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Impact of seasonal variation on renal function test in Sirohi goat

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Abstract
Present study was designed to investigate the effect of hot-humid and winter season on serum metabolites in Sirohi goat. Serum metabolites include Serum urea, uric acid and creatinine which were measured. This study revealed a substantial seasonal impact on all serum metabolites. Renal function test include serum urea, uric acid and creatinine which had greater values in winter than hot-humid season. The blood samples were collected aseptically from jugular vein using 18 gauge needles in blood vacutainer Lybcon clot activator serum vial (4ml) and serum was separated from each sample. The serum metabolites were determined by automated blood biochemistry analyzer (Turbochem100). The mean±SE values of serum urea and serum creatinine (mg/dl) were significantly (p<0.05) higher during winter than hot-humid season. However, Serum Uric acid (mg/dl) was higher during winter in comparison to hot-humid season and the effect was highly significant (p<0.01). It was concluded that the winter and hot-humid seasons exerted different physiological effects particularly kidney on the Sirohi goat with marked variation in serum urea, serum uric acid and serum creatinine. Renal functions can be appraised on the basis of certain serum metabolites in animals such as serum urea, serum uric acid and serum creatinine. These certain serum metabolites can be important indicators of health status in animals.

Keywords: Sirohi goat, serum, urea, uric acid, creatinine, winter

Introduction
Goats have developed adaptive mechanisms that allow their survival at very high as well as very low temperatures. However, despite their extreme tolerance to environmental changes, the productivity of these animals often declines due to thermal stress (Al-Tamimi 2007) [2]. Adaptability of animal to hot or cold climatic condition depends on the integration of various physiological systems such as the respiratory, circulatory, excretory, nervous, endocrine and enzymatic systems. But variations are observed not only between species, but also between breeds and even between individuals within breed in the coordination of all these systems to maintain the productive potential under thermal stress (Marai and Habeeb, 2010) [10]. Domestic Animals respond to heat stress changes in numerous ways, altering their physiology and behaviour in the process and serum biochemical parameters (Abdelatif *et al.*, 2009) [1]. The aim of the present study is to assess and compare the important biochemical parameters attributing adaptable characters in hot-humid and winter season in Sirohi goat.

Materials and Methods
Selection, Feeding and Maintenance of Animals
The present study was carried out in Sirohi goat at Livestock farm complex (LFC) at Post Graduate Institute of Veterinary Education and Research, (PGIVER), Jaipur (Rajasthan), situated at an altitude of 1417 feet above mean sea level, latitude and longitude position being 26.9° N and 75.8° E respectively, with ambient temperature in hot-humid as high as 35 °C and in winter as low as 8 °C. The experiment was conducted on ten Sirohi goat (about 24 months) selected from LFC herd. The experimental animals were maintained as per standard feeding and management practices followed at Livestock farm complex, PGIVER, Jaipur. This consists of feeding ad libitum roughages and water; concentrates mixture as per Kearl (1982) feeding standard. Concentrate mixture composited of maize, wheat bran, rice bran and mineral mixture and salt.

Estimation of Biochemical Parameters
Blood samples were collected aseptically from jugular vein using 18 gauge needles in blood

vacutainer Lybcon clot activator serum vial (4ml) and serum was separated from each sample. The serum metabolites were determined by automated blood biochemistry analyzer (Turbochem100) in the Department of Veterinary Physiology and Biochemistry, P.G.I.V.E.R., Jaipur. Blood sample from each animal was taken on any single day of the month/season, to estimate the biochemical parameters in Sirohi goat under seasonal variation.

Statistical Analysis

The results were presented as Mean±SE. The data was analyzed statistically as per Snedecor and Cochran (1989) using t- test in Microsoft excel 2007: Paired to Samples for Means and results were interpreted.

Results

Serum Urea: The mean±SE values of serum urea (mg/dl) was significantly (p<0.05) higher during cold than hot-humid season (Table 1). The increased serum Urea level in present study during cold season was in accordance with Srikandakumar *et al.* (2003) [16] in Merino sheep, Fike *et al.* (2005) [4], Suhair and Abdalla (2013) [17], Ghosh *et al.* (2013) [5] and Attia N.E.S. (2016) [3]. They observed lower serum urea during high ambient temperature than cold season in goat and sheep. This may be attributed to the decrease in ruminal ammonia-nitrogen which is compensated by the more absorption of urea nitrogen by rumen causing the decrease of blood urea and the increase of urinary nitrogen excretion.

