



# Human disease, Food and Veterinary Epidemiology

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# Overview

- Context of work
- Food safety issues in the past and currently
- Recent developments benefiting from veterinary epidemiology



# New Zealand Food Safety Authority

- Protects and promotes public health and safety
- Facilitates access to markets for New Zealand food and food related products
- To be achieved with a multi-disciplinary approach but both goals require veterinary epidemiology to be successful



# Meat inspection and gross abnormalities

- Examples of lesions/defects to be inspected for:
  - Bacteria, bruising, neoplasms
  - Cestodes
  - Contamination



# Meat inspection - gross pathology

- Concentration on gross pathology
  - Examples: pleurisy, tuberculosis, arthritis, bruising
- Public health significance not always clear
- Historically, recording of conditions is mainly used for trimming directions
- Options to improve farming/transport practices, eg:
  - feedback to farmers
  - case-control studies



# Pleurisy

- Important from a processing perspective
- Pleurisy routinely recorded, pneumonia not
- Public health significance questionable
- Company specific recording systems
- Case-control study performed with records from modern recording system
- A number of risk factors were identified



# Meat inspection - Cestodes

- Hydatids
- *Taenia ovis*
- *Taenia saginata*



# Hydatids

- Hydatids eradicated in New Zealand:
  - Commitment from all stakeholders
  - Field Advisory Service/National Hydatids Council
  - Anthelmintics
- Role of meat inspection
  - Surveillance, individual farm identification for further action



# *Taenia ovis*

- Acceptability of product rather than public health issue
- Sensitivity of inspection limited
- National Hydatids Council used inspection results to control *T. ovis* infections
- Currently voluntary control with a meat-industry scheme



# *Taenia saginata*

- Inspection procedures labour-intensive and little, if any, public health benefit in NZ
- Routine recording system
- Option of reduced inspection requirements because of:
  - Routine recording
  - Various surveys
  - Quantitative Risk Assessment
  - Subject to: increased company input



# Gross contamination

- Faecal material → Public health risk
- Recording of contamination is processor-related rather than farm-related
- Historically informal comparison of premises but did similar standards apply?
- A workable sampling plan to achieve “Zero Faecal Tolerance”



# However, often in the past

- Knowledge of test (sensitivity, specificity) and inspection outcomes was vague
  - No robust link with public health outcomes
  - Adverse effects of palpation hardly considered
- Increasingly attempts to make meat inspection more science-based



# National Microbiological Database (NMD)

- Initially an export system
- Sheep and cattle carcasses
- APC and generic *E. coli*
- Indication of hygiene of processing
- Microbiology and Epidemiology



# *Salmonella* Brandenburg

- Abortion and mortality in sheep
- Zoonosis, occupationally derived.
- Importance as a foodborne disease?
  - ESR investigation of cases
  - Development of stochastic model (use of NMD)
  - Model suggests foodborne component of very limited importance
  - ‘Validated’ with ESR surveillance in combination with PFGE surveys
- Model drives research, but not for its own sake only!



# 1 July 2002

Creation of NZFSA, ie merger of parts of

- Ministry of Health (MoH)
    - *food sold on the domestic market, including imported food*
  - Ministry of Agriculture and Forestry (MAF)
    - *other food-related legislation that was, for the most part, aimed at primary production, processing and exports*
- Increased emphasis on measurable public health outcomes



# Public Health Surveillance

- Performed by the Institute of Environmental Science and Research Limited (ESR)
- Under contract by the Ministry of Health (MoH)
- Notification rates used by NZFSA Public Health Physician to monitor performance



# Notifiable diseases include:

Enteric zoonoses, at times foodborne:

- Campylobacteriosis
- Listeriosis
- Salmonellosis
- VTEC/STEC infection
- Yersiniosis



# Consequently

- Aspirational goals have been set
  - Campylobacteriosis: 50% reduction foodborne, domestically acquired over 5 years
  - Salmonellosis: 30% reduction foodborne, domestically acquired over 5 years
  - Listeriosis: No increase in the foodborne component



# Campylobacteriosis

- Unacceptably high notification rates in New Zealand
- Details of Risk Management Strategy on NZFSA web site

<http://www.nzfsa.govt.nz/consumers/food-safety-topics/foodborne-illnesses/campylobacter/strategy/index.htm>



# Epidemiology

- Both human and veterinary epidemiology
- Collaboration with science providers (ESR, Massey University, NIWA)
- To establish long-term trends
- To establish reservoirs and pathways (“source attribution”)
  - MLST
  - Stochastic models based on surveys etc.



# Poultry NMD

- Includes *Campylobacter*
  - Caecal samples
  - Rinsates
- *Campylobacter* Performance Target established
- If not met by processor, escalating severity of action



# Chemical residues

- Infrequently Maximum Residue Levels are exceeded (meat & produce)
- MRLs
  - to encourage the best practice in the production of food
  - reflect Good Agricultural Practice
  - are not risk-based
- Infrequent ingestions of product that exceeds the MRL at low level no cause of concern
- Intention to model dietary intake and human health risk with Chemist and Toxicologist



# Conclusion

- Many opportunities to use epidemiology to contribute to the goals of the Food Safety Authorities
- Conventional meat inspection issues still important
- Increased emphasis on modelling
  - to better understand problems
  - to link to public health outcomes