The Haryana Veterinarian (June, 2023) **62(1),** 23-25 ISSN 0033-4359 (P) **Research Article**

EFFECT OF DIFFERENT SEASONS ON SERUM MINERALS IN SIROHI GOAT

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ABSTRACT

The present investigation was carried out in Sirohi goat (N=10) to study the effect of hot-humid and winter season on biochemical profile related to minerals. The blood samples were collected aseptically from jugular vein using 18 gauge needle in blood vacutainer (Lybcon clot activator) and serum was separated from each sample. The serum minerals were determined by automated blood biochemistry analyzer (Turbochem100). The mean±SE values of serum calcium was higher during winter in comparison to hot-humid season but the effect was non-significant (P>0.05) however, serum phosphorus and magnesium was higher during hot-humid in comparison to winter season and the effect on phosphorus was highly significant (p<0.01), while non-significant (p>0.05) effect on magnesium was observed in Sirohi goat. Decreased magnesium concentrations of serum during winter season indicated its role in the reactions related towards oxidative stress. The reduction in serum calcium concentration observed in hot-humid could be attributed to reduction in the dietary intake which has been reported under heat stress condition. Whereas, the increase in serum phosphorous levels in hot–humid conditions indicate dehydration and reduced kidney functions and also could be attributed to environmental stressors.

Keywords: Calcium, Magnesium, Phosphorus, Serum minerals, Sirohi goat

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Goat farming plays a very important role in the economy of small and marginal farmers. Goat popularly known as 'Poor Man's Cow' is unique for its wide adaptive character to extreme environment either summer or winter. Goats are generally managed under extensive production system followed by semi-intensive production system, where only night shelter is provided. Many environmental effects affect on animal health and production. Despite having well-developed mechanisms of thermoregulation, most domestic animals do not maintain strict homeothermy during extreme environmental condition (Lu, 1989). 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). Serum Biochemical tests have been widely used for the diagnosis of various diseases and nutritional status of animal. The information gained from the serum biochemical parameters would substantiate the physical examination and together with medical history provide excellent basis for medical judgment. In addition, it would help to determine the extent of tissue and organ damage, the response of defense mechanism of the patient and aid in the diagnosing the type of possible diseases (Schalm *et al.*, 1975). The value of blood picture and mineral content of the animal varies from region to region (Pandiya *et al.*, 1977).

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.

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MATERIALS AND METHODS

A total of ten adult apparently healthy females of Sirohi breed of goat (More than two years of age, weighing about 30-35 Kg) were included in the present study which were reared at Goat farm of Livestock farm complex (LFC) at Post Graduate Institute of Veterinary Education and Research (P.G.I.V.E.R.), Jaipur (Rajasthan). It is a hot semi-arid zone of northern India, located at 26.9° N and 75.8° E, 1417 feet above the sea level. The experimental animals were maintained under uniform managemental farm practices. Blood samples of adult female Sirohi Goat were taken from jugular vein using 18 gauge needle in blood vacutainer Lybcon clot activator serum vial (4 ml) in the hot-humid and winter season from the same animal (N=10). 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. The blood biochemical parameters were estimated from serum which was stored in deep freezer (-20° C). Serum minerals (Calcium, Phosphorus and Magnesium) were estimated by using Automated TurboChem 100 Blood Biochemistry Analyzer by using Jeva Diagnostic Kits in the Department of Veterinary Physiology and Biochemistry, P.G.I.V.E.R., Jaipur.

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 and results were interpreted.

RESULTS AND DISCUSSION

Serum Calcium: The mean±SE value of Serum Calcium

was higher during winter in comparison to hot-humid season but the effect was non-significant (p>0.05). The significantly elevated Serum Calcium levels in present study during winter season were in consonance with the results of Nazifi *et al.* (2003) in Iranian sheep and Srikandakumar *et al.* (2003) in sheep. Al-Eissa *et al.* (2012) reported non-significant difference in calcium level in Nubian ibex goats. These results were contrary to the findings of Al-Haidary *et al.* (2012) in Australian Merino Sheep and Gottam G.S. (2020) in Pugal Sheep. They observed higher Serum Calcium during hot-humid than winter season. Reduction in Calcium concentration could be attributed to the reduction in the dietary intake which has been reported under heat stress condition. Low level of calcium may be due to hypoproteinemia as a consequence of the possible reduced feed intake associated with heat stress (Srikandakumar *et al.*, 2003). Opposite to the hot condition, the observed increased level of Calcium during winter season might be due to increased dietary intake in winter season.

