Getting the message across - effective epidemiological teaching

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Facilitating effective epidemiological learning (part 1)

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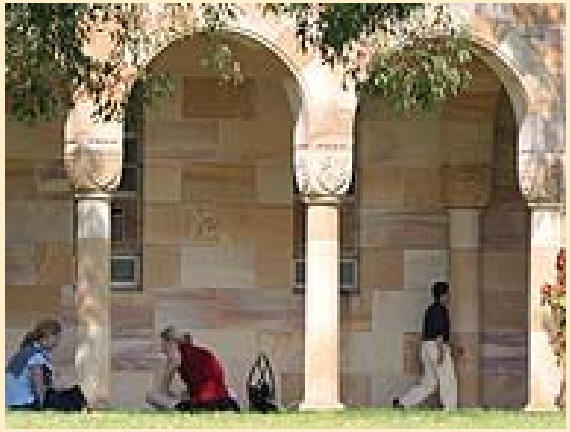

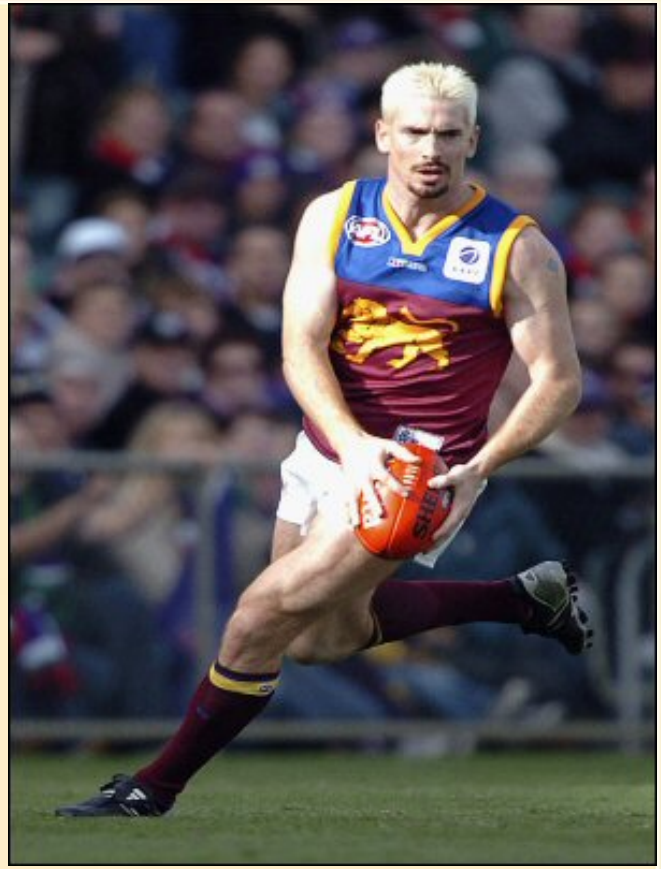

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Situation

- Excellent colleagues
  - A lot of them
  - Welcoming
  - Committed
  - Passionate
  - Talented
  - Diverse skills
  - Overworked
  - Move to Gatton
- Autonomy
- Steep learning curve

