

Does dust cause bovine respiratory disease in feedlot cattle?

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Abstract

This study investigated temporal patterns of respiratory disease in a 10,000-head feedlot in Southern Queensland, Australia from January to December 1995. Using data routinely-recorded by feedlot staff, survival analyses were used to characterise the incidence of respiratory disease as a function of the number of days on feed and as a function of calendar date. The incidence of respiratory disease was compared with daily rainfall data. Interpreted in context of the management history of the feedlot, the results of this study support the hypothesis that the risk of respiratory disease is increased during periods of dry (and dusty) weather.

Introduction

This study investigated the relationship between rainfall and the incidence of respiratory disease in a 10,000-head feedlot, near Condamine in Southern Queensland. The feedlot concerned fed cattle for three main markets: a supermarket market (260 - 320 kg bodyweight on arrival), a 100-day Japanese ox market and a 200 day Japanese ox market (both 400 kg bodyweight on arrival).

Materials and Methods

The population of interest included all cattle that entered the feedlot from 1 January 1995 to 31 December 1995. On entry to the feedlot cattle were uniquely identified and organised into 'lots' (management groups) for accounting purposes. Arrival dates, departure dates, breed and average weight on arrival were recorded at the lot level. Feedlot staff were trained to recognise and record a number of distinct clinical syndromes relating to the gastrointestinal, respiratory, circulatory, and reproductive systems. For individual cattle identified with illness by feedlot staff, dates and details of disease diagnoses, treatment, and mortality events were recorded.

We used survival analyses to investigate the temporal pattern of respiratory disease events in this population. Here, the event of interest was the date on which a respiratory disease event was diagnosed for individual stock. Stock that did not experience disease were classified as censored observations on the date of exit from the lot; stock that were diagnosed with a non-respiratory disease event were censored on the date of diagnosis. The temporal pattern of respiratory disease was evaluated firstly as a function of days on feed and secondly as a function of calendar date. Total daily rainfall was plotted as a function of calendar date and compared with the daily hazard of respiratory disease.

Results

The cumulative incidence for all disease conditions was 7.3 diagnoses per 100 cattle (95% CI 7.1 – 7.6 per 100 cattle). The crude morbidity for respiratory disorders was 1.84 diagnoses per 100 cattle (95% CI 1.7 – 2.0 diagnoses per 100 cattle). Crude

mortality was 0.3% (95% CI 0.25% - 0.38%).

The daily hazard of respiratory disease as a function of days on feed and calendar date are shown in Figures 1 and 2. In Figure 3, total daily rainfall recorded for the study period is shown, with daily hazard of respiratory disease shown on the secondary vertical axis.

Discussion

When plotted as a function of days on feed (Figure 1), the pattern of respiratory disease in this feedlot was typical of a propagative epidemic, suggesting that respiratory disease was being generated within animal groups after entry into the lot. While co-mingling of cattle from different sources into pen groups contributed to the initial peak of disease incidence, it was our hypothesis that dusty conditions (associated with periods of low rainfall) contributed to its propagation.^{1,2} To investigate this hypothesis, the daily hazard of respiratory disease was compared with total daily rainfall recorded for the same time frame (Figure 3). There were two dry periods during the study period: the first from March to April and the second from July to August. An increase in the incidence of all forms of respiratory disease was noted during each of these periods, with a decline in new cases following periods of rain. The incidence of respiratory disease was greatest throughout the March and April dry period. Feedlot management had undertaken more pen cleaning prior to the second dry period in an attempt to control the dust problem which was mainly a result of an accumulation of dried manure on the pen surface.

The survival analysis approach used in this study was useful to evaluate respiratory disease risk as a function of alternative time scales using information that was routinely collected by feedlot staff. Interpreted in context of the management history of the feedlot for the duration of the study, the results of this study support the hypothesis that the risk of respiratory disease is increased during periods of dry (and dusty) weather. These analyses also suggest that the effect of dry weather as a risk for respiratory disease is readily amenable to control measures. We conclude that analysis of data accumulated over consecutive years is required to more definitively confirm the relationship between dry weather and respiratory disease in Queensland feedlot cattle.

References

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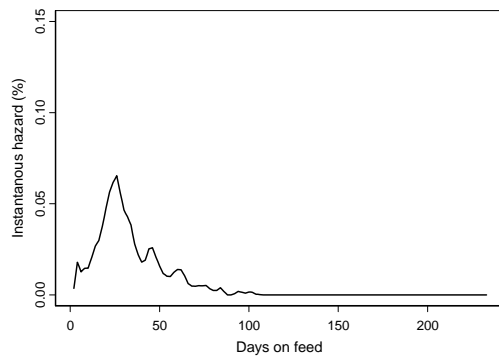


Figure 1. Daily hazard of respiratory disease as a function of days on feed.

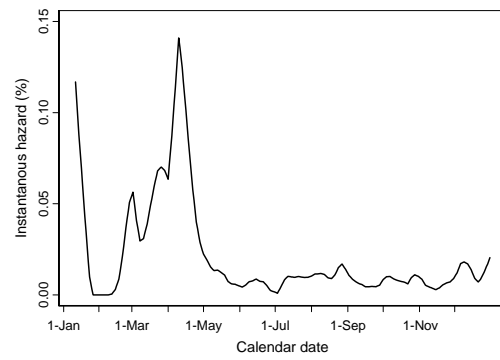


Figure 2. Daily hazard of respiratory disease as a function of calendar date.

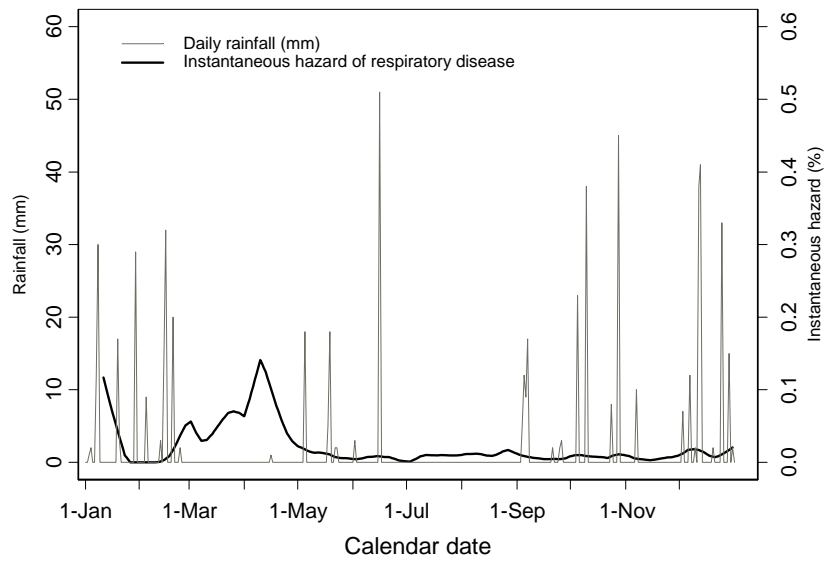


Figure 3. Total daily rainfall and daily hazard of respiratory disease, as a function of calendar date.