Relationships between Patterns of Behaviour and Liveweight Gains of Feedlot Steers

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There is considerable individual variation in the performance of feedlot cattle even when they are of the same genotype and sourced from the same property (Hasker *et al*., 1996). It is possible that behavioural differences between individuals may account for some of this variation. This paper reports the correlations between some behavioural patterns and average daily gain (ADG) of Brahman steers that were feedlot-fed for 100 days.

One hundred steers, aged 2 to 3 years, were randomly allocated on liveweight to two treatments, feedlot naïve and feedlot pre-exposed (Holroyd *et al*., 1996). There were 10 feedlot pens (5m x 30m) each of 10 animals. The steers were fed at about 0800 and 1400 daily. Times of day were expressed as six time periods relative to feeding times. These periods were about one half hour prior to feeding-out, for 1 hour after feeding-out and for 1 to 2 hours after feeding-out both morning and afternoon.

Two observers, allocated 5 pens each, recorded the behaviour of 4 focal animals within each pen morning and afternoon. Each animal was recorded for a 10-minute period twice daily. Two focal animals were withdrawn from the trial, so data from 38 animals were analysed.

The sequence of animals and pens was randomly allocated to each observer. Observations were made during days 1 to 14, 24 to 26, 38 to 40, 52 to 54, 73 to 75 and 94 to 96. The behavioural data were expressed as the proportions of the total observation time that each of seven behavioural states occupied. For analyses, the data were combined across days to match, as far as possible, the time periods for which ADGs were calculated.

A previous report of this trial analysed ADGs for the total feedlotting period (days 1-97) (Holroyd *et al*., 1998). However, as steers had lost varying amounts of weight during holding and transportation, and ADGs were not representative of the remainder of the feedlotting period, the first days of feedlotting were excluded for these analyses. Also, as it took time for the cattle to adapt to the environment and ration ADGs were calculated for days 5 to 27 (early phase) and days 27 to 97 (late phase).

Correlation coefficients were calculated between the parameters, as far as possible, for coincidental periods of time eg ADGs for days 5 to 27 and behavioural patterns during days 6 to 26. Coefficients marked with one asterisk are significant to $p<0.05$ and those with two asterisks to $p<0.01$.

During the early phase of feedlotting ADG ranged from –1.07 to 2.45 (mean 0.60) $kgday^{-1}$, and was positively correlated with the proportion of time spent ruminating (0.33*) and negatively correlated with the proportion of time spent standing alert (-0.38*) in the 1 to 2 hours after the morning feed-out. ADG during this phase was also positively correlated with the proportion of time spent standing relaxed in the period before the afternoon feed-out (0.49**).

In the late phase of feedlotting ADG ranged from –0.42 to 2.01 (mean 1.13) $kgday^{-1}$, and was positively correlated with the time spent ruminating prior to the morning feed (0.34*) and negatively with the time spent lying relaxed during the hour after the afternoon feed-out (-0.37*).

There were no significant correlations between ADG and the proportions of time spent feeding, lying alert and in the other state of combined miscellaneous behaviours.

These results suggest that ADG is likely to be higher in cattle that spend greater amounts of time ruminating in the early morning and that are relaxed rather than alert prior to feed-outs. The time of day during which animals are relaxed appears important as demonstrated by the negative correlation with ADG in the hour following the afternoon feed-out. This may have arisen because animals would be expected to be feeding during this time. Intuitively correlations between time spent feeding and ADG would have been expected. It may be that time spent in rumination is an indicator of nutrient intake and time spent in an alert state an indicator of nutrient expenditure, and these behavioural patterns combined create a better predictor of ADG than feeding. Alternatively, the presence of people may have inhibited some animals from feeding during observation times and they fed when the observers were absent.

Hasker, P. J. S. *et al*., 1996. Proc. Aust. Soc. Anim. Prod. 21: 398.

Holroyd, R. G. *et al*., 1996. Proc. Aust. Soc. Anim. Prod. 21: 400.

Holroyd, R.G. *et al*., 1998. Proc. Aust. Soc. Anim. Prod. 22: 317.

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