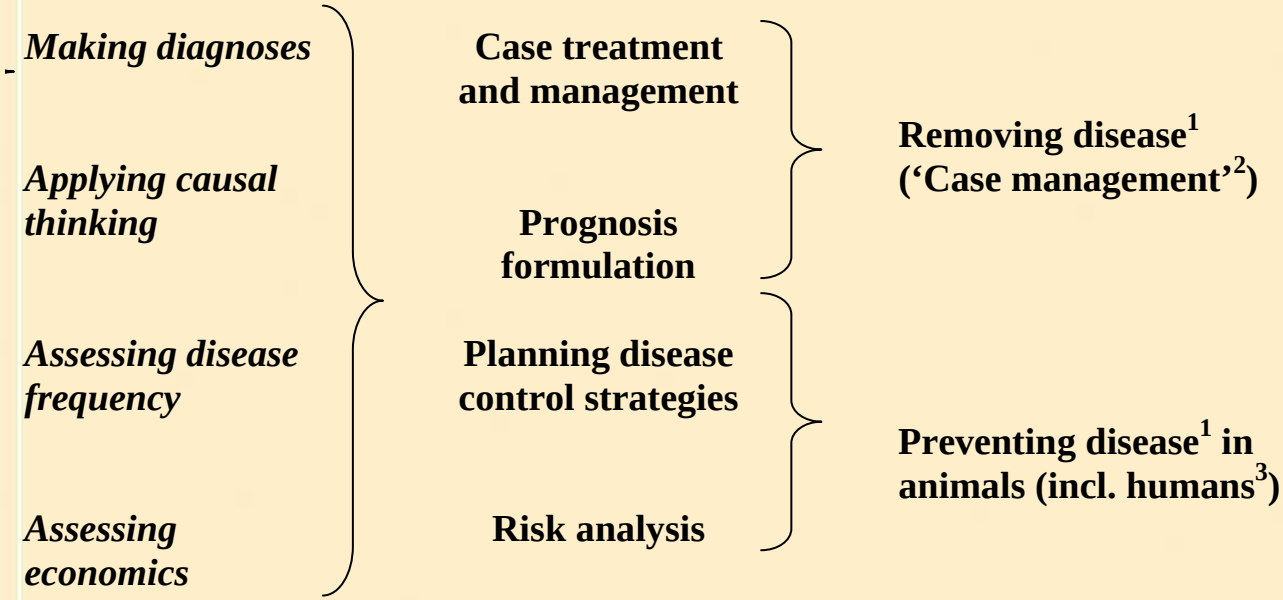
Situation

- Students
  - Diverse backgrounds
  - Bright
  - Young
  - Optimistic
  - Appreciative
  - Demanding
  - Overloaded with information
  - Unconvinced about the value of epidemiology

Situation

- 1st year: Biometry
  - 1 'lecture'/2 hrs 'prac' per week = 39 hrs
- 2nd year: Principles of disease
  - 7 'lectures'
- 3rd year: Small animal nutrition tutorial + ??
- 5th year: Epidemiology
  - 4 'lectures' per week = 40 hrs
  - 2*4 hr tutorials (10-12 per group)

Learning objectives ⇨ Learning activities ⇨ Learning outcomes ⇨ Assessment tasks



Evidence collection and evaluation

Data collection, management and simple analyses

1 'Disease' includes clinical or subclinical disorders, reduced productivity or welfare, and behavioural disorders
2 'Case' includes single animals
3 Largely through a) prevention of zoonotic diseases in humans and b) food safety

Learning objectives

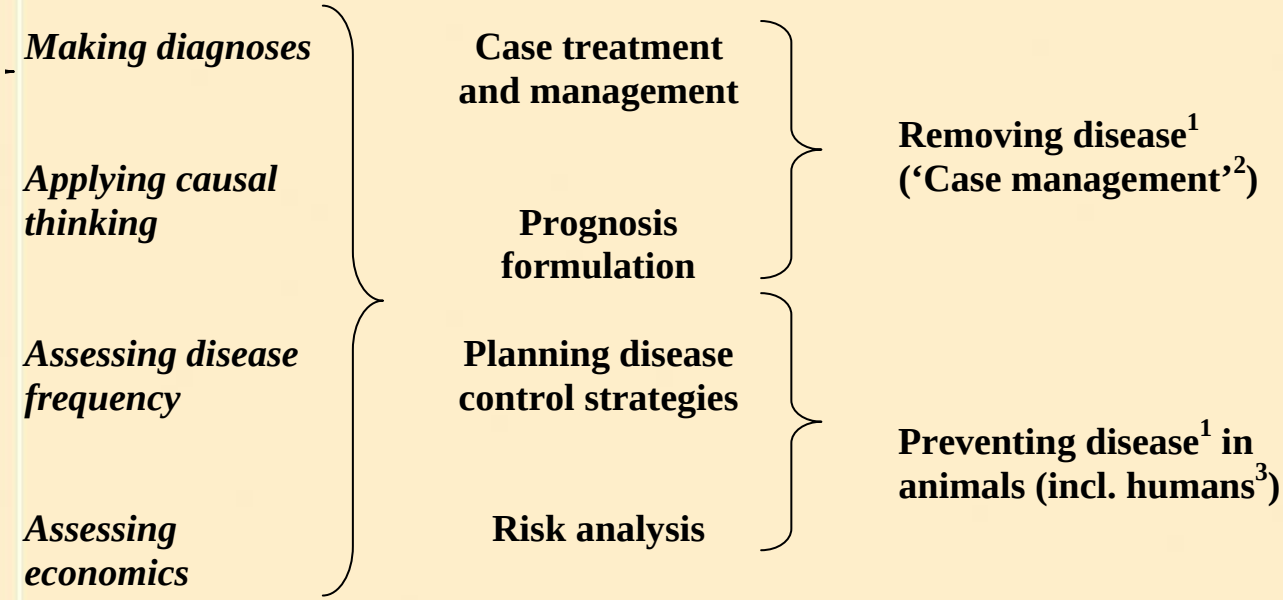
By the end of 5th year, undergraduates will be able to:

