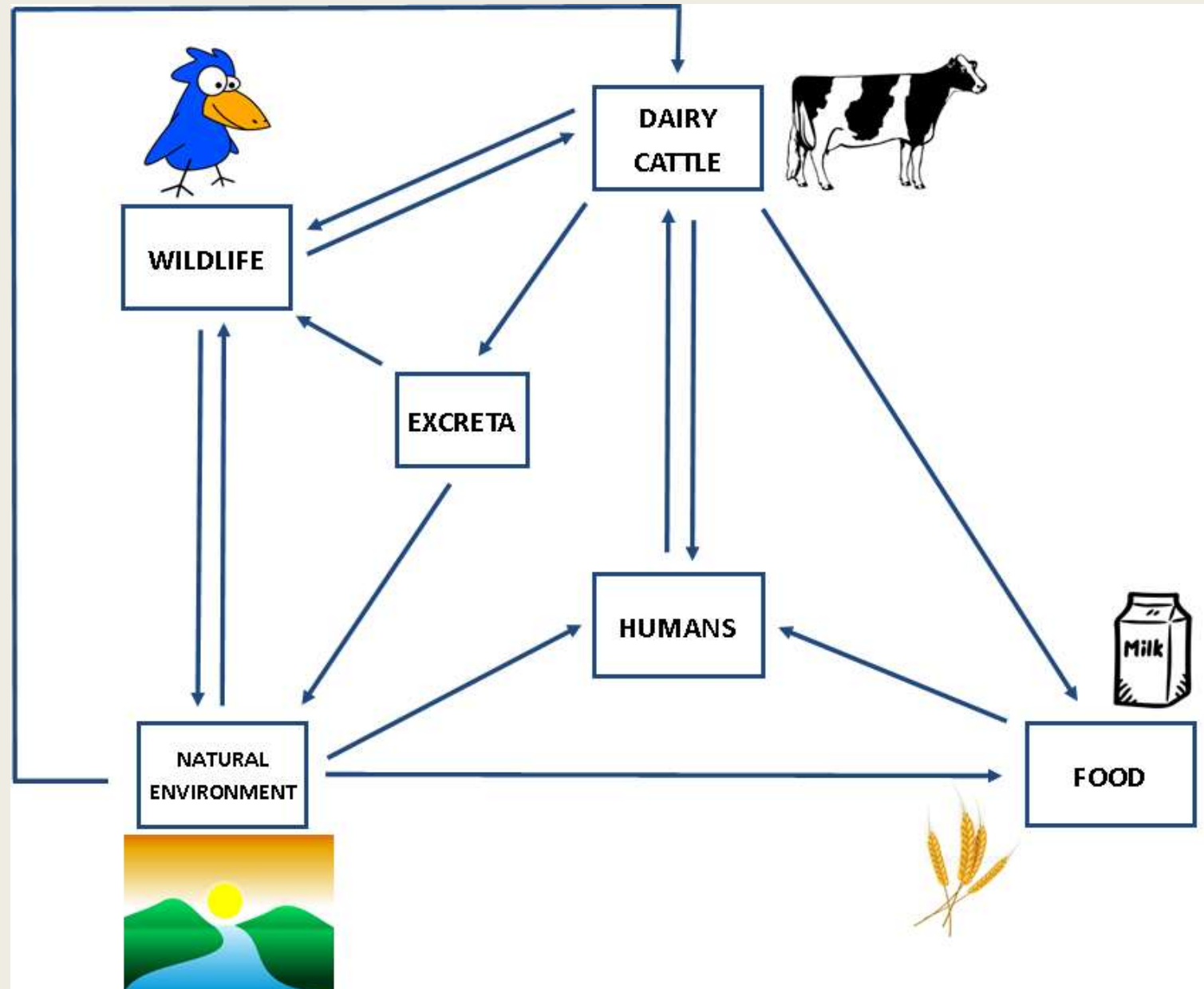
Leah Grout, University of Otago



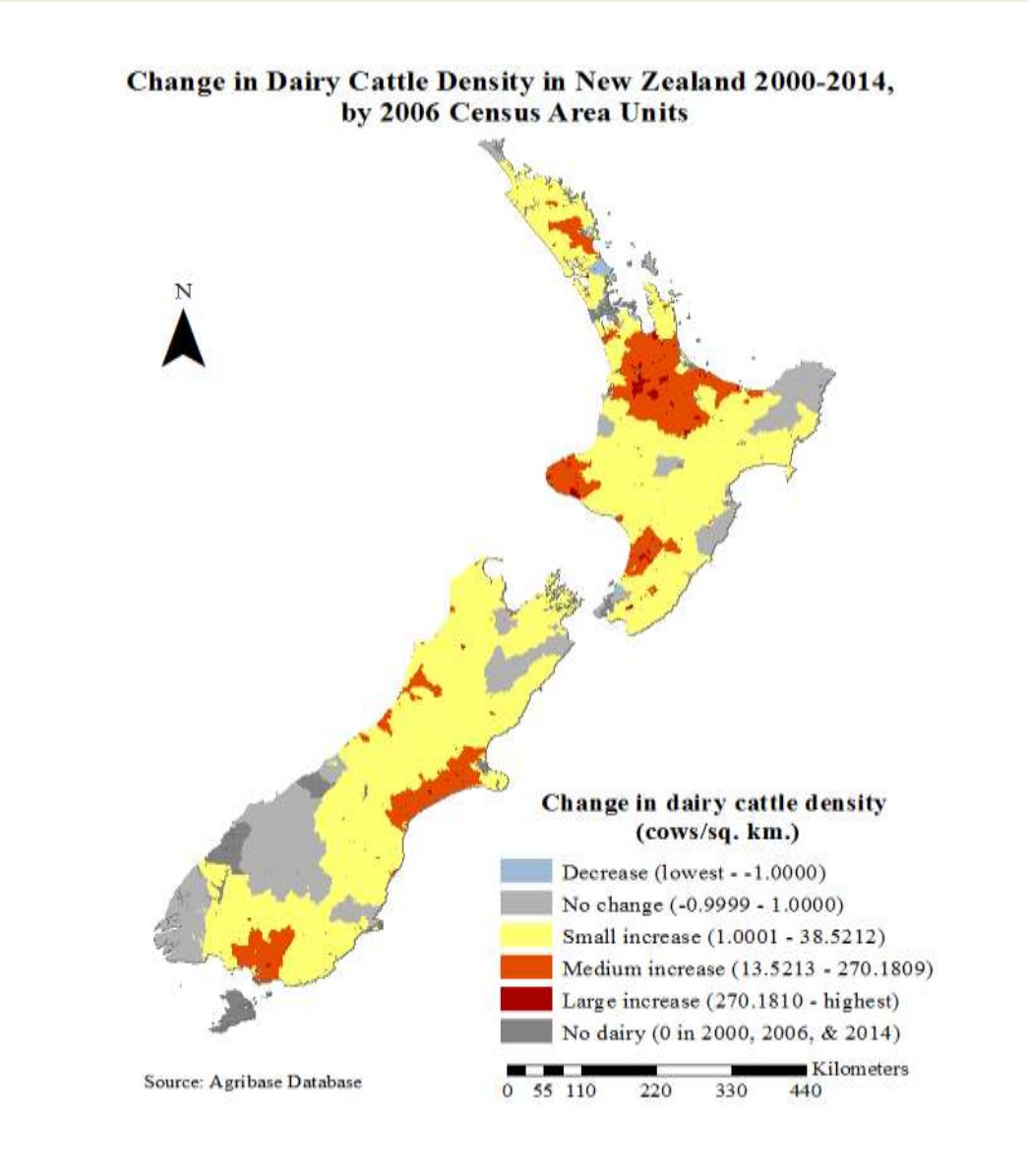
Enteric Zoonoses

- Enteric diseases pose a substantial public health and economic problem in NZ
- Annual incidence rates in NZ are high by comparison to other industrialized nations
- Dairy cattle are a known reservoir for a number of pathogens that can cause human illness, including:
 - *Campylobacter*
 - *Cryptosporidium*
 - *Giardia*
 - *Salmonella*
 - *Shiga toxin-producing E. coli (STEC)*