These results were disparity with Srikandakumar *et al.* (2003) [16] in Omani sheep, Nazifi *et al.* (2003), Pandey *et al.* (2012) [13], Urwat *et al.* (2015) [18] and Nedeva *et al.* (2019) [12]. They observed higher serum urea during high ambient temperature than cold season in goats and sheep. The increased level of serum urea may be due to reduced blood flow towards kidney during heat stress condition. The high level of serum urea might be attributed to excessive tissues protein catabolism associated with protein deficiency.

Serum Uric acid: The mean±SE value of Serum Uric acid (mg/dl) was higher during cold in comparison to hot-humid season and the effect was highly significant (p<0.01) (Table 1). The result of the present study, regarding higher serum Uric acid during winter season cannot be compared with the result of the other scientist because no literature is available with this regard.

These results were contrary to Srikandakumar *et al.* (2003) [16], Ghosh *et al.* (2013) [5], Vasava *et al.* (2016) [19] and Rathwa *et al.* (2017) [14]. They observed higher serum uric acid during high ambient temperature than cold season in goats and sheep. The increased level of uric acid found in during summer season may be due to the kidneys of experimental animals might experience reduced blood flow during heat stress condition. Heat stress may cause peripheral vasodilation to lose body heat and reduce the blood flow to the internal organs that result in reduced blood flow to the kidney. In addition to that, dehydration may also cause reduced blood flow to kidney as hot environment cause dehydration in animals. So, the reduced blood flow to kidney may lead less urine formation and thereby less excretion of uric acid. The increased uric acid levels may also be due to inefficient rumen ammonia incorporation into microbial protein or hepatic deamination of amino acids mobilized from skeletal muscle.

Serum Creatinine: The mean±SE values of Serum Creatinine (mg/dl) was significantly (p<0.05) higher during cold than hot-humid season (Table 1). These results were in agreement with the work of Muna *et al.* (2009) [11] in cattle. These results were disparity with Sharma and Puri (2003) [15], Srikandakumar *et al.* (2003) [16], Pandey *et al.* (2012) [13], Vasava *et al.* (2016) [19] and Rathwa *et al.* (2017) [14]. They observed higher serum creatinine during high ambient temperature than cold season in goats and sheep. This may be due to the kidneys of experimental animals might experience reduced blood flow during heat stress condition. The phenomenon of increase in creatinine may be a consequence of increased skeletal muscle breakdown rather than protein metabolism.

Higher serum creatinine concentration in hot ambience could be because of higher metabolic activity in liver and muscle due to ambient stress (Gottam, 2004) [6]. Cortisol (Kataria *et al.* 2000a) [9] stimulated creatine metabolism in liver could result in higher creatinine formation. Gottam *et al.* (2005) [8] asserted about creatinine levels as good indicators of stress since increased levels indicated catabolism.

Table 1: Effect of Hot Humid and Winter Season on Mean±SE values of Renal Function Tests (Creatinine, Uric Acid and Urea) in Sirohi Goat (N=10)

Parameters	Season	Mean±SE	Observation (P Values)
Urea (mg/dL)	Hot-Humid	41.14±8.09	*
	Winter	102.5±13.09	
Uric Acid (mg/dL)	Hot-Humid	0.33±0.04	**
	Winter	1.02±0.09	
Creatinine (mg/dL)	Hot-Humid	0.82±0.03	*
	Winter	0.93±0.04	

* Significant (p≤0.05)
** Significant (p≤0.01)

Discussion

The goat adapted to seasonal weather fluctuations in the environment it was found in research. Sirohi goat is well adapted in extreme hot temperature but don't in winter season. So, elevated values of serum urea, uric acid and creatinine were found in winter season. The results of present study showed a highly significant (P≤0.01) effect of hot-humid and cold season on the mean±SE values of serum Uric acid was recorded and serum Creatinine (mg/dl) and Urea showed a significant (p≤0.05) effect in Sirohi Goat. However hyperuricaemia was found during cold season in female Sirohi Goats. Based on obtained findings, it can be concluded that Hot-humid and winter seasons affect biochemical profile especially involve in excretory system in Sirohi Goat.