Major objective(s):

- **Recognise potential or actual examples of major types of bias**
- **Evaluate a reported observational study for internal validity**
- **Evaluate a reported clinical trial for internal validity**
- **Explain external validity, recognise an example of a study where external validity was low for a particular purpose and discuss why external validity was low**

Contributing/2ry objective(s):

- Recognise the major epidemiological techniques for assessing effects of treatment and management of clinical cases (mechanistic hypotheses, case reports/case series/observational studies and clinical trials)
- Explain the strengths and weaknesses of each technique for assessing effects of treatment and management of clinical cases
- Describe bias and explain how bias differs from random error
- Recognise examples of confounding or potential confounding and explain the basis of how confounding has/may have occurred using these examples
- Describe why methods of selection and losses to follow-up can cause bias
- Describe why methods of classification can cause bias
- Appraise reports describing effects of alternatives for treatment and management of clinical cases for evidence of important or potential confounding, selection and misclassification biases and present basis for conclusions reached
- Describe the process of hypothesis testing and interpret examples of p-values
- Explain statistical power and when the concept of statistical power is used
- Interpret examples of confidence intervals
- List the major considerations when determining how many animals to study
- Interpret examples of relative risks (crude and adjusted) and odds ratios (crude and adjusted)
- Describe the critical study design issues that determine internal validity of an observational study
- Describe the critical study design issues that determine internal validity of a clinical trial



Evidence collection and evaluation

Data collection, management and simple analyses

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Learning objectives

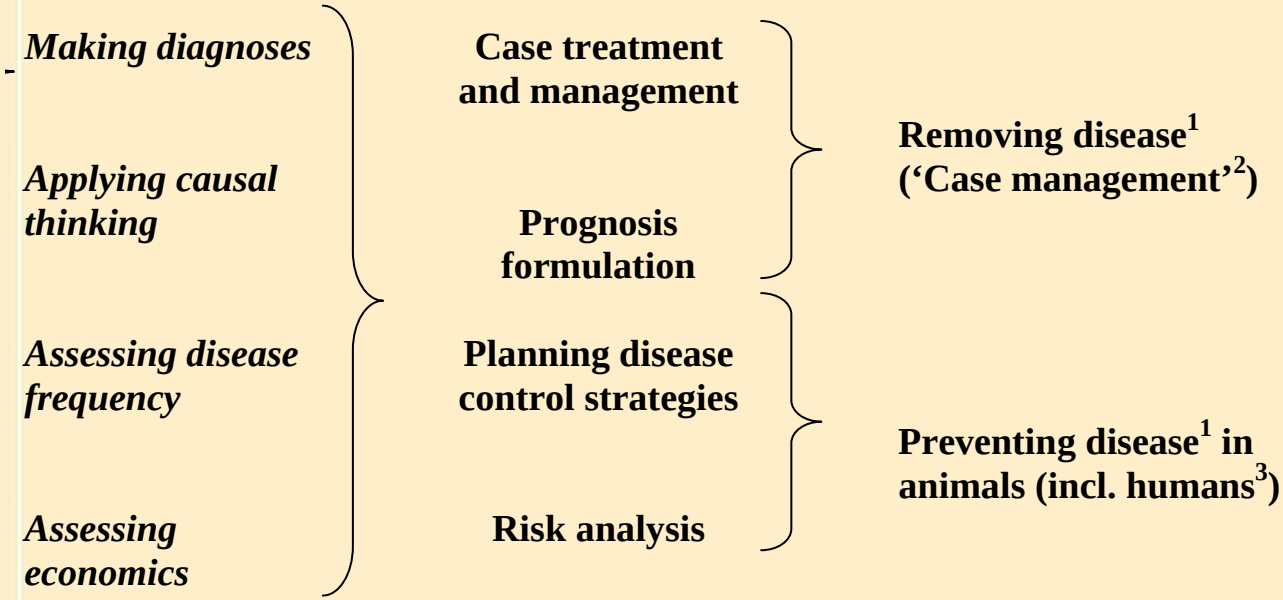
By the end of 5th year, undergraduates will be able to:

Major objective(s):

- **Calculate prevalence and incidence risk from data and interpret the results**
- **Describe and recognize various methods for assessing and monitoring disease frequency and discuss the pros and cons of each alternative**

Contributing/2ry objective(s):

- Explain the difference between prevalence and incidence risk, describe when to use each and recognize examples of each
- Describe the requirements for calculating the prevalence and incidence of a disease
- Calculate prevalence and incidence risk from data
- Distinguish examples of systematic and random sampling error
- List the major considerations when determining how many animals to sample
- Explain the principles of proving freedom from a disease



Evidence collection and evaluation

Data collection, management and simple analyses

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Learning objectives ⇨ Learning activities ⇨ Learning outcomes ⇨ Assessment tasks

Assessment tasks ⇨ Learning activities (⇨ Learning outcomes)

Examples

- Small animal nutrition tutorial
- NZ FMD hoax
- Data handling and simple analyses
- Propagating epidemic exercise
- Causal diagrams

Small animal nutrition tutorial

- With Linda Fleeman (Senior Lecturer in Small Animal Medicine)
- Dietary protein % for dogs and cats with chronic renal failure?
- Pre 1990: Low is best
  (Intervention studies in rats)
- 1990-2001: Moderate is best
  (Partially nephrectomised dogs)
- 2002: Low is best
  (RCT in dogs, cohort study in cats)

- Types of evidence

Examples

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Letter sparks foot and mouth scare

May 10, 2005

Print Email Email Alert

A letter sent to the prime minister's office claiming foot and mouth disease had been deliberately released on Waiheke Island is being analysed by police.

At this stage, the Ministry of Agriculture and Forestry (MAF) believe the threat is probably a hoax.

A farm on Waiheke Island in Auckland's Hauraki Gulf has been quarantined after the letter stated a vial of the virus was deliberately released to livestock on Monday.

Related Video

Letter sparks foot and mouth scare (07:17)

The director of biosecurity Barry O'Neill says the claim is being taken very seriously.

MAF has activated its disease management response systems. A controlled area notice has been issued which restricts the movement of livestock and risk material on and off the island while the investigation is underway. There are no restrictions on people travelling to or from the island.

Senior ministers and officials have been briefed and a police inquiry into the origin of the letter, which was sent from the Manawatu region, has been launched.

Agriculture and Biosecurity Minister Jim Sutton says New Zealand's diplomatic missions overseas have been told about the scare.

Sutton says they will be told about the precautions New Zealand is taking so they can get accurate information about the issue. He does not expect New Zealand exports to be cut off.

At a press conference on Tuesday afternoon assistant commissioner Peter Marshall at police headquarters in Wellington says demands were made in the letter. "Demands pertaining to a lump sum of money and...to a change of public policy pertaining to taxes."

Headlines

- Fonterra's Takaka plant to remain open
- Shearer fights ACC over unfair decision
- Carter Holt rises as parent explores
- Wine harvest near record
- US confirms second mad cow case
- Foresters urge Kyoto rethink
- Court crushes Northland Fed. Farmers
- Fed up farmers march on parliament
- Irate apple growers protest ban
- Farm prices, sales up
- Apple protest heads to Wellington
- Farmers lured across Tasman
- Telecom challenged over rural services
- Rural mobile users exposed to tumour

Archive

- NZ FMD hoax
  - FMD ecology
  - Surveillance
  - Movement controls
  - Tracing
  - Proving freedom

Examples

- Small animal nutrition tutorial
- NZ FMD hoax
- Data handling and simple analyses
- Propagating epidemic exercise
- Causal diagrams

- Data handling and simple analyses
  - Data types
  - Data distributions
  - Descriptive statistics
  - Data handling
  - Excel functions

Examples

- Small animal nutrition tutorial
- NZ FMD hoax
- Data handling and simple analyses
- Propagating epidemic exercise
- Causal diagrams

Epidemic #1

- The number of weeks that the epidemic will go for:
- The peak number of cases in any one week:
- Which week will be the peak week?
- Will any students not become infected during the epidemic? If so, how many?

