The Pharma Innovation Journal 2023; SP-12(7): 2136-2138

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(7): 2136-2138
© 2023 TPI
www.thepharmajournal.com
Received: 02-05-2023
Accepted: 07-06-2023

Mahipal Singh Nathawat
Assistant Professor, Department of Veterinary Physiology and Biochemistry, MJF College of Veterinary & Animal Science, Jaipur, Rajasthan, India

Barkha Gupta
Assistant Professor, Department of Veterinary Physiology and Biochemistry, PGIVER, Jaipur, Rajasthan, India

GS Gottam
Associate Professor, Department of Veterinary Physiology and Biochemistry, PGIVER, Jaipur, Rajasthan, India

Mohan Singh
M.V.Sc., Department of Veterinary Physiology and Biochemistry, PGIVER, Jaipur, Rajasthan, India

Corresponding Author:
Mahipal Singh Nathawat
Assistant Professor, Department of Veterinary Physiology and Biochemistry, MJF College of Veterinary & Animal Science, Jaipur, Rajasthan, India

Profiling of physiological parameters due to seasonal variation in Sirohi goat

Mahipal Singh Nathawat, Barkha Gupta, GS Gottam and Mohan Singh

Abstract
The current study set out to determine how the physiological traits of Sirohi goats responded to two different (cold and hot) seasons. We observed the overall mean value of various physiological parameters i.e. Respiration rate (per minute), Pulse rate (per minute) and Rectal temperature (°F) during hot-humid and cold season was 37.9±0.23 and 33.4±0.27; 78.1±0.23 and 71.9±0.55; 101.8±0.13 and 100.2±0.11, respectively. A highly significant ($p \leq 0.01$) effect of hot- humid and cold was observed on the mean value of many physiological variables i.e. respiration rate, pulse rate and rectal temperature in our study.

Keywords: Sirohi goat, pulse rate, respiration rate, rectal temperature

Introduction
A solid foundation for enhancing goat husbandry and health status is provided by a thorough grasp of how climatic conditions affect their physiological responses. Complex interactions between climate and animal parameters are involved in the climatic effects on animal health and output. The main physical parameters affecting an animal's health and productivity include the environment's temperature, radiant heat, air pressure, wind speed, relative humidity, rain, and cold. The environment in which the goats are raised and their management system play a big part in goat farming becoming successful. Low ambient temperatures in temperate regions and high environmental temperatures in tropical and dry regions can be fatal, which makes it difficult for an animal to keep its body in balance. (Silanikove 2000a) [16]. The interaction between animals and their environment, as well as each species' and breed's capacity for adaptation, are crucial factors because they are used to determine the optimal animal-raising practices and management techniques to implement in order to increase animal production. (Mirkena *et al*. 2010) [5]. Animals are directly impacted by climatic changes, which alter their physiology. (Ribeiro *et al*. 2015) [13]. The effect of climatic changes has led to numerous losses in cattle productivity by Salama *et al*. (2014) [14] The fact highlights the need for in-depth research to better understand how animals adjust to temperature fluctuations that are high. Rectal temperature and respiration rate are the physiological parameters that are frequently evaluated in investigations of adaptation in small ruminants. According to the season, age, sex, time of day, stage of physiological, activity, food intake, water consumption, and digestion, physiological variables generally alter. (Otoikhian *et al*. 2009; Phulia *et al*. 2010; Sharma and Kataria 2011; Leite *et al*. 2012; Lucena *et al*. 2013; Ribeiro *et al*. 2016, 2018) [7, 8, 15, 3, 4, 12, 11].

