



# Modelling human health risk from recreational water impacted by different faecal sources

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21/11/2017

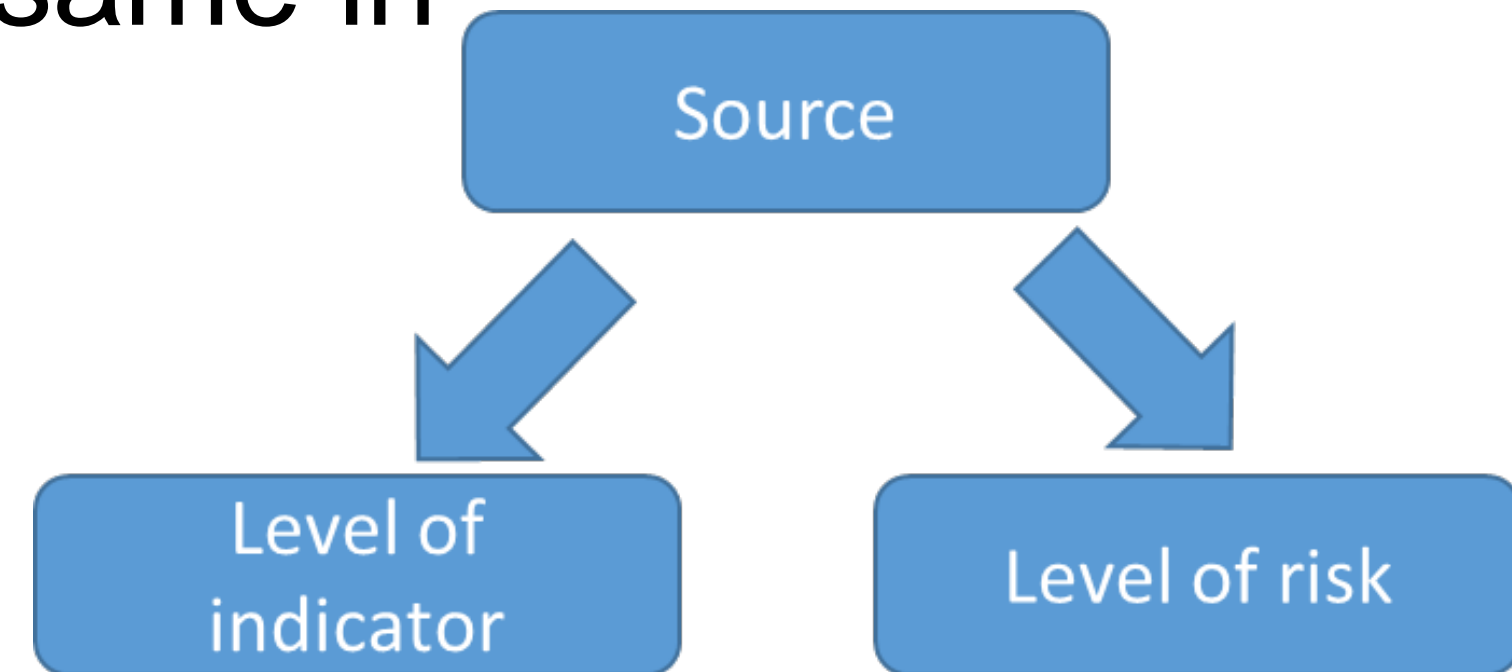
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# Scene setting

- Importance of swimming as a value to “water quality” in NZ
- Current guidelines don’t take into account source of contamination (apart from presence of wastewater treatment plants)
- Evidence from the US studies that risks associated with exposure to recreational waters impacted by fresh faeces depended on the source of the faeces.
  - Is this relevant to New Zealand?
  - Is this relevant to DairyNZ & ESR?
- Earlier MBIE bid to better inform risk and management of human health unsuccessful – but of growing concern and importance to NZ Inc. (“swimmability”)
  - Industry committed to actions for swimmable waterways – DairyNZ science role