Potential Transmission Pathways



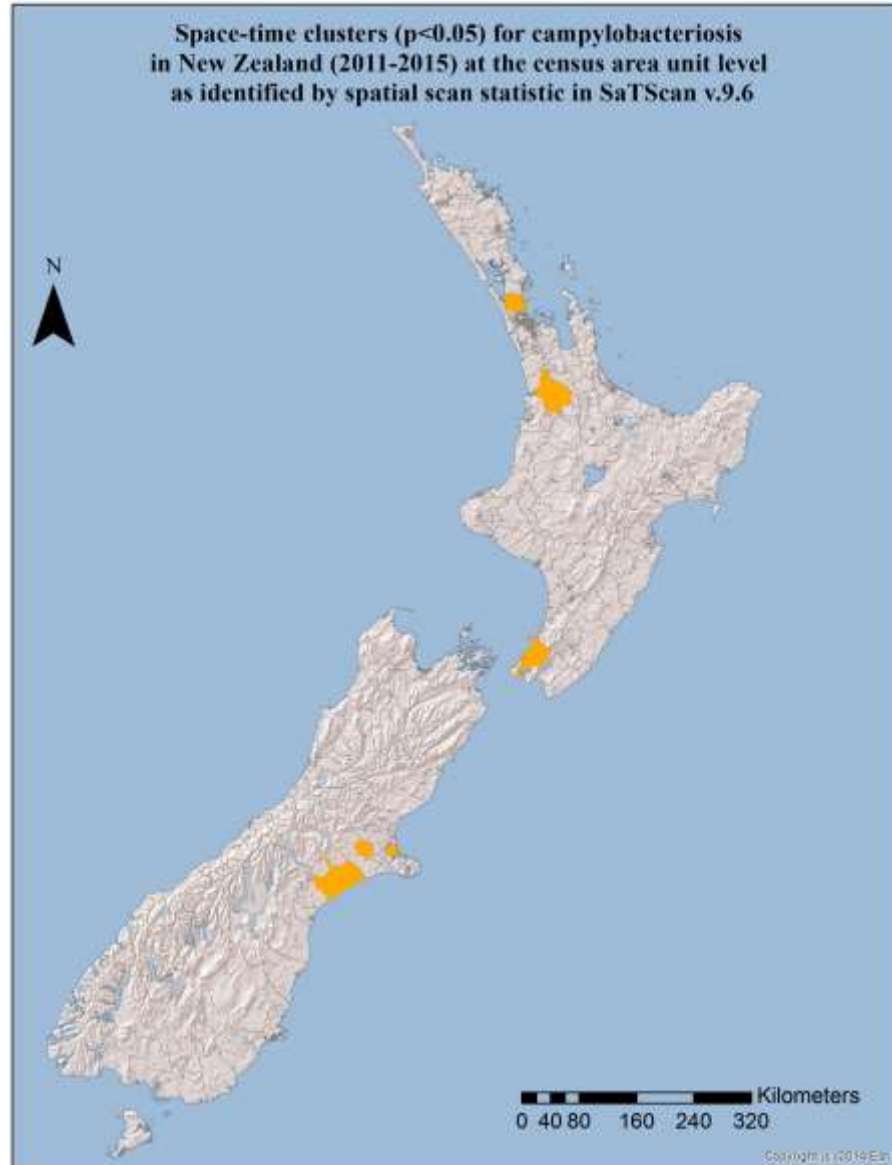
Change in Dairy Cattle Density 2000-2014



