Self-assessment

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A 180-cow, commercial dairy herd that calves throughout the year achieving a 305-day herd average of 8900 litres with complete diet feeding experiences significant levels of clinically lame cows. The herd owner expresses concern at the number of lame cows requiring treatment by the herdsman, as a supermarket inspection is due. The herd is housed on mattress cubicles bedded with chopped straw; milking cows are managed as one large group and go out to grazing during the summer months. Computerised records are available on-farm and you produce a figure of 90 lameness events per 100 cows/year. A graph of total lameness cases over a three-year period from 1 November 2005 to 31 October 2008 is displayed in Fig. 1.

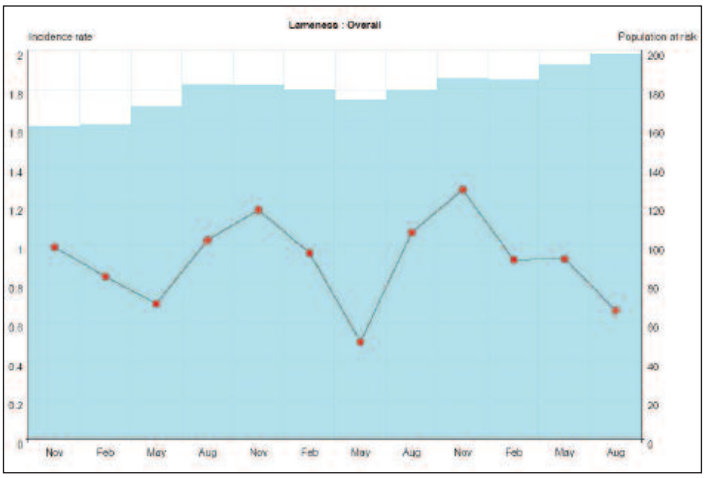

Fig. 1: *Three-monthly overall lameness incidence rate (Interherd, NMR Agrisoft).*

QUESTIONS

1. What is the difference between an **incidence rate** and **prevalence**?
2. Describe the pattern of cases shown in Fig. 1. What are the pitfalls of using an all-case rate when interpreting disease data?
3. The incidence rate of solar ulceration is shown in Fig. 2, using a lag period of 150 days. How would you describe this?
4. You investigate the incidence rate of lameness by parity group and realise that the rate in heifers is much higher, particularly for solar ulceration. What could be the patho-physiology behind this trend?
5. You decide to visit the farm and perform a mobility score assessment to investigate the prevalence of lameness and response to treatment. You discover an overall prevalence of score 2 (lame) and score 3 (severe lameness) of just 12%. What does this tell you about the epidemiology of lameness in this herd? What are the potential issues with mobility scoring?
6. You review risk factors for the development of solar ulceration with the herd owner and herdsman and identify long waiting times in the collecting yard, large group size and sub-optimal pre- and post-calving heifer management as potential areas of risk. How could you address the high rate of solar ulceration, particularly in heifers?

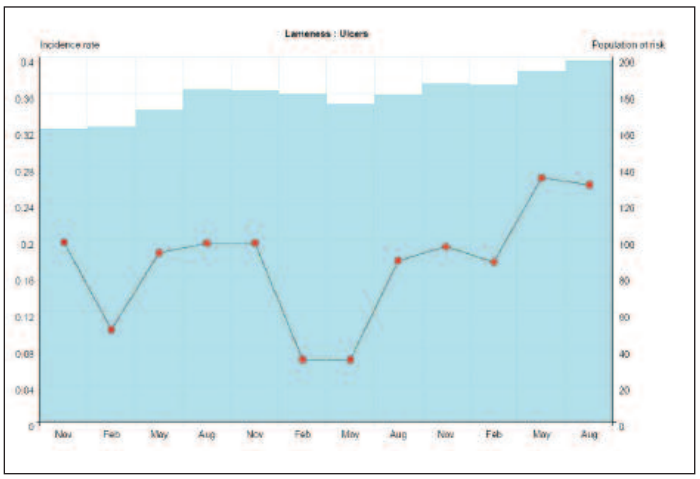

Fig. 2: *Three-monthly solar ulcer incidence rate (150-day lag period) (Interherd, NMR Agrisoft for the period 1/11/2005 to 31/10/2008).*

ANSWERS

1. The **incidence rate** describes the number of (usually new) cases of a disease or event that occurs between two points in time, per population at risk of recording the disease or event. **Point prevalence** is the number of animals that show disease (in this case lameness) at any one point in time and does not therefore have any temporal component. In this herd, cows are observed for lameness at each milking, and if a cow displays signs of being lame, she is examined the same day. There were issues with diagnosis of lesions - for example the terms 'foul-in-the-foot' and 'lour' (the colloquial term for foul used in the south-west of England) were used to record separate lameness events, where in fact they are the same diagnosis. It is often worth examining the raw data to ensure accurate data capture and therefore accurate incidence-rate calculation.