# Research question

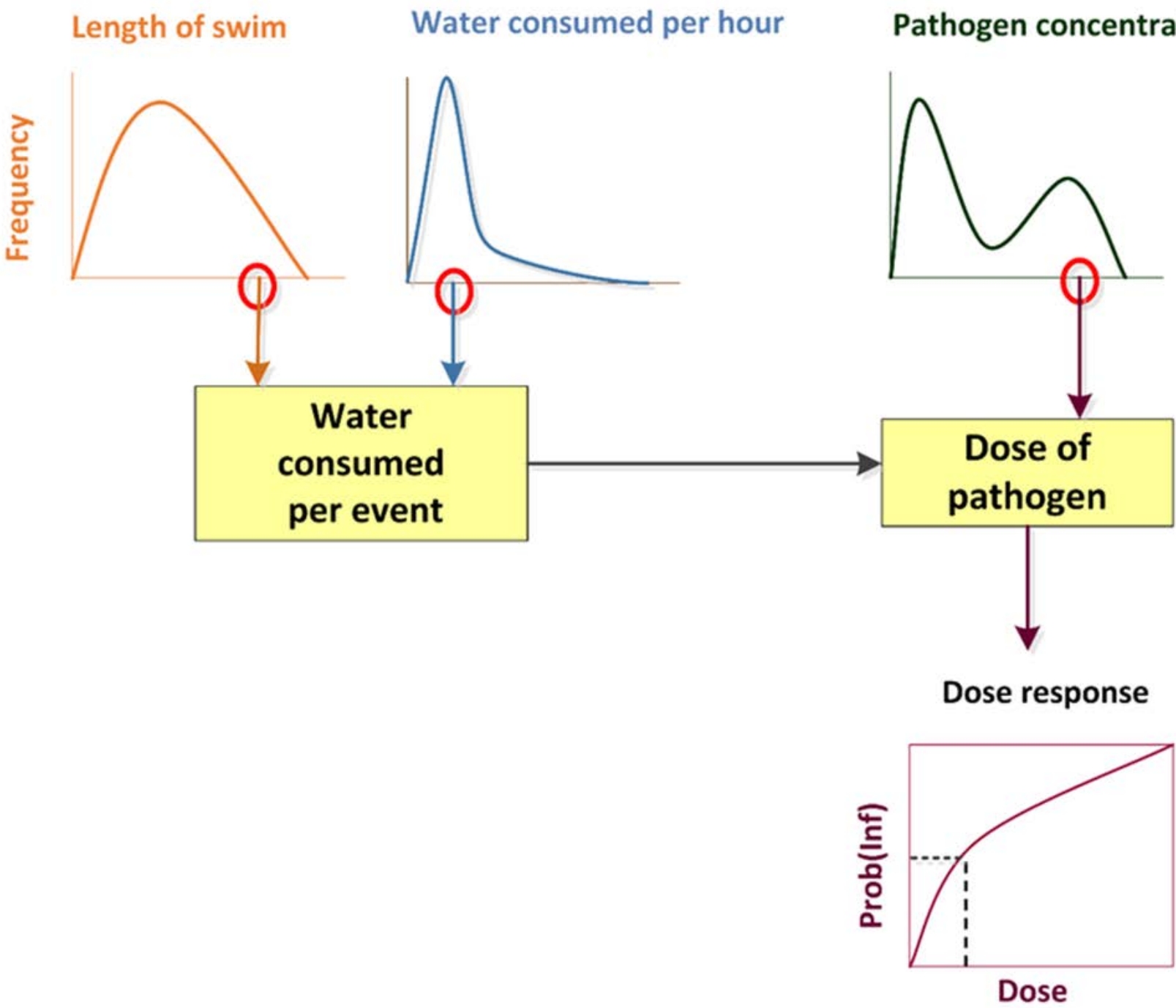
- ▶ If the concentration of *E. coli* in the water of two catchments is the same, but the sources of contamination differ, are recreational exposure risk the same in both catchments?