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References

1. Abdelatif AM, Ibrahim MY, Hassan YY. Seasonal variation in erythrocytic and leucocytic indices and serum proteins of female Nubian goats. Middle East Journal of Scientific Research. 2009;4(3):168-174.
2. Al-Tamimi HJ. Thermoregulatory response of goat kids subjected to heat stress. Small Ruminant Research. 2007;71(1-3):280-285.
3. Attia NES. Physiological, Hematological and

Biochemical Alterations in Heat Stressed Goats. Benha Veterinary Medical Journal. 2016;31:56-62.
4. Fike JH, Saker KE, O'keefe SFO, Marriott NG. Effects of tasco (A sea weed extract) and heat stress on N metabolism and meat fatty acids in wether lambs fed hay containing endophyte-infected fascue. Small ruminant research. 2005;60(3):237-245.
5. Ghosh S, Singh AK, Haldar C. Adaptive and ecological significance of the seasonal changes in hematological, biochemical and hormonal parameters in the tropical goat (*Capra hircus*). Journal of Endocrinology and Reproduction. 2013;17(2):113-122.
6. Gottam GS. Surveillance study on blood and serum analytes of small ruminants in drought affected western Rajasthan. M.V.Sc. thesis submitted to Department of Veterinary Physiology, College of Veterinary and Animal Science, RAJUVAS, Bikaner, Rajasthan, 2004.
7. Gottam GS. Perusal of varying environmental conditions versus physiological cadence in Pugal sheep from arid tracts subsuming environmental variables, hygric analytes, metabolic regulators, antioxidant system, endocrine responses and functions of organs and tissues. PhD Thesis submitted to Department of Veterinary Physiology, College of Veterinary and Animal Science, RAJUVAS, Bikaner, Rajasthan, 2020, 1-724.
8. Gottam GS, Kataria N, Kataria AK, Singh L. Effect of drought on red blood cell indices in sheep and goat. Veterinary Practitioner. 2005;6(1):35-36.
9. Kataria N, Kataria AK, Agarwal VK, Garg SL, Sahani MS, Singh R. Thyroid hormone profile in dromedary camel in winter and summer during water restriction. Journal of Camel Practice and Research. 2000a;7(1):21-26.
10. Marai IFM, Haeeb AAM. Buffalo's biological functions as affected by heat stress: A review. Livestock Science. 2010;127(2-3):89-109.
11. Muna H, Al-Saeed, Haidar KA, Rashad FG. Selective evaluation of certain blood and biochemical parameters of local cattle during winter and summer seasons. Basrah Journal of Veterinary Research. 2009;8(1):138-143.
12. Nedeva I, Slavov T, Varlyakov I, Radev V, Panayotov D. Haematological and blood biochemical parameters in Lacaune dairy sheep. Bulgarian Journal of Agricultural Science. 2019;25(1):91-95.
13. Pandey N, Kataria N, Kataria AK, Joshi A. Ambient stress associated variations in metabolic responses of Marwari goat of arid tracts of India. Journal of Stress Physiology & Biochemistry. 2012;8(3):120–126.
14. 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(13):650-654.
15. Sharma AK, Puri G. Effect of extreme hot condition on serum biochemical constituents in Marwadi goats. International Journal of Livestock Research. 2013;11(1):23-28.
16. Srikandakumar A, Johnson EH, Mahgoub O. Effect of heat stress on respiratory rate, rectal temperature and blood chemistry in Omani and Australian merino sheep. Small Ruminant Research. 2003;49:193-198.
17. Suhair MS, Abdulla AM. Effects of seasonal changes and shearing on thermoregulation, Blood constituents and semen charactistics of Desert Ram (Ovisaris). Pakistan Journal of Biological Sciences. 2013;16(24):1884-1893.
18. Urwat U, Fazili IS, Ruby. Sex and Seasonal Variations in the Serum Biochemical Profile of Changthangi Pashmina Goats. Animal Reproduction Science. 2015;9(4):138-148.
19. Vasava AA, Rathwa SD, Pathan MM, Pande AM, Madhira SP, Sarvaiya NP. Evaluation of serum biochemical constituents and hormonal profiles of surti goats during summer and winter season under intensive production system. Advances in Life Sciences. 2016;5(18):7503-7507.