EFFECT OF WATER RESTRICTION ON PHYSIOLOGICAL RESPONSES OF INDIGENOUS HOGGETS IN MIDDLE GUJARAT AGRO CLIMATIC CONDITION

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ABSTRACT

Eighteen farm born unshorn hoggets (25-30 kg) of Patanwadi and Marwari breeds of sheep were selected and randomly divided into three treatment groups on the basis of body weight comprising of six in each group, viz., T1: Control (*ad.lib.* water), T2: (WR1-20% water restriction), T3: (WR2-40% water restriction) to study the effect of water restriction (WR, for 28 days) on physiological responses. The experimental animals under T3 showed significantly ($P<0.05$) higher pulse rate than T2 and T1 at 7.30 am, whereas the pulse rate recorded at 2.30 pm was significantly ($P<0.05$) higher under T3 than T1 and at par with T2 as a result of water restriction. The animals under T3 showed significantly ($P < 0.05$) higher respiratory rate than T1 and T2 at 7.30 am whereas at 2.30 pm, the respiratory rate was at par among the treatment groups. Rectal temperature (°F) recorded at 7.30 am and 2.30 pm did not differ significantly due to water restriction. The changes observed in physiological responses indicated the adaptability of the animals to increased thirst periods.

KEY WORDS: Water restriction, physiological responses, Hoggets, Middle Gujarat

INTRODUCTION

In the changing scenario of climate change, thermal stress along with feed and water scarcity are the major predisposing factors for the low productivity of small ruminants under hot semi arid environment. Consequently, the Indian regions experience drought or flood in some parts of the country almost every year. The water intake and water turnover have been recorded much higher for sheep grazing on halophytes than on grasslands (Ben Salem et al., 2010). The response of animals to water restriction depends mainly on restriction rate, deprivation duration, animal species, breed, physiological stage and diet composition. Therefore, the present work was designed to evaluate the effect of water restriction on physiological responses of Indigenous sheep during summer season.

MATERIALS AND METHODS

Present study was conducted at Instructional Livestock Farm Complex, Department of LPM, Veterinary College, AAU, Anand during hot dry season (May-June). Eighteen hoggets (25-30 kg) of Patanwadi and Marwari sheep were selected as experimental animals and randomly divided into three treatment groups on the basis of body weight comprising of six animals in each treatment, viz., T1: Control (*ad.lib.* water), T2: (WR1- 20% water restriction), T3: (WR2- 40% water restriction). During the experiment, animals were maintained on ICAR feeding standard (1998) and offered wholesome clean palatable well water (TDS less than 800 ppm) according to treatment. The water ingestion of all experimental animals was assessed by offering *ad.lib.* water of known quantity using measuring cylinder during adaptation period of 15 days prior to actual experiment of 28 days to decide the quantum of water required by the animals under different treatments and then water was offered as per treatment. The animals of control group were offered water after measuring each time i.e. 9.00 am, 2.00 pm and 4.00 pm, while in treatment group, the whole day water

requirement was measured once in the morning and offered in respective labeled buckets once or twice a day till it was exhausted. The physiological responses, viz., rectal temperature, pulse rate and respiration rate of all the animals were recorded by using doctor's thermometer, artery palpation and flank movements, respectively once in a week at 7.30 am and 2.30 pm. The experimental data of dehydration was analyzed by two factorial completely randomized design by individual analyses and meteorological data were analyzed by simple completely randomized design (Snedecor and Cochran, 1985).

RESULTS AND DISCUSSION

The experimental animals showed significantly (P<0.05) higher pulse rate per minute at 7.30 am under 40 % water restriction (WR, 64.25±1.00) than 20 % WR (61.33±1.03) and 0 % WR (58.00±1.15), whereas pulse rate per minute recorded at 2.30 pm under 40 % WR (67.00±1.10) was significantly (P < 0.05) higher than 0 % WR group (64.29±1.01) and it was at par with 20 % WR (68.17±1.32). The pulse rate recorded at 7.30 am and 2.30 pm, increased under 40% WR than 20% WR and 0% WR (Table 1), which is in agreement with the earlier workers (Gupta, 2013 and Khanvilkar, 2014).

The experimental animals under 40% WR (30.75) showed significantly (P<0.05) higher respiratory rate at 7.30 am than 0% WR (28.33) and 20 % WR (28.08), whereas at 2.30 pm the respiratory rate was at par among the treatment groups. These observations corroborated with the work of Kheir and Ahmed (2008) and Gupta (2013). Respiratory frequency in unshorn sheep increased significantly (P<0.05) throughout the day reaching at 14.00 hr mean values of 56 breaths/min compared with 37 breaths/min at 7.00 h (Aleksiev, 2008). Similarly Mohammed Suhair and Abdelatif Abdalla (2013) observed higher respiration rate in sheep during summer season at 14.00 hr as compared to 7.00 hr (79.50±7.80 vs. 31.75±3.90). Respiration rate, in afternoon was double than morning respiration rate. Even in the afternoon, respiratory activity did not reach the morning levels. This could be attributed to modifying of the thermoregulatory set point in anticipation of night cooling.

The rectal temperature (°F) recorded at 7.30 am and 2.30 pm did not differ significantly among the three groups due to level of water restriction (Table 1). These observations were in agreement with other workers (Alamer, 2006; Kheir and Ahmed, 2008; Gupta, 2013 and Khanvilkar, 2014).

The changes in rectal temperature (°F), pulse rate and respiration rate indicated the adaptability of the animals to increased thirst periods. Dehydration due to thirst period provoked physiological mechanisms in the body in a manner that helped the animals to survive (Saini et al., 2013).

Table 1: Physiological responses of indigenous hoggets under different levels of water restriction

Physiological responses	T1 (Control)		T2 (20% WR)		T3 (40% WR)	
	7.30 am	2.30 pm	7.30 am	2.30 pm	7.30 am	2.30 pm
Pulse rate (No/min)	58.00^{a} ±1.15	64.29^{A} ±1.01	61.33^{b} ±1.03	68.17^{B} ±1.32	64.25^{c} ±1.00	67.00^{B} ±1.10
Respiration rate (No/min)	28.33^{a} ±1.09	57.58 ±1.23	28.08^{a} ±1.18	59.00 ±0.96	30.75^{b} ±0.95	59.50 ±0.77
Rectal temperature (°F)	101.10 ±0.11	101.62 ±0.11	101.18 ±0.10	101.59 ±0.08	101.36 ±0.12	101.75 ±0.14

Means bearing uncommon lower case superscripts (a,b,c) within the row differ significantly (P<0.05) 7.30 am, and those bearing upper case superscripts (A,B) differ at 2.30 pm.

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