# Approach and Assumptions

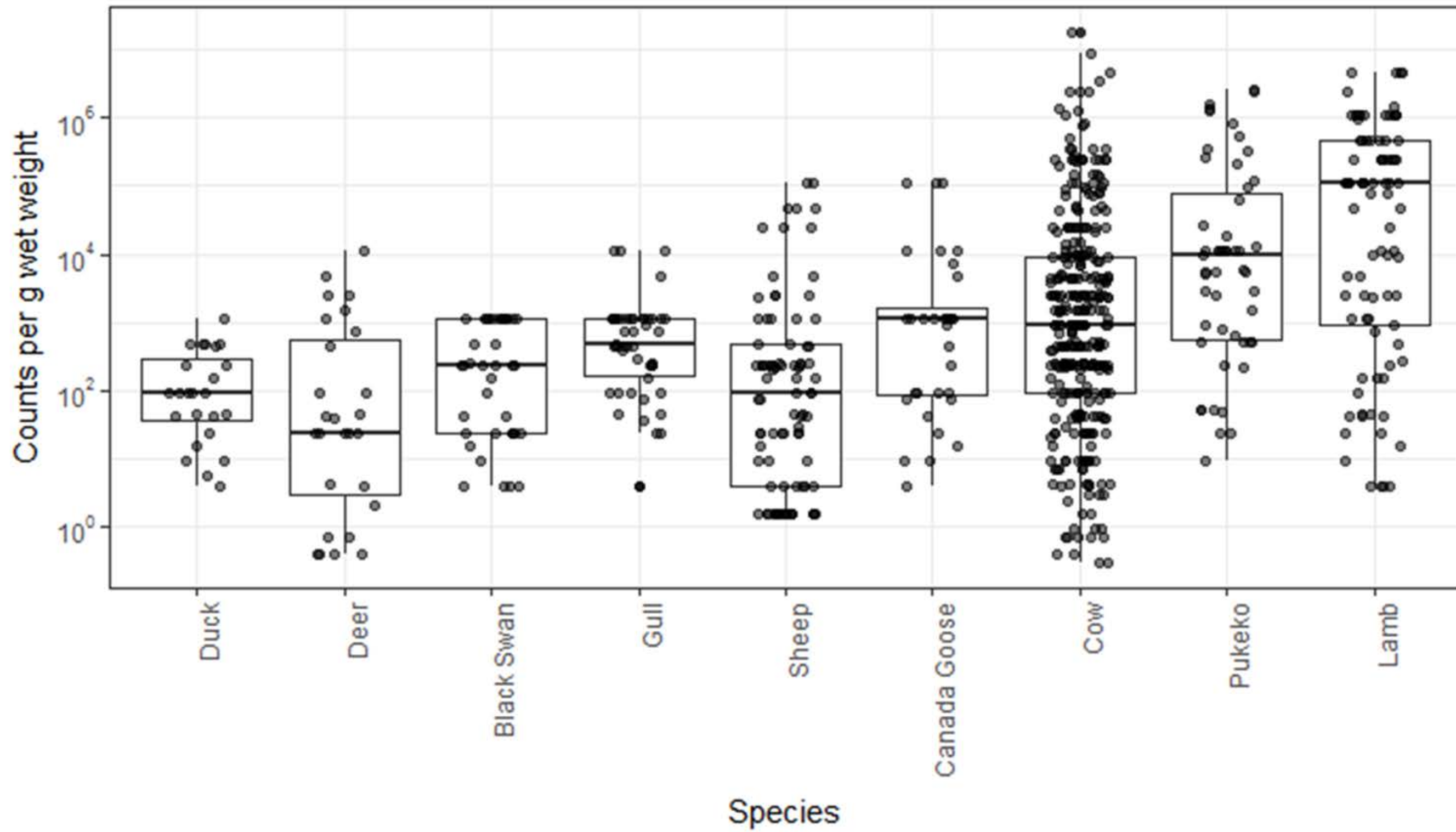
- ▶ Quantitative Microbial Risk Assessment (QMRA)
- ▶ Modelling Primary Recreational Exposure to Water
- ▶ Using New Zealand Data
  - ▶ Fresh Faeces
  - ▶ *Campylobacter* – only pathogen modelled
  - ▶ *E. coli* – only indicator modelled
  - ▶ No Attenuation of Pathogens or Indicator was modelled

