

Effect of Cool hour feeding during summer season on the Physiological and Haematological parameters of cross-bred cows in mid-lactation

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Abstract

The present study was conducted in the University Livestock farm and Fodder Research and Development scheme (ULF and FRDS), Kerala Agricultural University Mannuthy, Thrissur from February to May 2008, covering the hottest part of the summer on twelve healthy crossbred cows in mid lactation, to study the effect of feeding during cooler hours of summer season on physiological and hematological parameters of crossbred cows in mid lactation. Animals were divided into two groups of six each. The T1 animals were maintained on routine management protocol whereas the T2 animals were maintained on concentrate mixture and green grass as roughage with 1/3rd of the concentrate and roughage fed during the day time (10.a.m) and rest in evening (6.00 p.m) and early morning (5.00 a.m) hours. Various physiological and hematological parameters of the two groups were recorded. From the present study it was concluded that the cool hour feeding of the animals during summer season did not show much significant differences in physiological and hematological parameters of mid lactation cross bred cows. On statistical analysis a significant difference ($P < 0.05$) in plasma cortisol was obtained between the two groups during the first and second fortnights. The overall average plasma cortisol level was significantly higher in the T1 in comparison to T2.

Keywords: Cool hour Feeding, Physiological Parameter, Haematological Parameter, Lactation,.

Introduction

Dairy animals are homeotherms and therefore, when the environmental temperature rises or falls abnormally, the animals are subjected to stress. Shifting a greater percentage of feed intake to night time would reduce the energy expenditure of cows during daytime, possibly lowering heat dissipation and reducing heat load upon them. The present study was aimed to study the effect of feeding during cooler hours of summer season on physiological and hematological parameters of crossbred cows in mid lactation.

Materials and Methods

The study was conducted at the University Livestock farm and Fodder Research and Development scheme (ULF and FRDS), Kerala Agricultural University Mannuthy, Thrissur which is situated 22.25m above the mean sea level, at 10°32' North latitude at 76°16' East longitude. The experiment was conducted from February to May 2008, covering the hottest part of the summer.

Twelve healthy crossbred cows in mid lactation having a peak yield of minimum eight litres in the

previous lactation, were selected as the experimental animals. The animals were divided into two groups of six each as uniformly as possible with regard to age, milk yield and parity and were randomly allotted to two dietary treatments. The T1 animals were maintained on routine management protocol followed in the ULF and FRDS based on the recommendations of package of practices. The T2 animals were maintained on concentrate mixture and green grass as roughage with 1/3rd of the concentrate and roughage fed during the day time (10.a.m) and rest in evening (6.00 p.m) and early morning (5.00 a.m) hours. Water was made available throughout the day.

Daily maximum temperature, minimum temperature and relative humidity were recorded inside the shed to quantify the microenvironment prevalent around the animals in both the treatment groups. Physiological parameters like respiration rate and rectal temperature were measured to give an immediate response to the climatic stress and consequently the level of comfort to the animal. Blood was collected at fortnight intervals for estimating hemoglobin, erythrocyte sedimentation

rate, packed cell volume, plasma glucose and cortisol. The data collected on various parameters during the course of the experiment were analyzed statistically as per Snedecor and Cochran (1994).

Results and Discussion

The average rectal temperature during morning was 101.40 ± 0.02 and 101.45 ± 0.02 °F respectively for the two treatments groups T1 and T2 which increased to 102.07 ± 0.03 and 102.09 ± 0.04 °F respectively in the afternoon. In the present study the average rectal temperature during morning and afternoon between T1 and T2 did not differ significantly. This is in agreement with that of Aharonia *et al.* (2005) who studied the efficacy of feeding cows at night, to reduce the heat load upon them in a hot climate and found that the rectal temperature and respiration rate were smaller for night time fed animals but did not differ significantly from day time fed cows. The mean respiration rates of the cows recorded at the mornings were 28.92 and 29.22 per min respectively for the cows in T1 and T2. The corresponding values at the afternoon were 49.23 ± 0.31 and 47.13 ± 0.44 per min. In the present experiment, the respiration rate for morning and afternoon recording was not found to be different between T1 and T2. This indicated that night time feeding alone had no effect in reducing respiration rate during high ambient temperature when compared to day time feeding. The mean hemoglobin values of the cows in the T1 and T2 were 11.76 and 12.18 g per cent respectively. The initial hemoglobin content of the animals in the two groups were 11.14 ± 0.65 and 11.62 ± 0.39 g percent while the final values were 11.99 ± 0.43 and 12.39 ± 0.41 g per cent respectively for T1 and T2. Statistical analysis of the data revealed no significant difference between the two treatments. This is in accordance with the finding of Bioucek *et al.* (1990) who reported that exposing dairy cows to high temperature during day time had no effect in hemoglobin per cent. The mean PCV values of the cows in the T1 and T2 were 30.29 ± 0.42 and 29.86 ± 0.33 per cent respectively. The initial PCV values were 29.11 ± 0.88 and 29.62 ± 0.94 per cent while the final values were 3.43 ± 1.63 and 29.55 ± 0.73 per cent respectively for T1 and T2. Results revealed that the difference in PCV per cent between treatments were non significant. The present observation in PCV per cent is in accordance with the observation of Mohamed (1984) who reported that PCV value did not differ when the cows were exposed to successive seven day

periods at 20 and 32°C. The overall average erythrocyte sedimentation rate of the cows in T1 and T2 were 3.12 ± 0.08 and 2.90 ± 0.06 mm per 24 hours respectively. The initial erythrocyte sedimentation rate of the animals in the two groups were 3.19 ± 0.27 and 2.76 ± 0.13 mm per 24 hours while the final values were 3.14 ± 0.22 and 2.97 ± 0.20 mm per 24 hours respectively for T1 and T2. Statistical analysis of the data revealed no significant difference between the two treatments. The mean plasma glucose level of the cows in the T1 and T2 were 42.6 and 42.82 mg per cent respectively. The initial plasma glucose level of the animals in the two groups were 44.46 ± 2.48 and 46.96 ± 3.12 mg per cent while the final values were 44.15 ± 1.40 and 41.94 ± 1.21 mg per cent respectively for T1 and T2. No significant difference was observed between the two groups ($P > 0.05$) following night time feeding. The mean plasma cortisol level was between 9.55 to 18.96 ng/ml in control group, in comparison to experimental cows (8.61 to 13.3 ng/ml). The overall average plasma cortisol level in the control and experimental animals were 12.27 ± 0.58 and 10.84 ± 0.34 ng/ml respectively. Alvarez and Johnson (1973) reported that an initial increase in cortisol occurs due to acute heat stress followed by a decline after prolonged exposure in cows. Therefore, the animals adjust physiologically to elevated heat loads by decreasing adrenal corticoid output. Yousef and Johnson (1967) also stated that during heat acclimation there is reduction of plasma cortisol that help in reducing the heat production of animals.

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