2. Fig. 1 shows the all-case rate is very high, exceeding 50 cow lameness events per 100 cows/year and increasing to 120 events per 100 cows/year. These peaks are in August to October and November to January, suggesting autumn and/or winter issues particularly.

   A problem with using an all-case rate is that it does not give a true reflection of the amount of **new** cases that the herd experiences, and therefore is not a fair assessment of the current disease level on the unit. This introduces the concept of a **'lag period'**, i.e. the interval between new events of a disease, which varies according to the type of lesion diagnosed. Selecting an appropriate lag period can dramatically alter the overall incidence rate by not counting the same case more than once.

3. A lag period of 150 days may be more appropriate when investigating claw horn disease, due to the long healing times often required for these lesions. Fig. 2 shows an approximation for a new case rate of solar ulcers, given this lag period, and shows a rise in the last 18 months from 8 cases per 100 cows/year to 25 cases per 100 cows/year. This suggests a worsening of the current situation, but it is important to realise that this could involve small numbers of actual cases and therefore again it is important to examine the raw data.

4. A high incidence rate of disease in heifers, particularly solar bruising and ulceration, suggests poor management, with sub-optimal acclimatisation to the housing. The pathology is currently thought to involve external environmental factors (such as mechanical pressure from increased standing times on concrete resulting in increased levels of matrix metallo-proteinases that degrade collagen fibres) as well as individual animal factors (such as the composition and size of the digital cushion in heifers) - see the review by Mulling and Greenough given at the World Buiatrics Congress 2006.

   Fig. 3 displays an incidence plot by month since birth and clearly shows the extremely high rate of lameness experienced by heifers, for example a rate of 0.7 events per animal year (equivalent to 70 cases per 100 animals/year) in the 28th month of life.

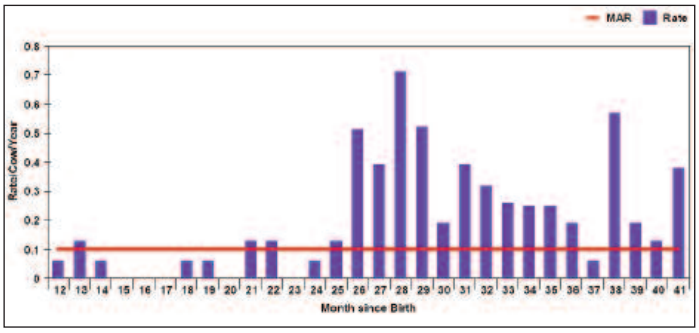

Fig. 3: *Lameness incidence rate from birth analysis (Total Vet, SUM-iT/QMMS Ltd.).*

5. Low apparent herd prevalence with a high incidence suggests several possible scenarios, including rapid identification and treatment, effective treatment and/or aggressive culling of persistently affected cows. In this herd, all three were valid and shows how important analysis of clinical events are when diagnosing and monitoring endemic diseases in herds, particularly if herds are benchmarked against one another. Potential problems with mobility-scoring assessment may include:

- operator subjectivity
- bilaterally lame cases or chronic cases that may be difficult to assess
- not all cows being freeze-branded and identifiable
- a short distance where cows walk to attempt to score
- sub-optimal lighting conditions
- cows chased out of parlour if too slow to exit if scoring is done during milking
- cows that abduct hind limbs due to large udders at peak yield.

6. Interventions in this herd focused on heifer management, including bringing pre-calving heifers back to the farm 6-8 weeks prior to calving and housing them with the transition

cow group in an attempt to introduce the heifers to the housing over a longer period than before (Fig. 4). Post-calving, creating a separate heifer group may reduce bullying and allow increased lying times, although this was resisted by the herdsman due to increased labour and milking time plus the small number of heifers made this impractical. The use of rubber matting in the collecting yard has also been discussed and costed and may also reduce the rate of solar ulceration. It is extremely important to realise that exactly by how much the rate of lameness may be reduced by implementing these measures is impossible to know, as intervention studies have not been carried out. They are, however, likely to be cost effective due to the high financial (and welfare) cost of solar ulceration. In this case, any changes made must then be monitored carefully using index case rates and overall rates, appreciating that a long time period may have to elapse before improvements are seen.

Fig. 4: *Pre-calving heifers housed on mattress cubicles with transition cows.*

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