# QMRA



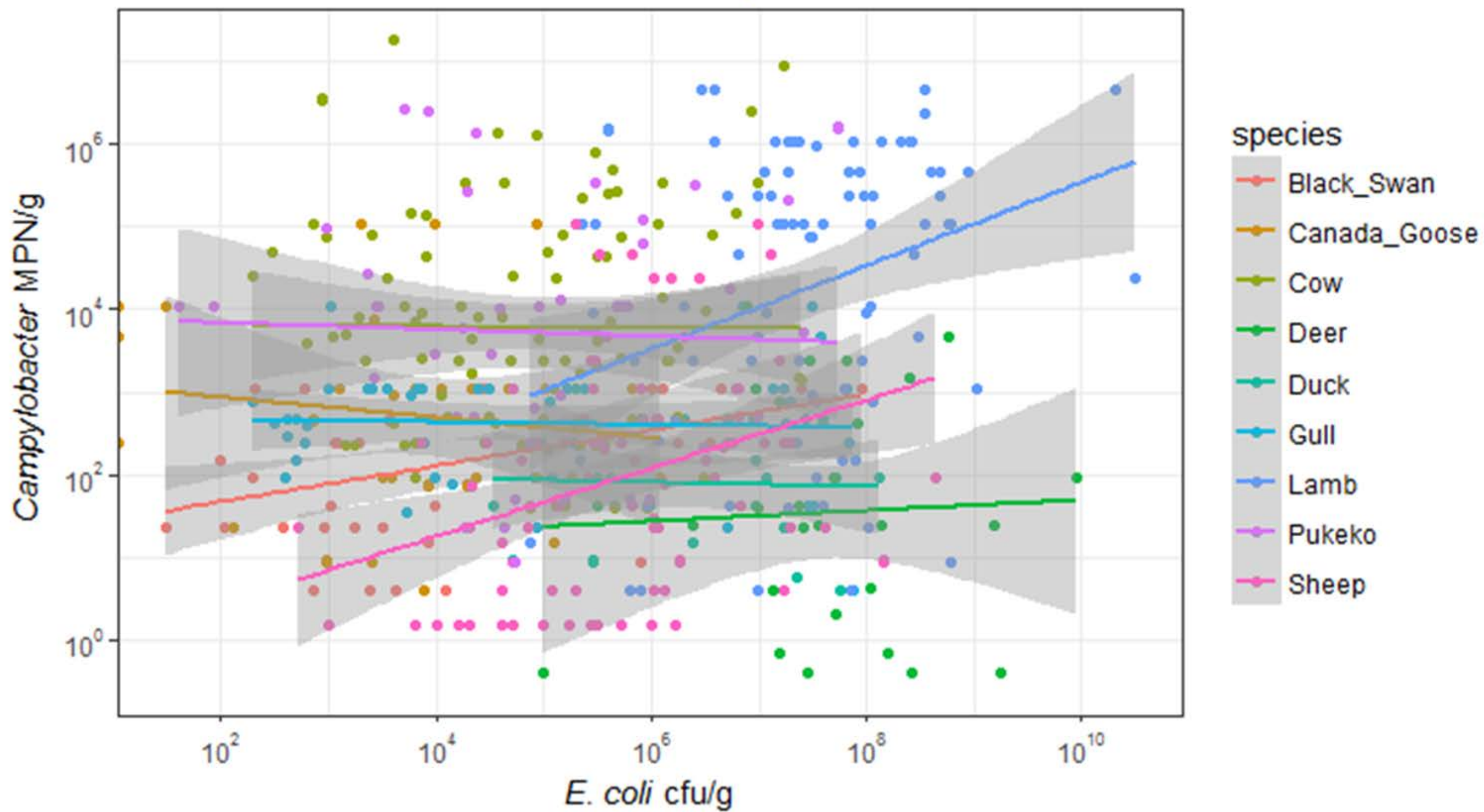
- ← Pathogen Concentration Faeces
- ← Indicator Concentration Faeces
- ← Infectivity of Pathogen
- ← Prevalence of Pathogen
- ← Target Level Indicator

*Campylobacter* results (ordered by mean values)