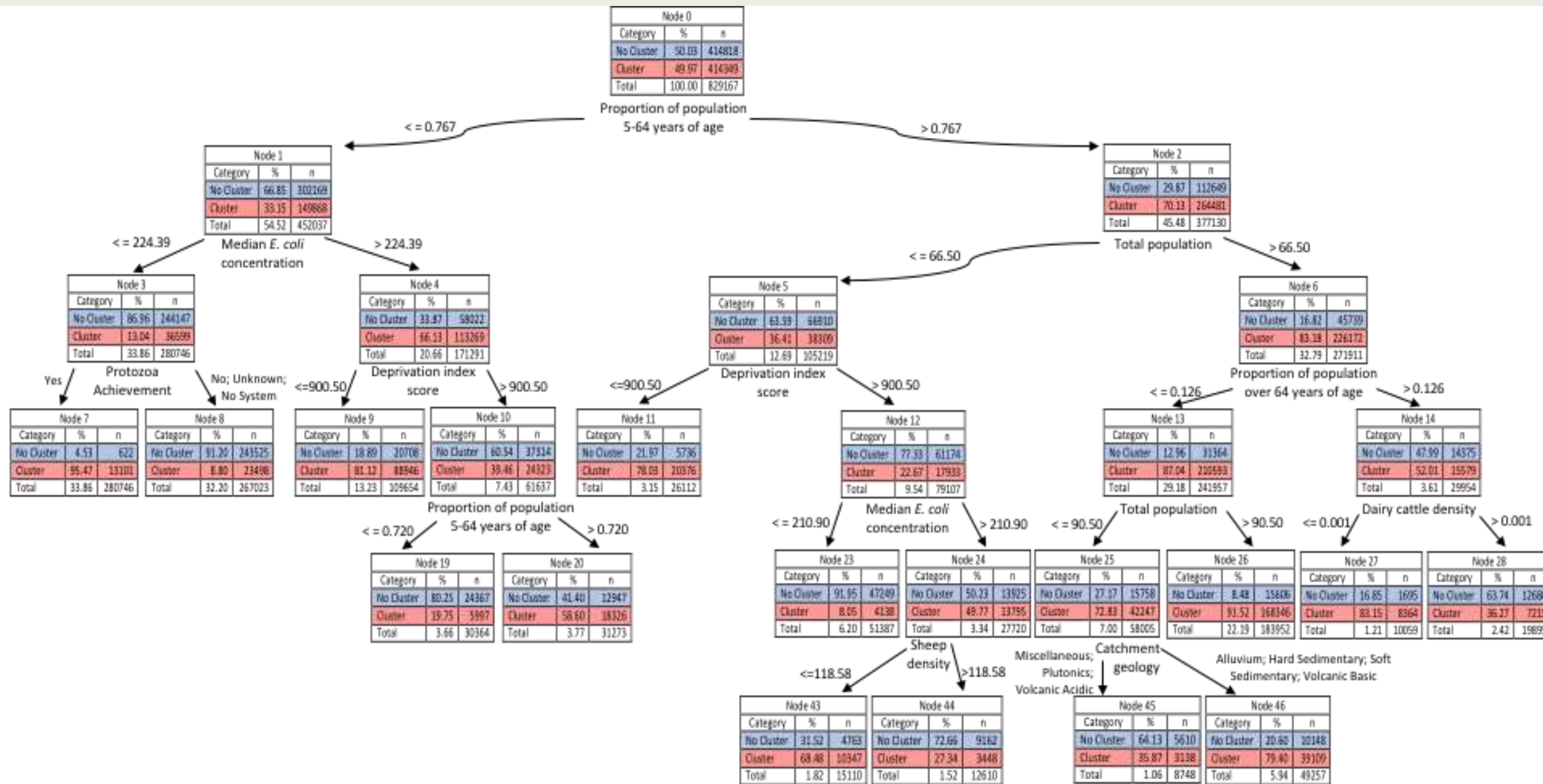
Methods

- Notified cases of campylobacteriosis and cryptosporidiosis from 1997-2015 obtained from national surveillance system
- SaTScan retrospective space-time permutation used to identify clusters
- Cluster data spatially linked to census, livestock density, and environmental variables at the river segment level
- Classification and Regression Tree analysis used to analyze potential risk factors

