Meeting 2: Patterns of disease

Reading

- Thrusfield 2nd Edn or 3rd Edn Chapter 5 (Determinants of disease)
- Thrusfield 2nd Edn or 3rd Edn Chapter 6 (Transmission and maintenance of infection)
- Thrusfield 2nd Edn or 3rd Edn Chapter 7 (The ecology of disease)
- Thrusfield 2nd Edn or 3rd Edn Chapter 8 (Patterns of disease)
- Thrusfield 2nd Edn, pp 54-59 or 3rd Edn pp 67-74 (mapping)

Presentations

1. Methods of disease transmission and maintenance of infectious diseases with examples
2. Host factors and disease occurrence with examples
3. Use of geographical information systems with examples of their application to animal health
4. Patterns of disease in time

Exercises

1. Discuss and analyse the factors that have contributed to the development of emerging diseases and their importance eg SARS, avian influenza, Nipah, West Nile virus or another topical disease
2. Discuss the Reed-Frost model – application, advantages and limitations
3. Example examination question 1. Need to consider:
    - Occurrence (time, space and population),
    - Cause (agent characteristics, host factors, environmental factors), source,
    - Susceptibility
    - Transmission (effective contact),
    - Cost
    - Control management or eradication options

Example examination questions

1. Select a topical disease for three (3) of the four options below. Explain how features of the epidemiology of each disease you have selected are relevant to its control, management or eradication
    a. A food-borne zoonotic disease of wildlife or companion animals
    b. A parasitic disease of wildlife or companion animals
    c. A congenital disease of animals

   d. A viral disease of production animals (2005 written)

2. Briefly describe the essential features and application of
   a. Time series analysis
   b. Geographic information systems (2003 written)
3. Briefly describe the essential features and application of Reed-Frost models (2002 written)
4. Write brief notes to demonstrate your understanding of herd or population immunity
5. Using examples, write brief notes on methods of disease transmission (2002 written)
6. Write brief notes to demonstrate your understanding of temporal patterns of disease (2001 written)

Additional reading/resources

- Sergeant et al. (2004) Epidemiological problem solving, Ausvet Series in Epidemiological Skills for Animal Health Professionals, pp 25-29
- Epidemiological Skills in Animal Health, PGFVS Proceedings 143; pp 161-175 (ecology of disease), pp 239-254 (patterns of disease)
- McGinn et al (1996) Geographic information systems for animal health management and disease control. JAVMA 11(1): 1917-1921.
- Sanson et al. (1991) Geographic information systems: their application in animal disease control. Rev. sci. tech. Off. int. Epiz. 10(1): 19-195.
- Jackson et al. (2005) Epidemiology of the 2003-2005 Epidemic of Avian Influenza H5N1 in Asia. In: Proceedings of the Food Safety & Biosecurity and Epidemiology Branches of the NZVA, pp 87-99.
- Daszak P, Cunningham AA and Hyatt AD (2000) Emerging Infectious Diseases of Wildlife – Threats to Biodiversity and Human Health. Science, 287(5452): 443-449.
- Morse SS (1995) Factors in the Emergence of Infectious Diseases. EID 1(1). Available: http://www.cdc.gov/ncidod/eid/vol1no1/morse.htm
- 'Global Aspects of Emerging and Potential Zoonosis: a WHO perspective' Available: http://www.cdc.gov/ncidod/eid/vol3no2/meslin.htm

Meeting 14: Herd health, disease control and eradication programs

Reading

- Thrusfield 2nd Edn, pp 322-336 or 3rd Edn, pp 368-383 (herd health)
- Thrusfield 2nd Edn, pp 337-348 or 3rd Edn, pp 384-404 (disease control and eradication programs)
- Thrusfield 3rd Edn, pp 168-187 (surveillance and monitoring programs)

Presentations

1. Herd health programs: principles, design, strategies, limitations and methods of monitoring success/progress.
2. Regional/national disease control and eradication programs: principles, design, strategies, limitations and methods of monitoring success/progress.
3. Demonstrating freedom from disease (both a descriptive approach, and a revisit of sampling)

Exercises

1. The Global Rinderpest Eradication Program (GREP) is a time-bound program to eliminate rinderpest from the world by the year 2010. Discuss the epidemiological issues which would have to be evaluated before global eradication of a disease such as rinderpest could be considered an achievable objective over a period of 20 to 30 years. Focus your answer on the epidemiological principles, not the specific details of the example disease.
2. The initial decision on whether or not to undertake a national control program for a specific disease of major importance may be influenced by many factors. Using as examples one of more diseases with which you are familiar, discuss the factors which you believe should be taken into account, and describe the role which you, as an epidemiologist, might play in assisting the decision-making process.
3. As a veterinary practitioner, you are asked by a client to develop a herd health program for a dairy cattle herd. Provide an overview of how you would do this, including design features and implementation. Focus on the epidemiological principles.
4. Discuss national disease monitoring and surveillance programs (eg. TGSP, NAQS)

Example examination questions

1. Virulent footrot (VFR) of sheep is considered by many to be a significant disease that is of economic importance to flock owners and the sheep industry as a whole. However, there are others who consider it to be of no importance. You have been asked to provide advice to the Animal Health authorities on the merits of proceeding with a control program. Describe the factors that you would consider and outline any activities you would implement to assist in reaching a recommendation. (2003 written)

2. A program to eradicate brucellosis from cattle in New Zealand has been in place for a number of years and the prevalence of infected herds has been substantially reduced and is now quite low. The program objective remains unchanged – to eradicate brucellosis from cattle in New Zealand.

   Programs to eradicate contagious diseases from animal populations in regions have specific features which can change during the course of such programs. Contrast the major issues associate with the design and implementation of such an eradication program between two stages: stage 1 – early in such a program, and stage 2 – once the disease prevalence has been reduced to a low level.

   Explain why such changes are required. The emphasis in this question is not on the specific epidemiology of brucellosis but is on the differing issues that need to be addressed as a program to eradicate a contagious disease proceeds (2000 written).

Additional reading/resources

- Epidemiological Skills in Animal Health, PGFVS Proceedings 143; pp 141-148 (disease control programs), pp 353-361 (monitoring performance of regional programs)
- Davidson RM (2002) Control and eradication of animal diseases in New Zealand. NZ Vet J 50(3) supplement: 6-12.
- Pharo H (2002). New Zealand declares 'provisional freedom' from hydatids. Surveillance 29(3):3-7. Available from http://www.sciquest.co.nz/crusher_download.asp?article=9003829
- Taylor WP et al. (1995). The principles and practice of rinderpest eradication. Veterinary Microbiology 44: 359-367.
- Tweedle NE and Livingstone P (1994). Bovine tuberculosis control and eradication programs in Australia and New Zealand. Veterinary Microbiology 40: 23-29.
- Radostits OM et al. (1994). Herd Health. 2nd edition, WB Saunders, Philadelphia, USA pp 10-24.