

NIGHT FEEDING OF GROWING CATTLE IN HOT SUMMER RELIEVES HEAT LOAD AND INCREASES GROWTH EFFICIENCY

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Under heat load conditions eating and digestion may cause an increased heat load if they coincide with the hotter part of the day. The studies were designed to assess the effect of time of feeding on the heat production (HP) pattern during the day and its effect on performance and efficiency. The data presented summarize studies over three summers, during about 90 days each year, in two feedlots: one unshaded, the other shaded by a 3 to 4 m high roof covering about one-third of the yard. Fattening calves, Holstein and beef breed, and growing beef heifers were used. In each feedlot each year animals were separated on the basis of breed, gender and age, and divided between two treatments: day and night fed. The day-fed animals received most of their feed during the day, and the night-fed animals received most of theirs during the night. Diet metabolizable energy (ME) was identical in the two treatments in each site and each year. Rectal temperature (Tr) and respiration rate (RR) were measured in the morning and in the afternoon. Body weight (BW) gain was measured monthly. Intake and efficiency were measured on a group basis, calculated monthly, and summarized for the entire trial. ANOVA statistical analysis was applied to the animal data and the pair comparison t-test was applied to the group data on animal gain, intake and efficiency (gain per intake). A treatment effect was accepted as significant for $P < 0.05$. During the 3 years we used 349 animals, separated into 11 groups in each treatment. Heart rate (HR) and skin temperature were measured throughout the day by data loggers attached to a harness strapped to the chest behind the forelegs. In one year, HP throughout the day was calculated by multiplying HR by the measured HP of one heartbeat, calculated from the oxygen consumption and HR simultaneous measurement. Rectal temperature was unaffected by the time of feeding in both feedlots. In the unshaded feedlot Tr was higher by 0.3°C in the afternoon than in the morning ($P < 0.05$). Respiration rate (breaths/min) in the morning was not affected by the feeding regime; it was higher in the shaded feedlot than in the unshaded one, 61 and 52, respectively. In the shaded feedlot RR of the day and night fed animals increased in the afternoon by only 8 and 5 breaths/min, respectively; in the unshaded feedlot it increased by 49 and 34 breaths/min, respectively. The cattle manifested the lowest HP during the hotter hours of the day, when they were fed at night, but the whole-day HP was not significantly affected by feeding at night. In sum, the 3-year study on the group basis showed that dry matter (DM) intake was significantly reduced ($P < 0.001$) by feeding at night: 7.628 and 6.961 kg/day for the day- and the night-fed animals, respectively. In spite of the lower intake of the night-fed cattle, their average growing rate was identical with that of the day-fed ones: 1.217 kg/day for both treatments. As a result, the gain per intake the efficiency was significantly increased by night feeding: 162.4 vs. 178.5 (g gain per kg DM intake, $P < 0.005$) and 14.26 vs. 15.74 (g gain per MJ ME intake, $P < 0.005$) for the day-fed and the night-fed, respectively. The mechanisms that caused the significant increase of about 10% in the conversion of feed to growth are not clear, and further research is needed. Preliminary studies, in which we used a natural digestive tract the plant alkanes as low-absorbable markers, indicated a tendency for diet digestibility to be increased by about 5% by night feeding, compared with day-feeding.

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