

Development of an attention bias test to measure anxious states in Merino sheep

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Attention bias is the preferential cognitive processing of certain types of information before others. For example, anxious individuals pay more attention to threatening cues than calmer individuals. Measures of attention bias using threat-related attention orienting in animals may therefore assist in the assessment of welfare by distinguishing between different anxiety levels in sheep.



Aims

This experiment aimed to refine and validate a threat perception test to measure anxious states in Merino sheep.

Methods

- 30 minutes before testing in an arena, 60 weaned male Merino lambs received one of 3 treatments ($n=20$):
 - Control – saline administered i.m.
 - Anxiolytic – diazepam at 0.1 mg/kg i.v.
 - Anxiogenic – 1-(m-chlorophenyl)piperazine (m-CPP) at 2mg/kg i.m.
- Sheep entered a 4 x 4.2m arena containing hay (Figure 1). A dog outside the arena was visible through a window for 3 seconds, then the window was closed and the dog moved away. Sheep were in the arena for 3 minutes.
- A number of behaviours were recorded during the 3 minutes including latency to eat, escape attempts, vocalisations, urinations and defecations.
- Total time spent eating, zones crossed, total time spent vigilant, vigilance bout frequency and duration were later collated from video footage.
- Data for latency to eat were analysed using R by survival analysis, urinations were analysed using GenStat by logistic regression and other behaviours were analysed in a linear model using ASReml.

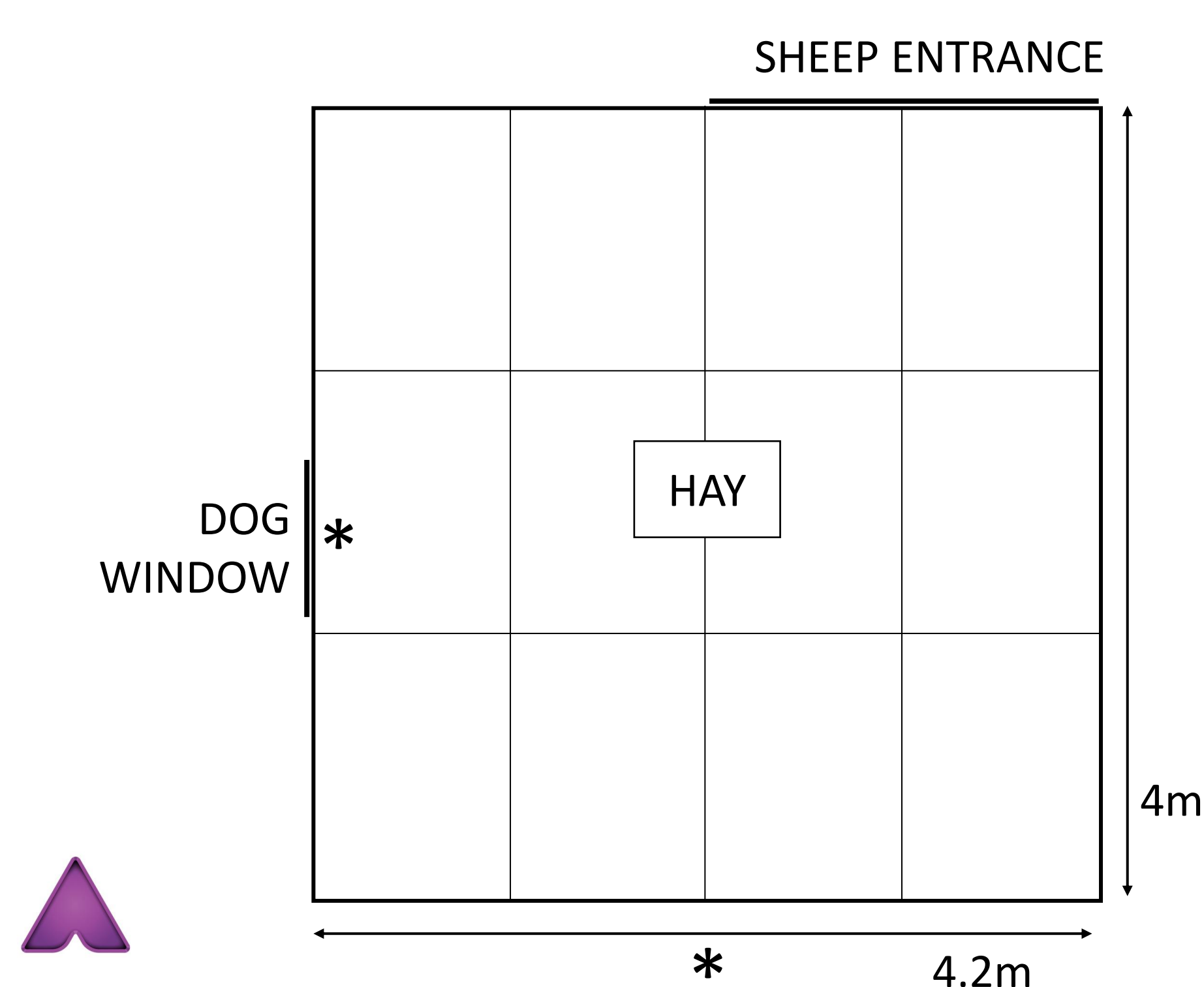


Figure 1: Diagram of the threat perception test arena (4m x 4.2m) divided into 12 sections with lucerne hay placed in the centre. A dog was visible through a window (77cm x 58cm) for 3 seconds then the window was closed. The symbols '*' show positions of the two cameras.