Cluster Detection Results



CRT Analysis for Disease Clusters



CRT Analysis for Disease Clusters

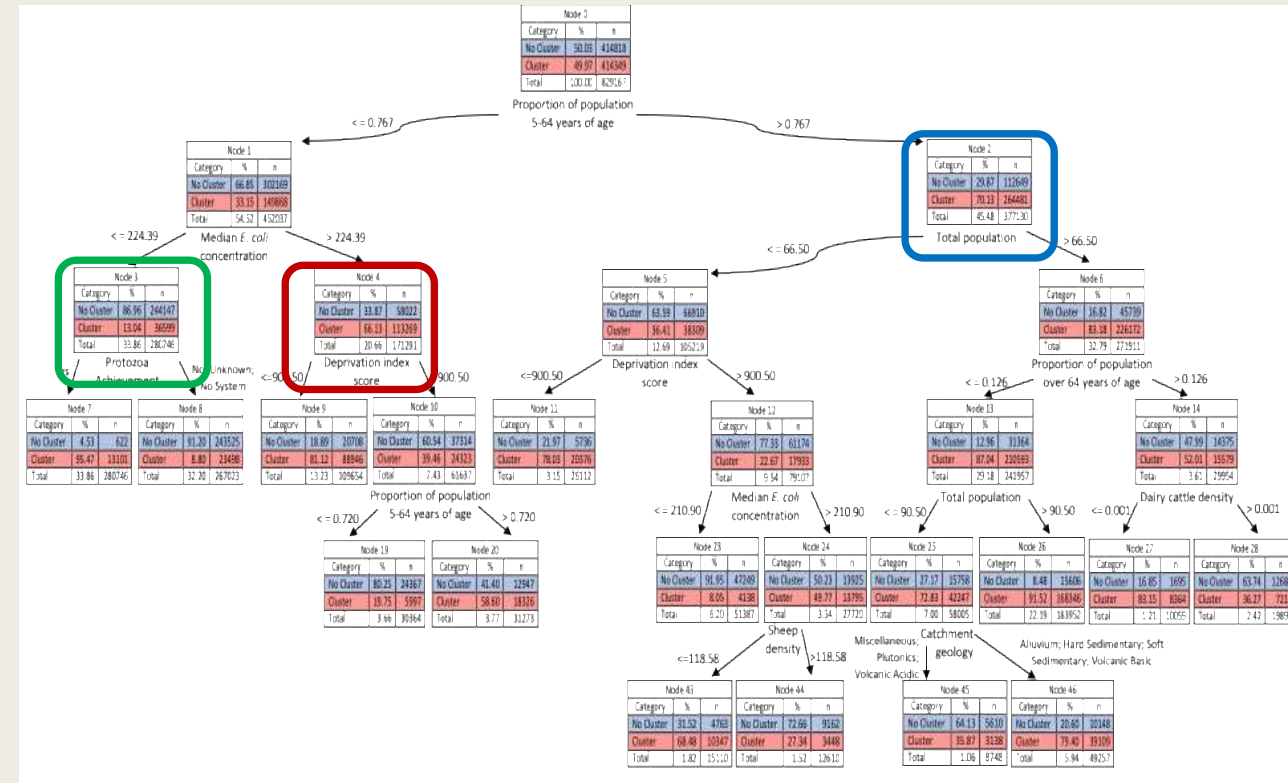
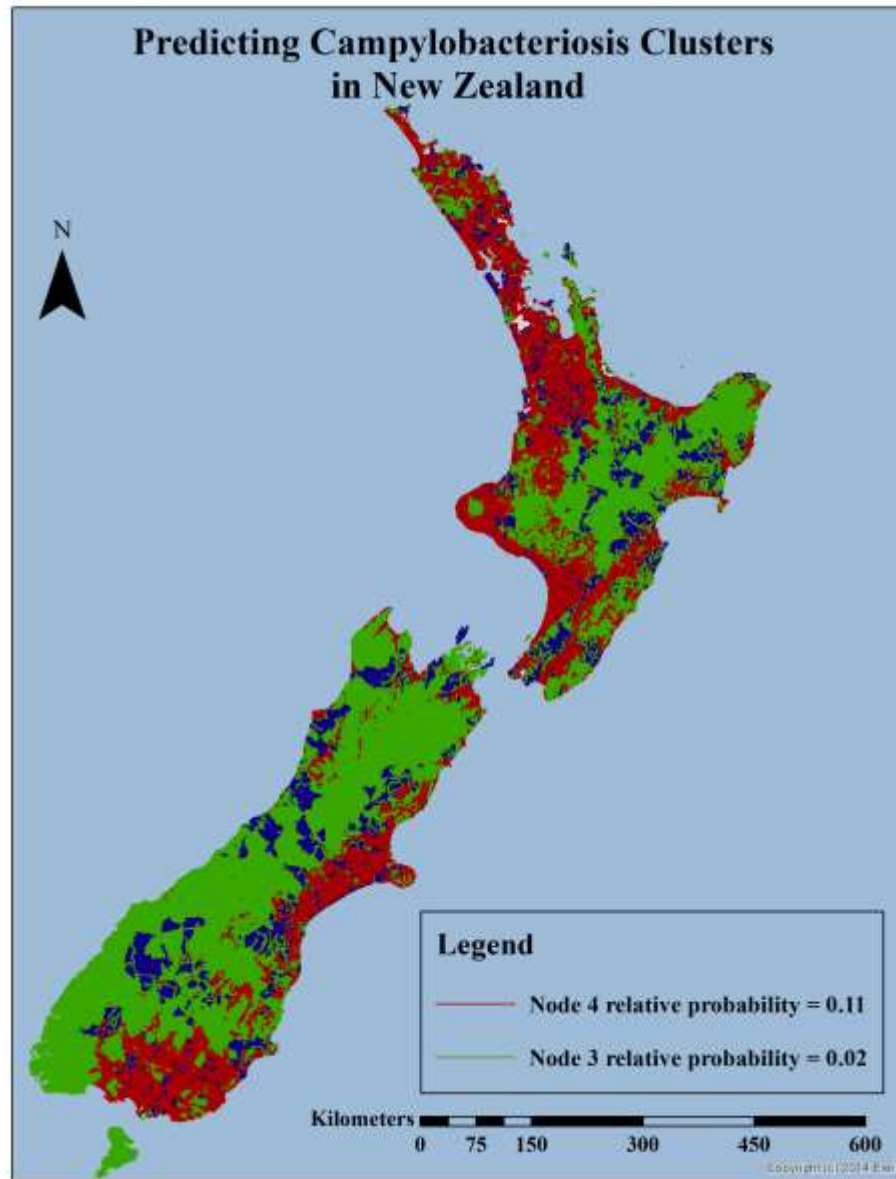
Campylobacteriosis