- Propagating epidemic exercise
  - Propogation of a contagious disease
  - Epidemic curves
  - Natural history of epidemics
  - Herd immunity

Examples

- Small animal nutrition tutorial
- NZ FMD hoax
- Data handling and simple analyses
- Propagating epidemic exercise
- Causal diagrams

Death in Loggerhead Turtles due to unnatural causes/human influence

Lumpy jaw disease in macropod species in captivity

Eye cancer in cattle

Pruritis in dogs

Hookworm infestation in dogs

Dog aggression towards other dogs

Mastitis in cows

Heroin addiction in humans

Urine spraying in cats

Weight loss in horses

Deaths of puppies during/just after birth

Low wool yield in sheep

Crib biting in horses

Obesity in cats

Anaesthetic death in dogs

Dental calculus in dogs

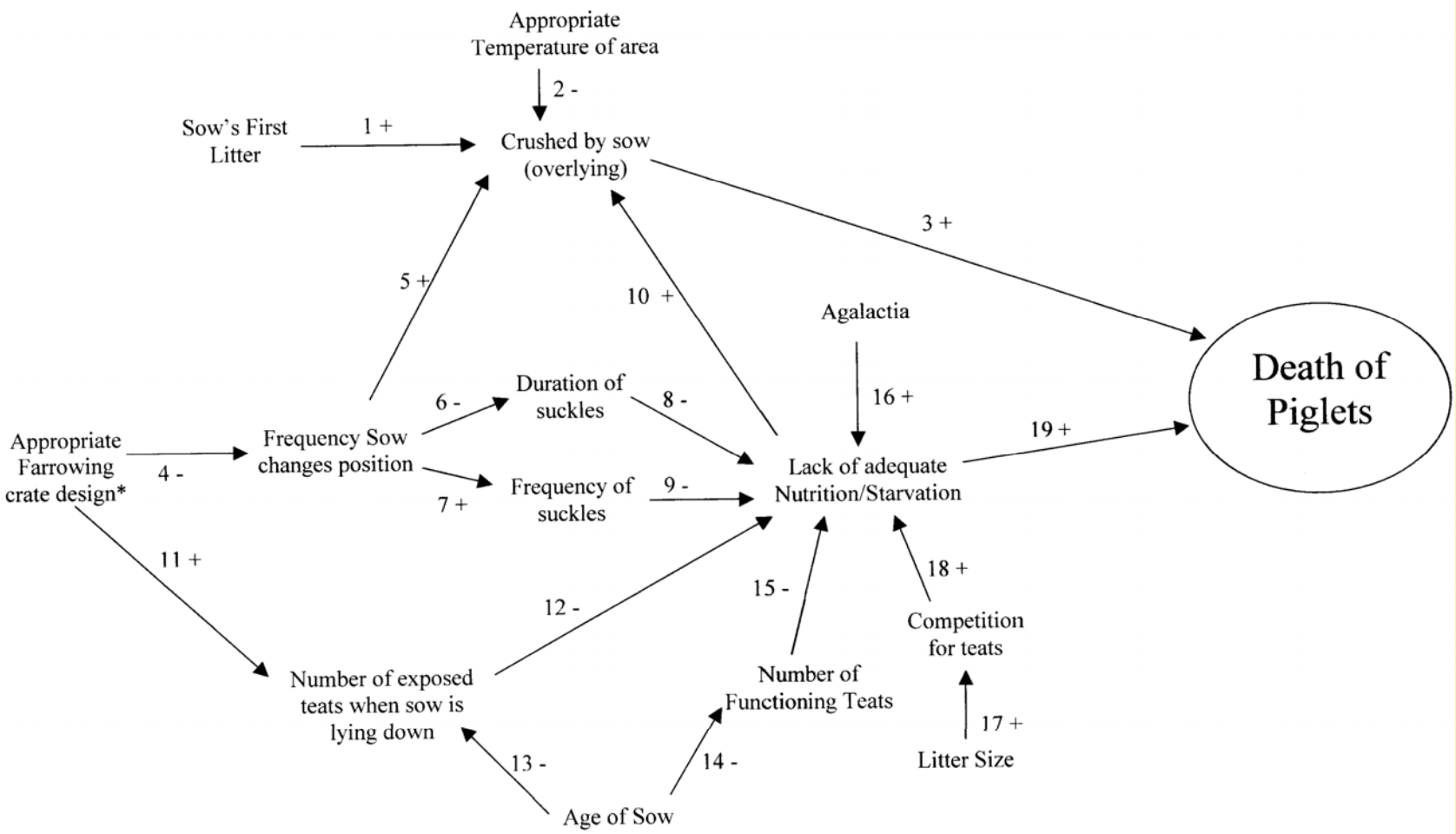
Breast cancer in women

Depression in humans

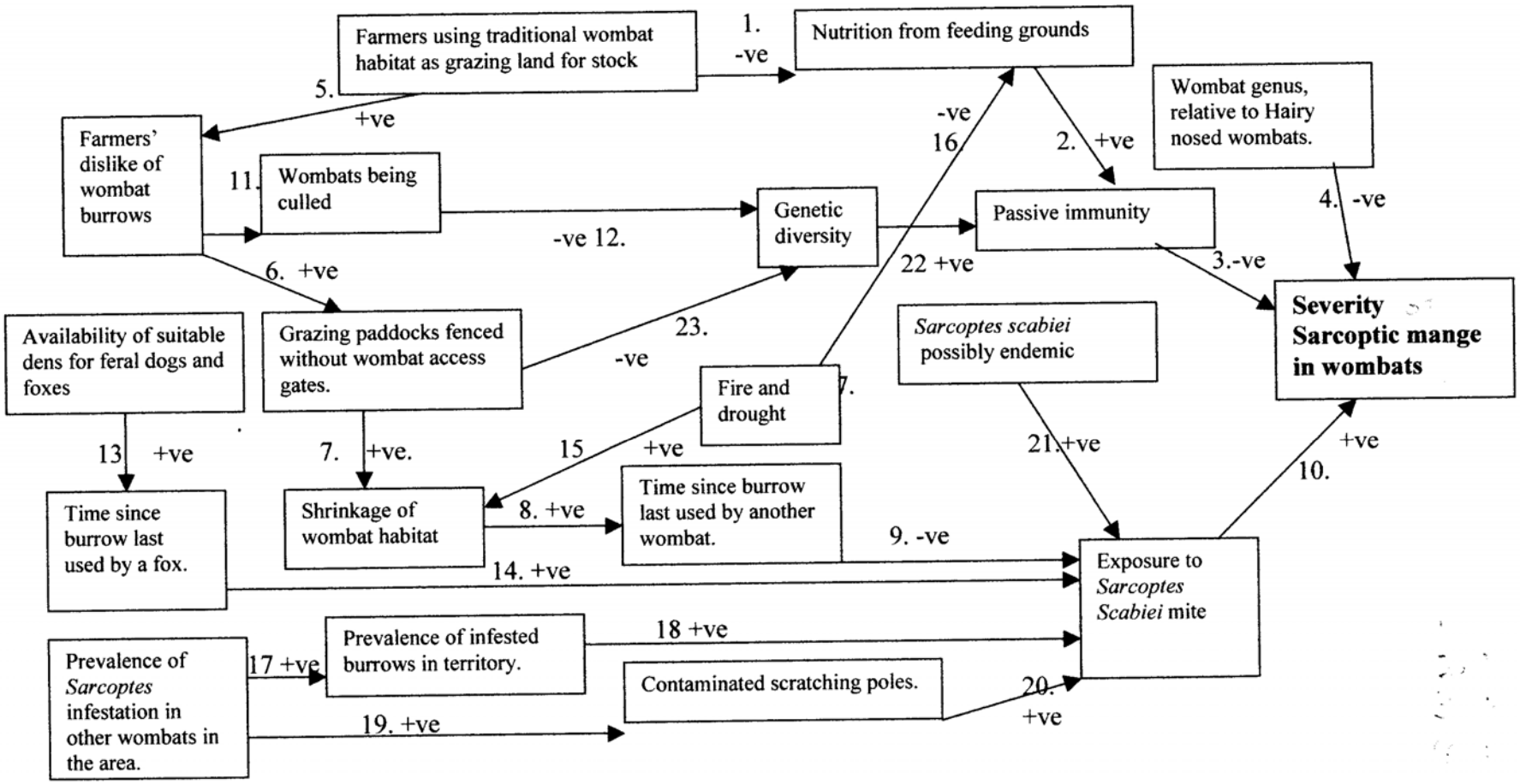
Stroke in humans

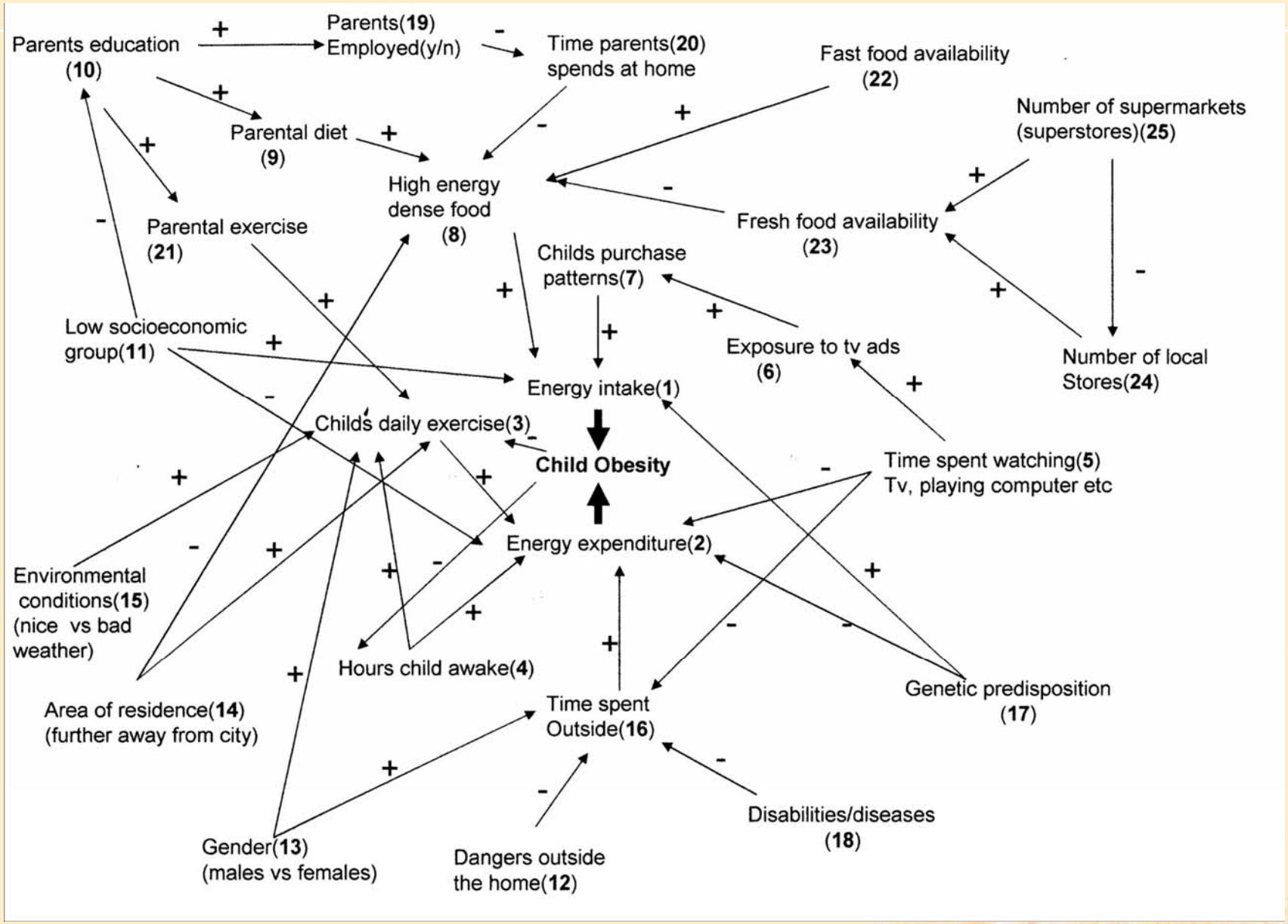
Queensland itch in horses

Some Causes of Death of Pre-weaned Piglets in Intensive Housing Systems



Causal diagram for the intensity of Sarcoptic Mange infection in Wombats





Facilitating effective epidemiological learning: Challenges

- Models in practice
- 'Embedding' epi principles throughout all courses
- Epidemiology of diagnostic processes
- Better understanding of:
  - Preferred learning methods
  - Cognitive processes
- Innovative approaches to facilitating learning
- Time-effective assessment tasks