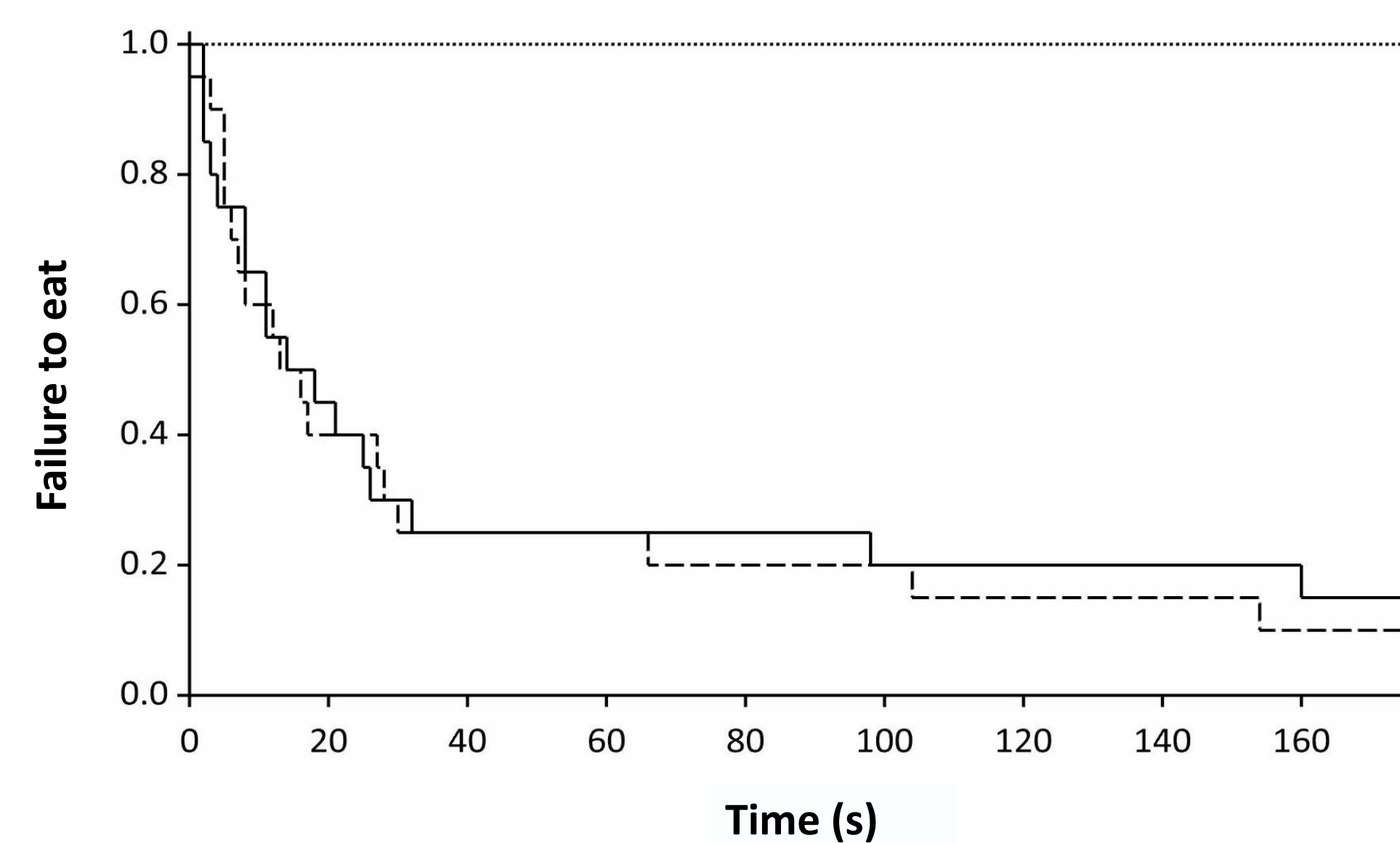


Figure 2: Kaplan-Meier curves for the threat perception test; Solid lines = control, long broken lines = diazepam, dotted lines = m-CPP. Every time an animal approached the feed reward, the probability on the Y axis drops.