- Most important predictors
 - *Age*
 - *Population*
 - *Median river E. coli concentration*
 - *Drinking water quality*
 - *Catchment geology*
 - *Sheep density*
 - *Dairy cattle density*

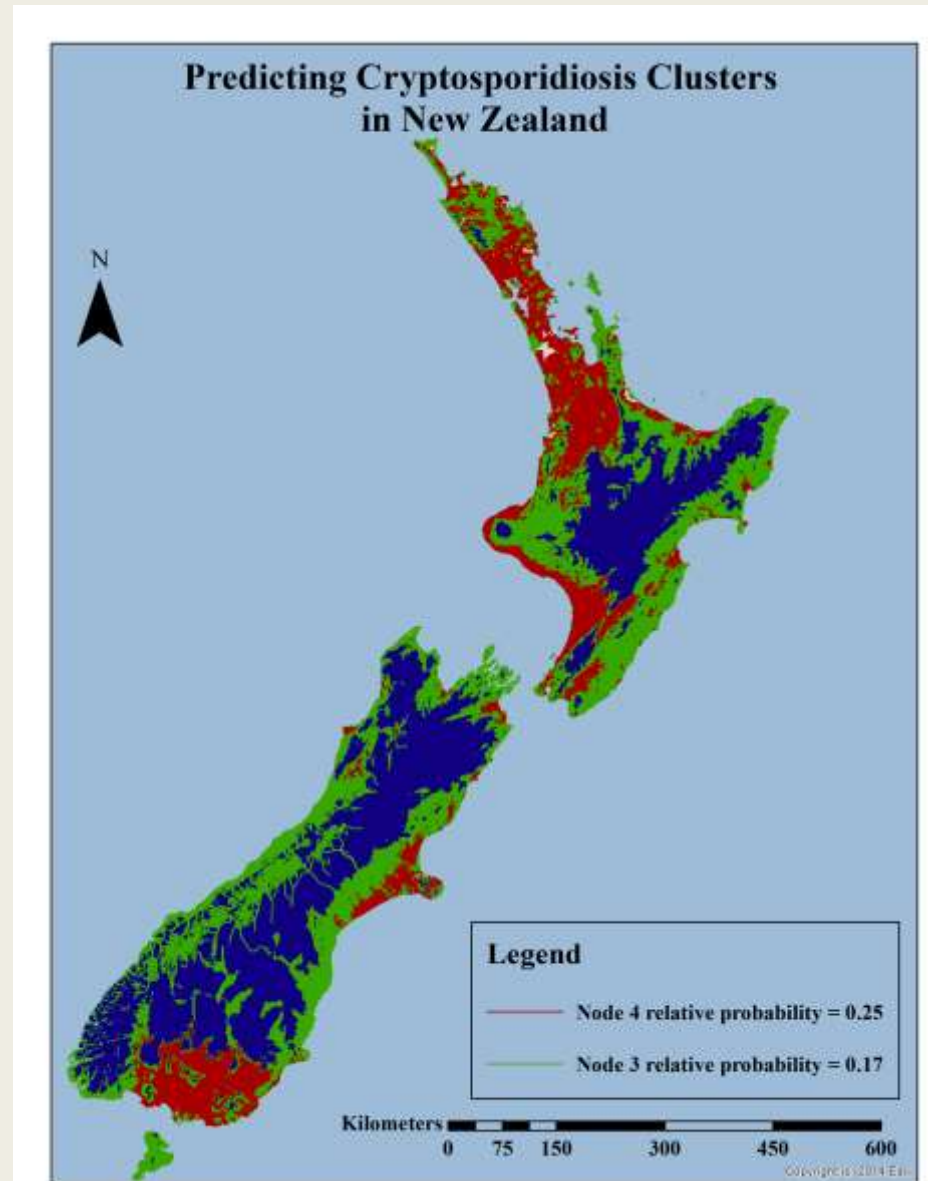
Cryptosporidiosis

- Most important predictors
 - *Catchment source of flow*
 - *Median river E. coli concentration*
 - *Dairy cattle density*
 - *Age*
 - *Socioeconomic deprivation*
 - *Population*
 - *Catchment climate*

