Synchronisation of *E. coli* O157 shedding in an Australian grass-fed beef herd

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Introduction

Escherichia coli O157 is an important foodborne pathogen capable of causing serious illness in humans. Healthy cattle transiently shed *E. coli* O157 and directly or indirectly transmit the pathogen to humans[1]. The objective of this study was to describe the temporal dynamics of *E. coli* O157 shedding in an Australian grass-fed beef herd, and to identify possible risk factors for shedding of this pathogen.

Methods

- 23 beef cows were sampled twice a week for 9 months
- Faeces were collected from each cow by rectal palpation
- Direct plating and immuno-magnetic separation (IMS) was used to categorise animals into negative (non-shedding) and positive (shedding) on each occasion
- Numerous animal, climate and environmental variables were measured

Analysis

- The probability of shedding over time was visualised to differentiate between shedding and non-shedding events of the whole the herd. An ANOVA and GLM were used to identify which variables were associated with shedding events.

Results

- Overall prevalence of *E. coli* O157 shedding within the cohort during the study was 12.8%
- Much variation of shedding between and within individuals was identified
- Three distinctive peaks in probability of shedding were detected (Figure 1)
- Hide contamination (P=0.04) and rainfall in the 24 hours prior to sampling (P = 0.03) were associated with the probability of *E. coli* O157 shedding. The average level of hide contamination score (from 1 to 5: clean and dry – slightly dirty – dirty – very dirty – filthy and wet) during shedding (1.4) differed from non-shedding (1.7). The mean of rainfall (mm in the 24 hours prior to sampling) during shedding events (3.4) differed from non-shedding events (0.6).

Conclusion

This study demonstrated temporal clustering in shedding: members of the herd were synchronised in their pattern of shedding of *E. coli* O157. No literature has identified this previously. Occurrence of rainfall was a predictor of shedding in this herd grazing in a medium rainfall environment.
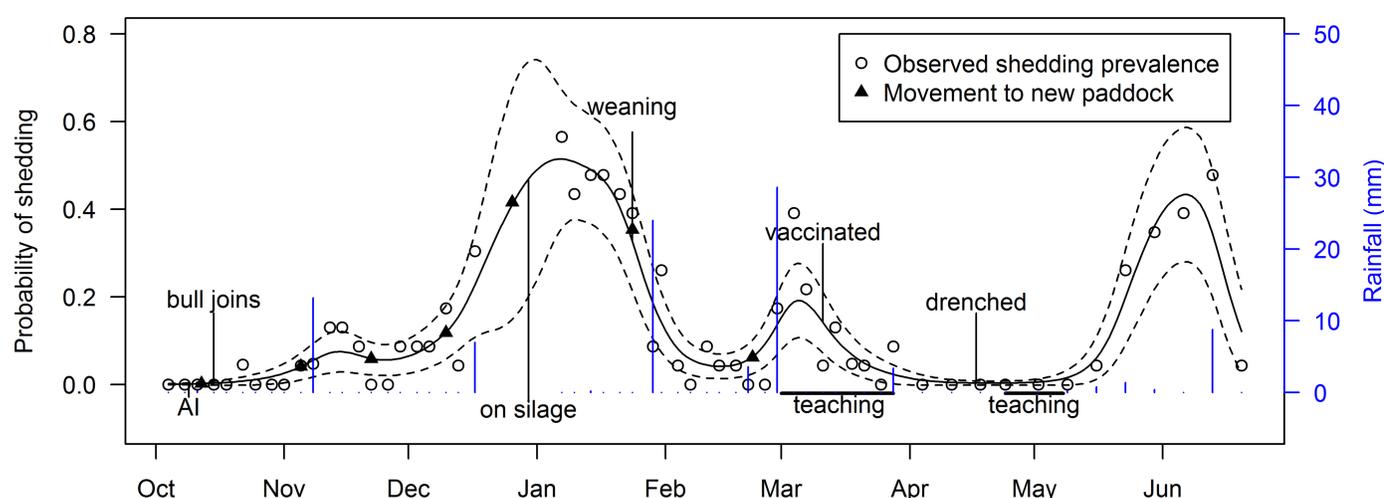

Figure 1. Temporal change in probability of animals shedding *E. coli* O157 (and 95% CI). The timing of management variables, the timing of movement of the animals between paddocks and the amount of rainfall in the 24 hours prior to sampling are shown.

References
[1]Rangel JM et al., 2005. Epidemiology of *Escherichia coli* O157:H7 outbreaks, United States, 1982 – 2002. Emerg Infect Dis 11:603-609.

Future research

The next step is to focus on daily, individual animal variation to obtain a more complete overview of the shedding pattern of *E. coli* O157 in grass-fed beef cattle.

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