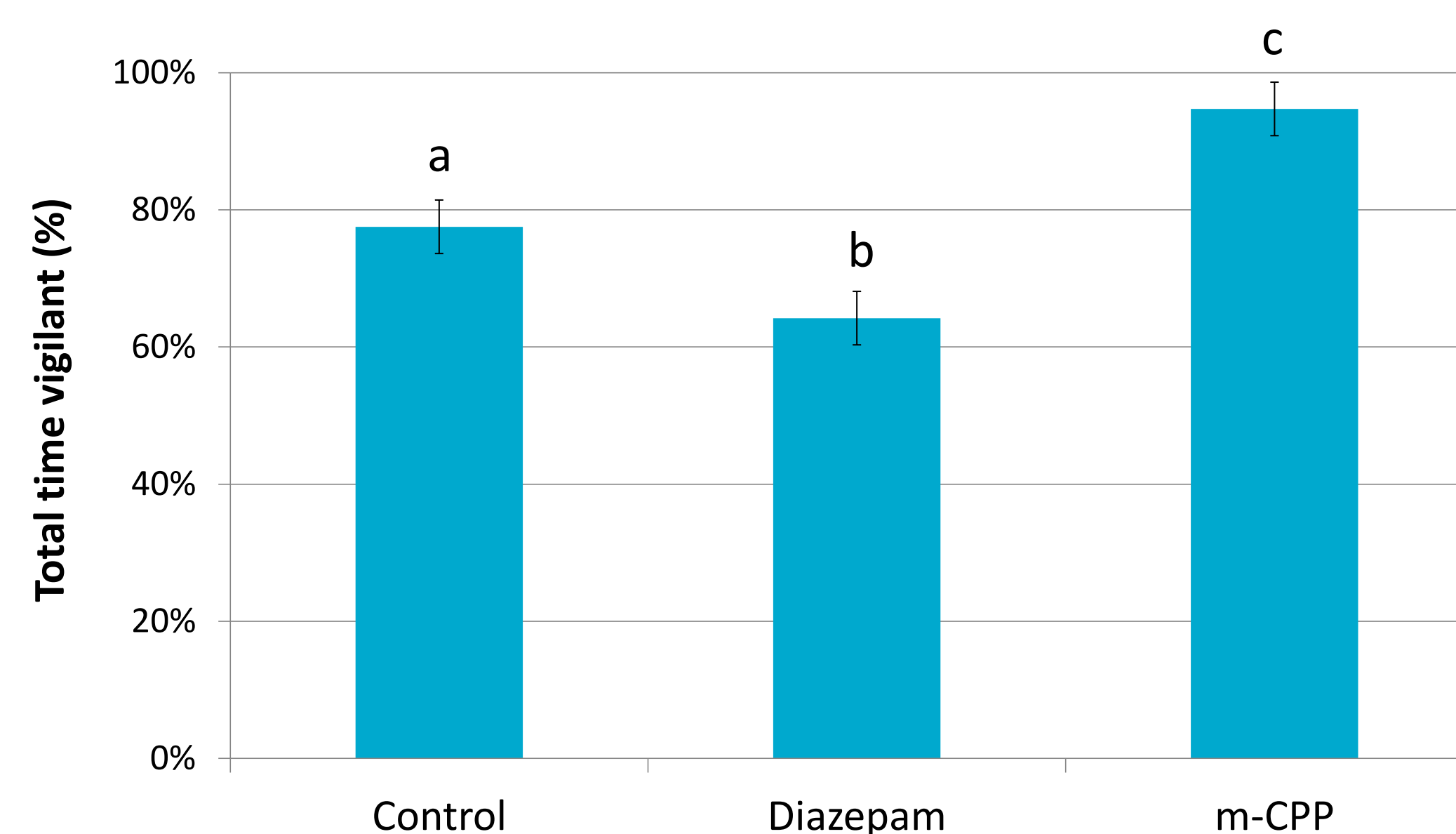


Figure 3: Average (\pm SEM, $n = 20$) proportion of time spent displaying vigilant behaviour for each treatment group where vigilant behaviour is defined as having the head at shoulder height or above.

Results

- The m-CPP group had a higher latency to eat ($180 \pm 11.7s$; $P<0.01$) than the control and diazepam groups ($49 \pm 11.7s$ and $44 \pm 11.7s$, respectively) (Figure 2). The control and diazepam groups did not differ.
- Sheep receiving m-CPP spent more time vigilant than controls ($95 \pm 3.9\%$ and $77 \pm 3.9\%$ respectively; $P<0.01$) (Figure 3). Controls spent more time vigilant than the diazepam group ($64 \pm 3.9\%$; $P<0.01$).
- The m-CPP group spent less time eating than the other two groups ($P<0.01$). The diazepam group spent the most time eating ($P<0.01$).

Conclusions

The finding that sheep receiving the anxiogenic treatment were more vigilant towards the threat and had a higher latency to approach the food than sheep receiving the anxiolytic treatment indicates that these sheep were orienting their attention more towards the threat. The test developed in this study shows promise as a measure of anxious states in sheep.

FOR FURTHER INFORMATION

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