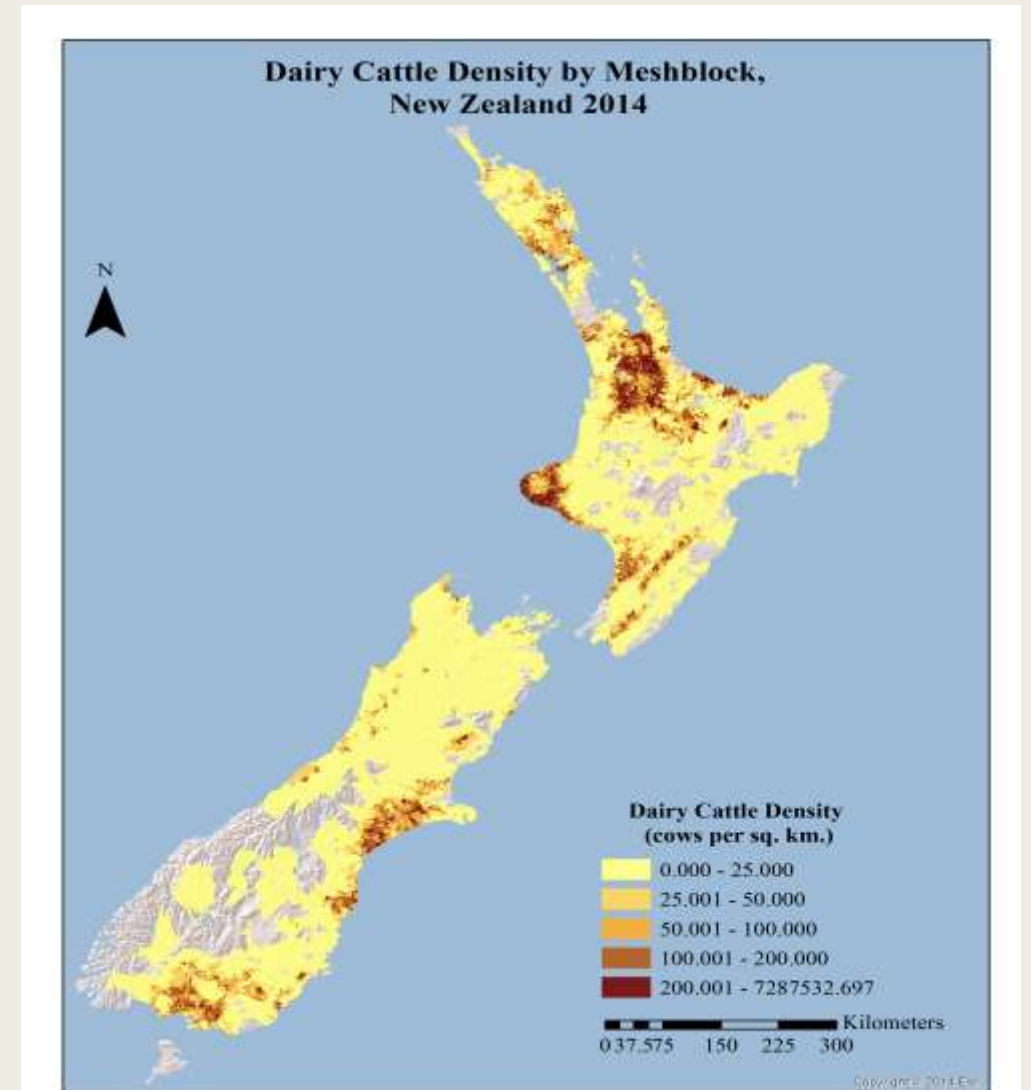
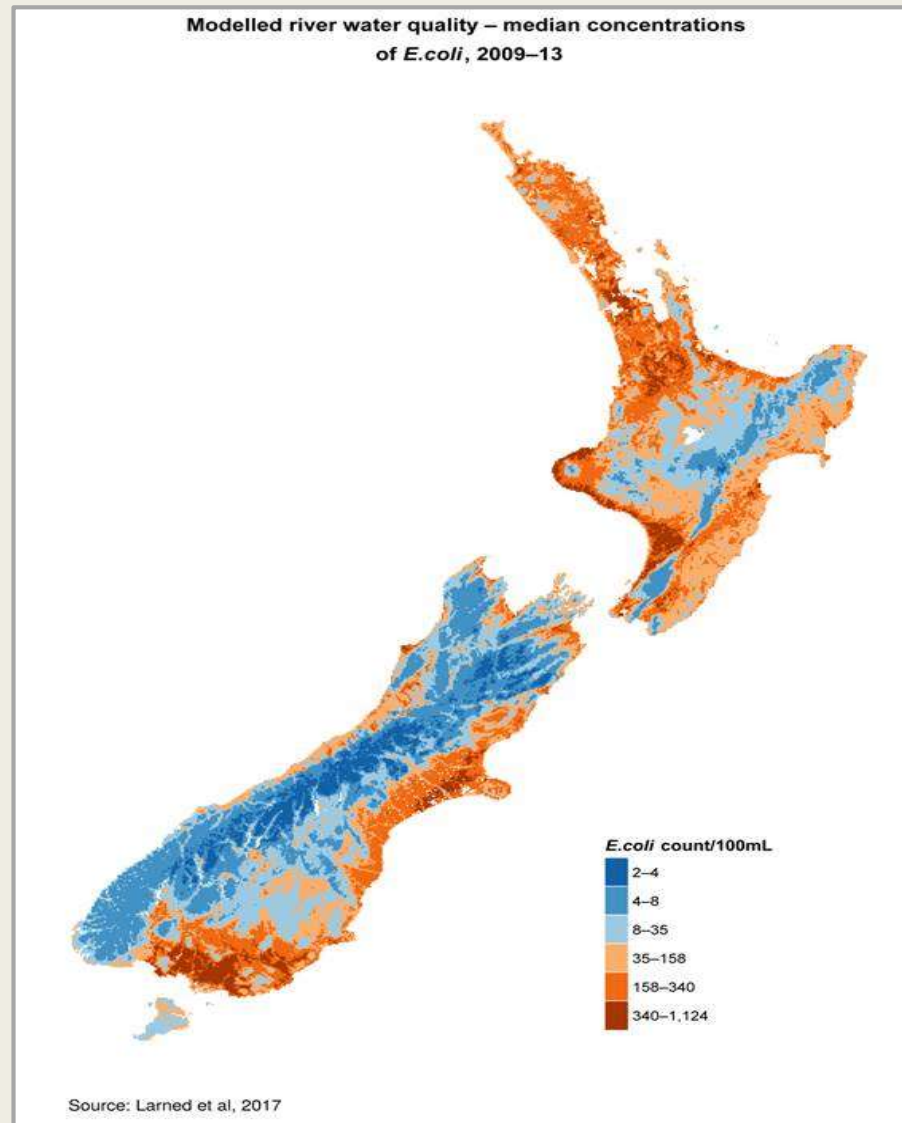
Campylobacteriosis Clusters



Cryptosporidiosis Clusters



Modelled River Water Quality



Analysis of Average Seasonal Notification Rates

- Livestock densities were more important for seasonal notifications than for clusters
- CRT analysis doesn't easily allow for estimation of net effects of independent variables
- Attempted to use CRT results to guide regression with interaction terms
 - *Multicollinearity issue*

Conclusions

- Results suggest distinct dominant pathogen sources and varied transmission routes for campylobacteriosis and cryptosporidiosis cases in New Zealand
- Waterborne transmission may play an important role in outbreaks in New Zealand
- Environmental characteristics may influence the fate and transport of pathogens
- Future research should explore interactions between risk factors

Questions or comments?

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HEIRU

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