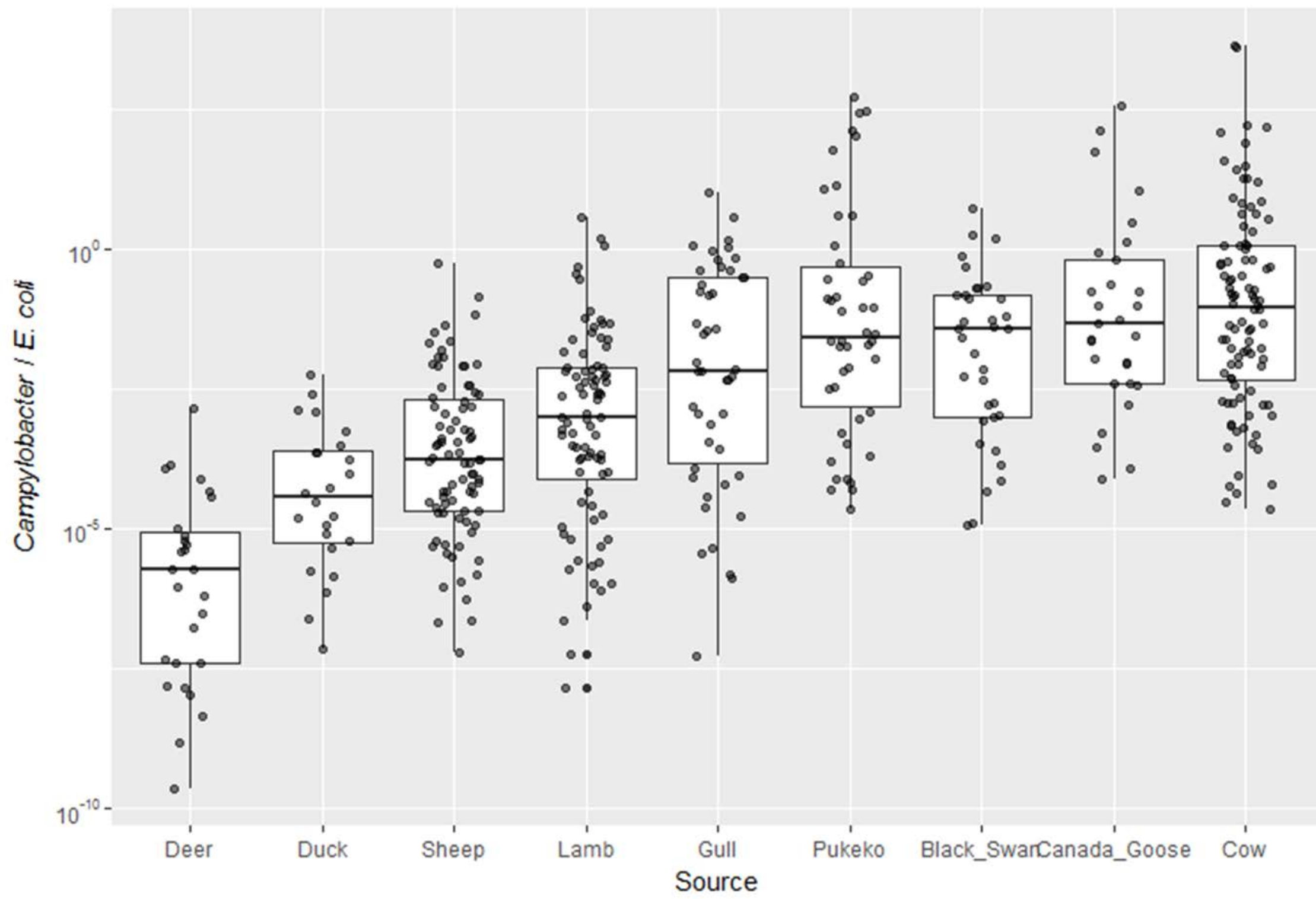




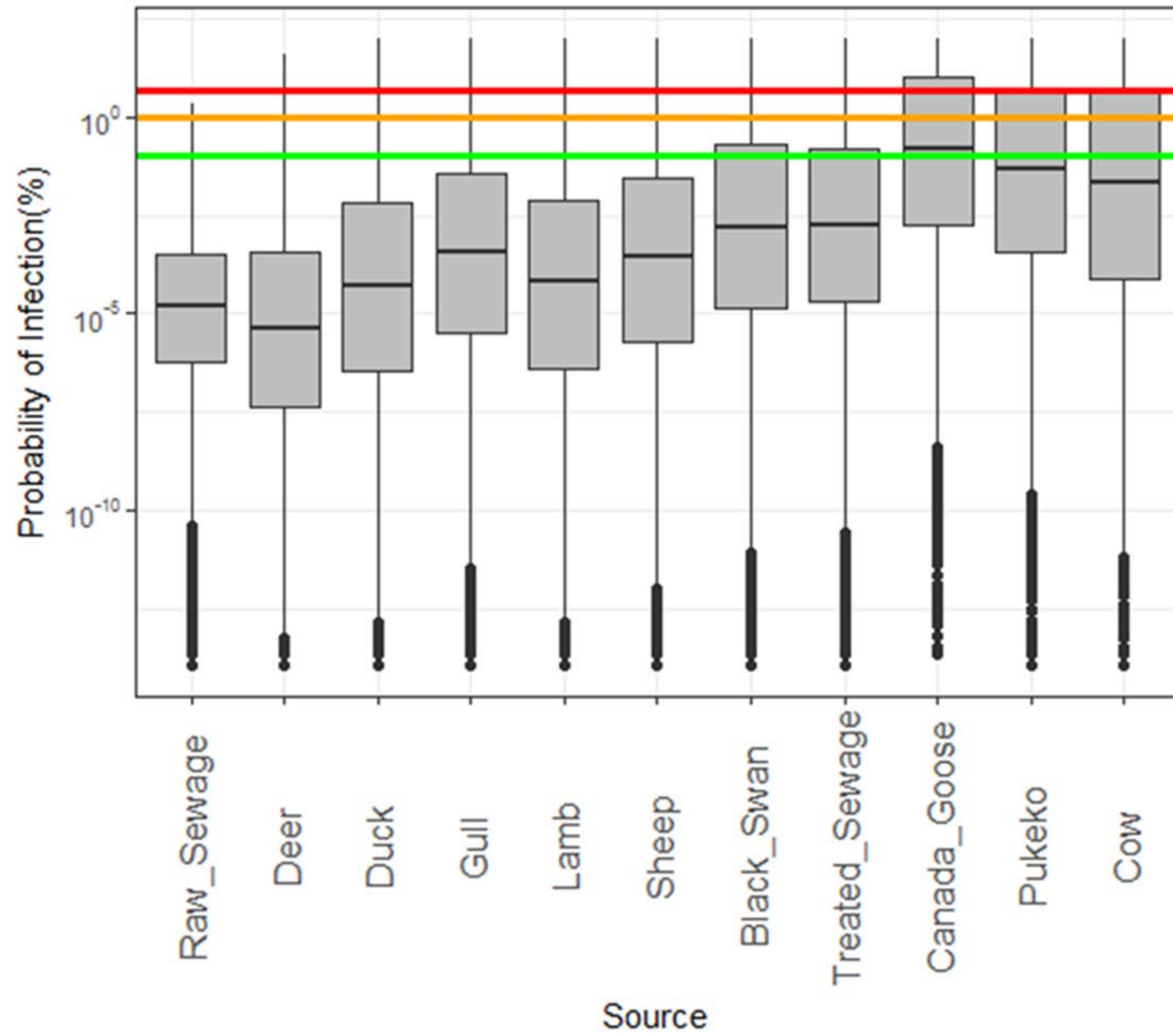
## Relationships between pathogens and indicators density in faeces