Material and Method
Ten adult apparently healthy females of Sirohi breed of goat (above two years of age, weighing about 30-35 Kg) were included in our study, reared at Livestock farm complex (LFC) Goat farm at P.G.I.V.E.R., Jaipur (Rajasthan). Physiological parameters (Respiration Rate, Pulse Rate, Rectal Temperature) were evaluated prior during hot-humid and cold seasons. Respiration rate was detected by watching the flank movement. The Pulse rate was measured using the femoral artery, which is located about one-third of the way down the thigh on the inside of the goat's back leg. The digital thermometer was inserted with a twisting motion in rectum of Goat and the temperature displayed had been noted down in digital thermometer after beep sound. A small amount of lubricant i.e. petroleum jelly was applied on the digital thermometer prior to its use.

Statistical Analysis: The findings were displayed as Mean±SE. The data was statistically evaluated using the t-test: Paired to Samples for Means and the findings were interpreted in accordance with Snedecor and Cochran (1994) [17].

The meteorological/environmental variables during hot-humid and cold seasons are presented in Table 1.
Animals start to experience heat stress with a THI of 72 and above, according to early research done in the 1950s at the University of Missouri. This stress threshold is 71THI. The different stress levels include:
Low (72 to 79 THI)
Medium (80 to 89 THI)
Extreme (90 THI or greater)

The range of THI was 53.34±0.11 to 67.75±0.17 during cold season while it was 67.64±0.19 to 87.94±0.23 during the hot-humid. In view of the above classification, level of heat-stress under hot-humid season could be classified as mild to moderate.
In order to achieve the goals of the study, the findings of the current investigation, which was intended to assess the various physiological reactions and their seasonal variations in the hot-humid and cold seasons in adult female Sirohi Goats (N=10), have been laid out in this chapter in the following order.

Table 1: Mean±SE values of environmental variables (EVs) of Jaipur district of Rajasthan during varying environmental conditions

Environmental Variables	Mean±SE values during varying environmental conditions	
	Hot-humid	Cold
T_{min}, ˚C	22.40±0.12	10.27±0.09
T_{Max}, ˚C	33.23±0.09	21.90±0.06
RH_{Min}%	41.00±0.58	31.50±0.29
RH_{Max}%	79.00±0.58	50.33±1.45
THI_{Min}	67.64±0.19	53.34±0.11
THI_{Max}	87.94±0.23	67.75±0.17

*THI - 0.8 * ambient temperature + (relative humidity / 100) *(ambient temperature-14.3)) + 46.4
N - Number of Observation
T_{Min} - Minimum Temperature
THI - Temperature Humidity Index
T_{Max} - Maximum Temperature
RH - Relative Humidity

The following equation, suggested by NOAA (1976), was used to determine the corresponding temperature-humidity index (THI).

Results and Discussion
Physiological Parameters

- Pulse rate
- Respiration rate
- Rectal temperature

Table 2: Effect of Hot-humid and Cold Season on Mean±SE values of physiological Parameters RR, RP and RT in Sirohi Goat (N=10)

Parameter	Season	Mean ± SE	Observation
Respiration Rate (Per minute)	Hot-humid	37.9±0.23	**
	Cold	33.4±0.27	
Pulse Rate (Per minute)	Hot-humid	78.1±0.23	**
	Cold	71.9±0.55	
Rectal Temperature (°F)	Hot-humid	101.8±0.13	**
	Cold	100.2±0.11	

NS - Non-significance (p>0.05)
* - Significance (p≤0.05)
** - Highly Significant (p≤0.01)
N - No. of Animals

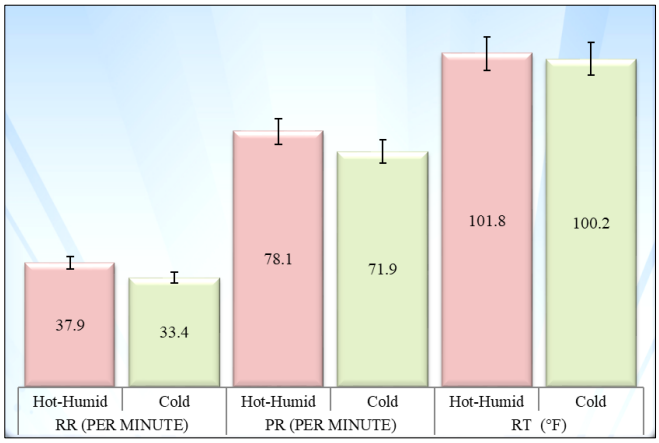

Fig 1: Mean±SE Values of RR, PR and RT according to the effect of Hot-humid and Cold in Sirohi Goat

