EFFECTS OF TIME OF COOLING ON PHYSIOLOGICAL PARAMETERS AND FEED INTAKE OF CATTLE

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Animals have the ability to physiologically, behaviourally and immunologically adapt to hot conditions so that the consequences of excessive heat load are minimised. However, the productive efficiency of cattle exposed to excessive heat load will be impaired when the intensity and duration of hot conditions exceed their homeostatic and compensatory capabilities. Impaired production is manifested by a reduction in feed intake (FI) and growth rate. The object of this trial was to study the physiological function of thermally stressed cattle prior to, during, and following a period of cooling where the cooling occurs at two different times.

A 110 day study was undertaken at the University of Queensland Gatton cattle metabolism unit using six *Bos taurus* beef steers growing from approximately 216 to 281kg liveweight. The steers were housed in individual stalls in two environmentally controlled rooms (3 stalls/room). The steers were fed *ad libitum* a diet of containing 60% concentrate and 40% roughage. A Latin-square design with five replications was used, involving two days pretreatment, five days exposure to treatment conditions, and then a nine day rest period in shaded outside yards. Two cooling treatments were used (one in each room): daytime cooling (DC), and night time cooling (NC). The DC steers were cooled using sprinklers (15 micron droplet size) and fans from 0800 to 1500 hours each day. At 1500 hours the sprinklers were turned off, and fans moved to the adjoining room (NC). The sprinkler system was then turned on for those steers which had not been wetted during the day. These steers were then cooled from 1500 to 0800 hours the following day. No supplemental heat was used after 1500 hours. The sprinklers were set to turn on for 5 minutes, every 20 minutes when ambient temperature ≥ 28 °C.

Over a five day test period (120 hours), ambient temperature (t_a) ranged from 22.3 - 41.2 °C (mean 30.43); relative humidity (RH) ranged from 45.9 to 87.9% (mean 68.48). The values for temperature humidity index (THI) (Gaughan *et al.* 1996) ranged from 69 - 94 units (mean 81.52). Between 0800 and 1500 hour, mean t_a was 36 °C , mean RH was 65% and mean THI was 89 units. Between 1500 and 0800 hours the means were t_a = 27 °C, RH = 70%, and THI = 78 units. The effect of t_a and time of cooling on feed intake (FI), respiration rate (RR), pulse rate (PR) and panting (PS) were measured hourly. Rectal temperature (RT) were measured every 5 minutes. These data were analysed using SAS (1988).

Steers subjected to DC had a greater mean RR, RT, PR and PS than the night cooled steers (Table 1).

Table 1. Means ± s.e. for respiration rate (RR), heart rate (HR), rectal temperature (RT) and panting score (PS) for steers cooled during the day (DC) or at night (NC)

	DC	NC	Significance
RR	78.09 ± 0.96	53.98 ± 0.95	***
HR	93.0 ± 1.15	86.38 ± 1.14	***
RT	39.16 ± 0.02	39.02 ± 0.02	***
PS	0.33 ± 0.01	0.19 ± 0.01	***

*** P<0.0001

Although there were no differences between treatments in terms of FI, there were differences in eating behaviour. The DC cattle tended to eat during the day and the NC cattle at night. The changes in eating behaviour are currently being investigated as are management options for cooling hot cattle.

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