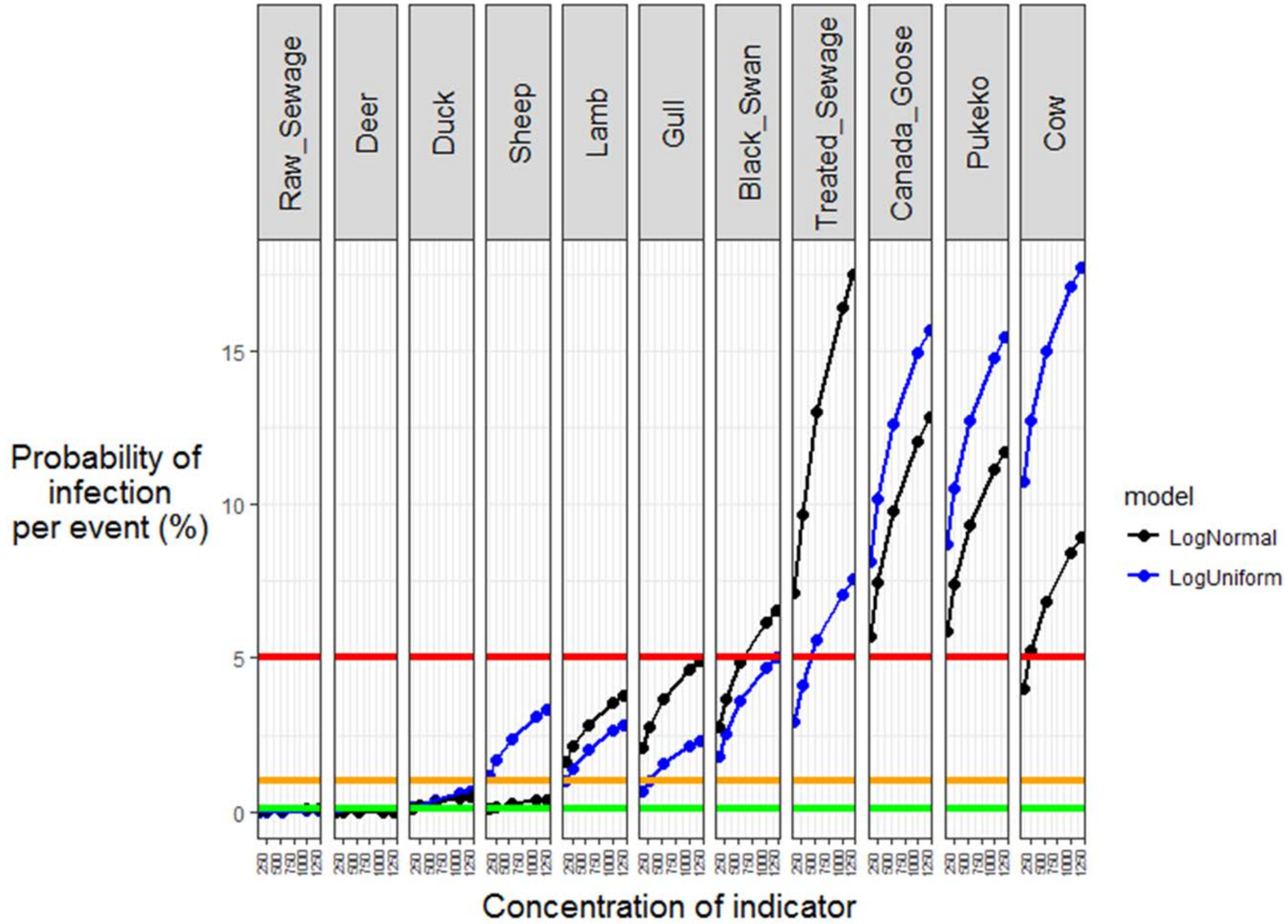
### Pathogen to Indicator ratio







- ▶ 260 cfu/100ml *E. coli*
- ▶ *No corrections for infectivity or prevalence of Campylobacter*



# Take home message

- Estimated risks associated with exposure to recreational waters impacted by fresh faeces do depend on the source of the faeces.
- Data gaps/further work:
  - Better understanding of the distribution of pathogens and indicators
    - Including spatial and temporal variability
    - Most appropriate description of distributions
  - Factors that attenuate microbial contamination of waterways
  - Need to consider multiple source of contamination
  - Need to consider a wider range of pathogens
- Load must always be considered when assessing risk – source & load

# Acknowledgments

- ▶ The team would like to thank all the agencies that provided data to the study:
  - ▶ AgResearch
  - ▶ NIWA
  - ▶ Massey University
  - ▶ ESR colleagues
  - ▶ Otago Innovation
- ▶ The team would like to thank DairyNZ and ESR (SSIF) for jointly funding
- ▶ Thank you for listening & questioning



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