Serum Phosphorus: The mean±SE value of Serum Phosphorus was highly significant (p<0.01) during hot-humid in comparison to winter season. The elevated Serum Phosphorus levels in present study during hot-humid season were in consonance with the results of Sandabe and Chaudhary (2000) in Sahel goat and Al-Eissa *et al.* (2012) in Nubian ibex goat. The increased level of Serum Phosphorus might be due to feeding of cereal grains in the form of concentrate as a good source of Phosphorus. The low serum phosphorus levels were probably the consequence of feeding regimen of the animals (Daramola *et al.*, 2005). The increased serum Phosphorous levels in hot-humid condition indicate dehydration and reduced kidney functions and could also be attributed to environmental stressors. The serum minerals concentrations may also vary due to certain disease conditions like kidney failure, diabetes etc. however, it is not applicable in present study as the sample population considered as healthy.

These results were in contrast with the finding of Antunovic *et al.* (2002) and Nazifi *et al.* (2003) in Iranian sheep. They observed higher Serum Phosphorous during winter than hot-humid season. In these studies, lower level of inorganic phosphorous was found during summer season which might be due to reduction in feed consumption. Seasonal variations across the year have a great influence on mineral concentration of the grass and subsequently on blood serum concentrations.

Serum Magnesium: The mean±SE value of Serum Magnesium was higher during hot-humid in comparison to winter season but the effect was non-significant (p>0.05).

Table 1. Effect of Hot-Humid and Winter Season on mean±SE values of Serum Minerals (Calcium, Phosphorus and Magnesium) in Sirohi Goat

Parameters	Season	Mean±SE	Observation
Calcium (mg/dL)	Hot-Humid	8.88±0.39	NS
	Winter	14.53±3.38	
Phosphorus (mg/dL)	Hot-Humid	5.38±0.36	**
	Winter	2.86±0.24	
Magnesium (mg/dL)	Hot-Humid	2.94±0.44	NS
	Winter	2.58±0.42	

** Significant ($p \leq 0.01$)
NS Non-Significant ($p > 0.05$)

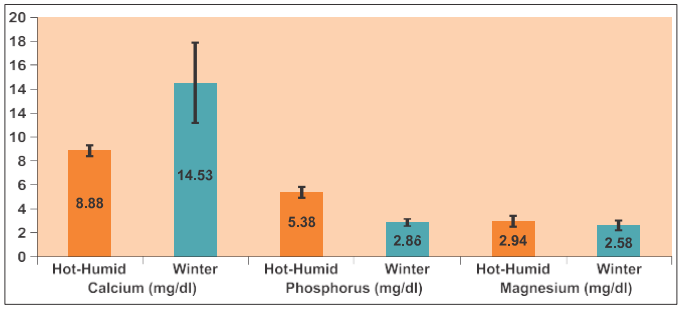

Fig. 1. Mean±SE values of Serum Calcium, Phosphorus and Magnesium level during Hot-Humid and Winter Season in Sirohi Goat

The elevated Serum Magnesium levels in present study during hot-humid season were similar to the results of Gowda (1954) in sheep and Gottam G.S. (2020) in Pugal Sheep. Stress related changes were observed by Healy and Falk (1974) in the values of magnesium, whereas, stress effect was not observed on the mean value of serum magnesium in Merino sheep by Parker *et al.* (2003).

These results were contrary to the findings of Nazifi *et al.* (2003) in Iranian sheep and Al-Eissa *et al.* (2012) in Nubian ibex goat. The researchers observed higher Serum Magnesium during winter than hot humid season. Khan *et al.* (2007) observed interaction effect between season and animal class (p< 0.05). Earlier workers had also shown the effect of ambience on serum magnesium in animals (Kataria *et al.*, 1993 in goat; Kataria *et al.*, 2002 in camel and Dias *et al.*, 2008 in sheep). Decreased concentrations of serum magnesium during extreme season indicated towards its role in the reactions related to the oxidative stress. The higher levels of serum magnesium during early days of life is a consequence of enhanced magnesium utilization for bone mineralization and also decreased Mg availability in ingested food (Mohammad, 2009). The main mechanism of Mg homeostasis takes place at the renal level (Quamme, 1993).

The understanding of the physiology of magnesium has undergone considerable change due to its functional significance in control of oxidative stress. The pattern of

changes in serum magnesium values was similar to those of antioxidants. Cernak *et al.* (2000) suggested that an interrelationship between magnesium changes and blood oxidants could be of both diagnostic and prognostic value. Changes in magnesium status may directly influence the cellular redox state and its deficiency is associated with the increased production of ROS and the induction of immune and inflammatory reactions (Schiffrin and Touyz, 2005).

CONCLUSION

The results of present study showed highly significant ($p \leq 0.01$) effect of hot-humid and winter season on Serum Phosphorus, magnesium and calcium levels. A significant effect ($p<0.01$) on serum phosphorus, while a non-significant ($p>0.05$) effect of season was observed on the mean value of different serum metabolites and minerals i.e. Magnesium and Calcium in Sirohi Goat. However, hypophosphatemia was found during winter season in female. Based on obtained findings, it can be concluded that hot-humid and winter seasons affect biochemical profile especially minerals in Sirohi Goat.

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