Physiological parameters
The mean±SE values of Physiological parameters Rectal temperature, Respiration rate, and Pulse rate due to hot-humid and cold season have been shown in table 2 and illustrated in figure 1.

Respiration rate (R.R.)
The mean±SE values of respiration rate (per minute) in hot-humid and cold season were observed as 37.9±0.23 and 33.4±0.27, respectively. The mean±SE value of respiration rate was found extremely significant (p≤0.01) during hot-humid as compared to cold season.
In our present study, same results were seen by Banerjee *et al.* (2015) [1], who reported that value of RR were significantly increased (p≤0.05) during summer and decreased during winter in Goats. Rahman *et.al* (2019) [9] observed that the goat population's winter RR average was lower than its summer average. Rathwa *et al.* (2017) [10] measured that RR was significantly (p≤0.05) lower in the winter than it was in the summer season in sheep. The increased rate of respiration during the summer may have been caused by both the rise in the surrounding temperature and the increased heat loss through the skin and respiratory system, which led to an adaptive mechanism of heat loss during the hot, humid season.

Pulse rate (P.R.)
The mean±SE values of pulse rate (Per minute) in hot-humid and cold season were noted as 78.1±0.23 and 71.9±0.55, respectively. When compared to the cold season, the mean± SE value of pulse rate was significantly (p≤0.01) greater during the hot-humid season.
In present study, same results were seen by Banerjee *et al.* (2015) [1], who observed that pulse rate increased during summer and decreased during winter in Goats. Rahman *et.al* (2019) [9] reported that the lowest significant overall average of pulse rate was recorded in winter season and the highest one was in summer season in Goats. Rathwa *et al.* (2017) [10] noted that pulse rate was significantly (p≤0.05) lower during winter season as compared to summer season in sheep. During hot and humid seasons, a raised pulse rate may be caused by both the direct effects of temperature as well as vasodilatation of the skin's capillary bed and consequent increased blood flow to body surface areas to help with heat dissipation.

Rectal Temperature (R.T.)

The mean±SE values of rectal temperature (°F) in hot-humid and cold season were 101.8±0.13 and 100.2±0.11, respectively. The mean±SE value of rectal temperature (RT) was found highly significant ($p \leq 0.01$) during hot-humid as compared to cold season.

Gottam, G.S. (2020) [2] reported overall mean±SE values of rectal temperature in female *Pugal* sheep as 102.70±0.01 (°F) and 101.51±0.01 (°F) in rainy/hot-humid and cold, respectively. A significant ($p \leq 0.05$) effect was observed on seasonal variation in the study.

In present study, same results were seen by Banerjee *et al.* (2015) [1], who reported that RT was significantly ($p > 0.01$), increased during summer and decreased during winter in Goats. Rahman *et al.* (2019) [9] measured that lowest ($p \leq 0.01$) The winter season saw the greatest RT average, whereas the summer season saw the highest RT for goats. Rathwa *et al.* (2017) [10] observed that RT was significantly ($p \leq 0.05$) decreased during winter season as compared to summer season in sheep. Decrease and increase in ambient temperature/ heat stress resulted in decreased or increased rectal temperature in Goats.

Increased physiological references (RT, RR, and PR) along with an increase in THI during the hot-humid season demonstrated that the animals in the current study were in a mild to moderate heat-stressed state.

