

Meeting 3: Measures of disease frequency and association

Reading

- Dohoo et al, pp 65-76 (disease frequency); pp 121-130 (measures of association); pp 76-81 (standardisation)
- Thrusfield, 2nd Edn, pp 37-47 or 3rd Edn pp 46-64 (disease frequency)
- Thrusfield, 2nd Edn, pp 224-229 or 3rd Edn, pp 269-273 (measures of association)
- Thrusfield 2nd Edn pp 49-53 or 3rd Edn pp 63-64 (standardisation)

Presentations

1. Rate, risk, proportion and ratio. Define, and compare and contrast these terms. Provide examples that demonstrate appropriate application.
2. Measures of disease frequency (prevalence, incidence, cumulative incidence, incidence rate, attack rate).
3. Measures of association (strength and effect of factor). Differentiate this from causation.
4. Standardisation. Explain the rationale for use. Compare direct and indirect methods.

Exercises

1. Retained placenta in cattle is a well-defined risk factor for reduced fertility. Twin calvings are a frequent (indirect) cause of retained placenta.

The magnitude of this effect was quantified using population data from Dutch dairy herds from 1982 to 1988 (Nielen M et al. (1989). Twinning in dairy cattle: a study of risk factors and effects. *Theriogenology* 32: 845 - 862). The following data was adapted from this report. For all 11,943 calvings that occurred over the period, 839 were followed by retained placenta (placenta not expelled by 24 hours after calving). Of these calvings, 369 were twin calvings. Of the twin calvings, 128 were followed by retained placenta. For our purposes, assume that no bias is present in these observations.

Calculate the following measures and describe the meaning of each:

Relative risk, odds ratio, population relative risk, population odds ratio, attributable rate, attributable fraction, estimated attributable fraction, population attributable rate, population attributable fraction, estimated population attributable fraction.

2. Identify the measures of disease frequency and/or association used in the following five papers. Give reasons why these measures were used and suggest appropriate alternatives if they exist.
 - Bailey CJ et al. (1997). Risk factors associated with musculoskeletal injuries in Australian Thoroughbred racehorses. *Preventive Veterinary Medicine* 32: 47-55.
 - Stevenson MA (2000). Disease incidence in dairy herds in the southern highland district of New South Wales, Australia. *Preventive Veterinary Medicine* 43: 1-11.

- Frei C et al. (1997). The production system and disease incidence in a national random longitudinal study of Swiss dairy herds. Preventive Veterinary Medicine 32:1-21.
- Mounchili et al. (2004). Risk factors for milk off-flavours in dairy herd from Prince Edward Islands, Canada. Preventive Veterinary Medicine 64: 133-145.
- [Telfer BL et al. Probable psittacosis outbreak linked to wild birds. Emerging Infectious Diseases 2005;11\(3\): 391-397.](#)

Example examination questions

1. Using the 2 X 2 table (below) show how to calculate the risk ratio, odds ratio, attributable risk and attributable fraction (2005 oral).

	D+	D-
E+	A	b
E-	C	d

2. Using examples, write brief notes on case fatality rate and mortality rate (2000 written).
3. Using examples, write brief notes on measuring disease frequency (1999 written).
4. Discuss differences between incidence and prevalence as a measure of disease occurrence. When would you choose one over the other? (1994 written)
5. Write brief notes on the similarities and differences between relative risk and odds ratio (1998 written).
6. Using examples, write brief notes on relative risk and attributable risk (2001 written).
7. Using the data in the table below calculate and explain important epidemiologic measures of association (strength and effect). (2002 written)

	Diseased	Not diseased	<i>Total</i>
Factor positive	20	5	25
Factor negative	10	10	20
<i>Total</i>	30	15	45

Additional reading/resources

- Epidemiological Skills in Animal Health, PGFVS Proceedings 143; pp 27–36 (disease frequency), pp 61-64 (measures of association)