References

1. Banerjee D, Upadhyay RC, Chaudhary UB, Kumar R, Singh S, Ashutosh Das TK, *et al*. Seasonal variations in physio-biochemical profiles of Indian Goats in the paradigm of hot and cold climate. Biological rhythm research. 2015;46(2):221-236.
2. Gottam GS. Perusal of varying environmental condition versus physiological cadence in Pugal sheep from arid tracts subsuming environmental variables, hygric analytes, metabolic regulators, antioxidant system, endocrine response and function of organ and tissue. Ph.D. Thesis, CVAS, RAJUVAS, Bikaner; c2020. p. 1-724.
3. Leite JRS, Furtado DA, Leal AF, Souza BB, Silva AS. Influência de fatores bioclimáticos nos índices produtivos e fisiológicos de caprinos native confinados. Revista Brasileira de Engenharia Agrícola e Ambiental. 2012;16:443-448.
4. Lucena LFA, Furtado DA, Nascimento JWB, Medeiros AN, Souza BB. Respostas fisiológicas de caprinos nativos mantidos em temperatura termoneutra e em estresse térmico. Revista Brasileira de Engenharia Agrícola e Ambiental. 2013;17:672-679.
5. Mirkena T, Duguma G, Haile A, Tibbo M, Okeyo AM, Wurzinger M, *et al*. Genetics of adaptation in domestic farm animals: a review. Livest Sci. 2010;132:1-12.
6. NOAA (National Oceanic and Atmospheric Administration). Livestock Hot weather stress. U.S. Department of Commerce. National Weather Service Central Region: Orlando, FL, USA; c1976.
7. Otoikhian CSO, Orheruata JA, Imasuen JA, Akporhuarho OP. Physiological response of local (West African Dwarf) and adapted Switzerland (White Bornu) goat breed to varied climatic conditions in South-South Nigeria. Afr J Gen Agric. 2009;5:1-6.
8. Phulia SK, Upadhyay RC, Jindal SK, Misra RP. Alteration in body surface temperature and physical responses in Sirohi goats during day time in the summer season. Indian J Anim Sci. 2010;80:340-342.
9. Rahman HA, Mourad RS, Soliman MM, Nebar AF. Effect of season on some thermoregulation and blood picture in damascus and zarabi male goats. Menoufia Journal of Animal Poultry and Fish Production. 2019;3(6):137-151.
10. Rathwa SD, Vasava AA, Pathan MM, Madhira SP, Patel YG, Pande AM. Effect of season on physiological, biochemical, hormonal, and oxidative stress parameters of indigenous sheep. Veterinary world. 2017;10(6):650.
11. Ribeiro NL, Costa RG, Pimenta Filho EC, Ribeiro MN, Bozzi R. Effects of the dry and the rainy season on endocrine and physiologic profiles of goats in the Brazilian semi-arid region. Ital J Anim Sci. 2018;17:454-461.
12. Ribeiro NL, Costa RG, Pimenta Filho EC, Ribeiro MN, Crovetti A, Saraiva EP, *et al*. Adaptive profile of Garfagnina goat breed assessed through physiological, haematological, biochemical and hormonal parameters. Small Rumin Res. 2016;144:236-241.
13. Ribeiro NL, Pimenta Filho EC, Arandas JKG, Ribeiro MN, Saraiva EP, Bozzi R, *et al*. Multivariate characterization of the adaptive profile in Brazilian and Italian goat population. Small Rumin Res. 2015;123:232-237.
14. Salama AAK, Caja G, Hamzaoui S, Badaoui B, Castro-Costa A, Façanha DAE, *et al*. Different levels of response to heat stress in dairy goats. Small Rumin Res. 2014;121:73-79.
15. Sharma AK, Kataria N. Effects of extreme hot climate on liver and serum enzymes in Marwari goats. Indian J Anim Sci. 2011;81:293-295.
16. Silanikove N. Effects of heat stress on the welfare of extensively managed domestic ruminants. Livest Prod Sci. 2000a;67:1-18.
17. Snedecor GW, Cochran WG. Statistical Methods.8th Indian Edition, 1994.