



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2020; SP-9(8): 15-19
© 2020 TPI
www.thepharmajournal.com

Received: 10-06-2020
Accepted: 14-07-2020

Manish Bobade
Livestock Production
Management Department,
College of Veterinary Science &
Animal Husbandry, Anjora,
Durg, Chhattisgarh, India

Vikas Khune
Livestock Production
Management Department,
College of Veterinary Science &
Animal Husbandry, Anjora,
Durg, Chhattisgarh, India

Sharad Mishra
Livestock Production
Management Department,
College of Veterinary Science &
Animal Husbandry, Anjora,
Durg, Chhattisgarh, India

K Mukherjee
Animal Genetics & Breeding
Department, College of
Veterinary Science & Animal
Husbandry, Anjora, Durg,
Chhattisgarh, India

MK Gendley
Nutrition Department, College of
Veterinary Science & Animal
Husbandry, Anjora, Durg,
Chhattisgarh, India

Anupam Soni
Livestock Production
Management Department,
College of Veterinary Science &
Animal Husbandry, Anjora,
Durg, Chhattisgarh, India

Corresponding Author:
Manish Bobade
Livestock Production
Management Department,
College of Veterinary Science &
Animal Husbandry, Anjora,
Durg, Chhattisgarh, India

Biochemical profile of Osmanabadi goats under different management systems in Chhattisgarh plains

Manish Bobade, Vikas Khune, Sharad Mishra, K Mukherjee, MK Gendley and Anupam Soni

Abstract

The study was undertaken 20 female Osmanabadi Goat to investigate the blood biochemical parameters. The goats were equally divided into two groups of 10 goats in each i.e extensive management system (group I) and semi-intensive management system (group II). Blood samples were collected at monthly interval for one year covering all three seasons. The results revealed that there was a significant influence of management on values of serum total protein, globulin, Albumin: Globulin ratio and BUN whereas the variation in albumin and glucose values was found to be non-significant in Osmanabadi goats reared under different management systems. The mean values of serum total protein, globulin and Albumin: Globulin ratio was found to be significantly higher ($P < 0.01$) for the extensive management system. However, the mean values of BUN were significantly higher ($P < 0.05$) and the values of glucose, albumin were found non-significantly ($P < 0.05$) higher for the semi-intensive management system. The mean values of glucose, total protein, albumin, globulin, BUN and Albumin: Globulin ratio was found to be at 54.78 ± 0.46 and 55.88 ± 0.44 , 6.93 ± 0.04 and 6.78 ± 0.03 , 3.36 ± 0.03 and 3.40 ± 0.04 , 3.57 ± 0.05 and 3.38 ± 0.04 , 14.07 ± 0.24 and 14.77 ± 0.24 and 0.97 ± 0.02 and 1.04 ± 0.02 for the extensive management system and semi-intensive management system, respectively. The results of the study could be able to manifest the influence of management system on the biochemical profile of Osmanabadi goats.

Keywords: Goat, Osmanabadi, total protein, glucose, BUN, management system

Introduction

Among all the domestic animals, goats play a vital role in improving the socio-economic status of the society. Because of its production potential and minimum requirements in investment with less risk, the goat is said to be “a poor man’s cow” by Mahatma Gandhi. Goats play a significant economic role for the farming communities living in lowland, midland and highland provinces. Further, these are hardy and adjustable animals and are known for providing a well-grounding source of income to more than 40% of the rural population below the poverty line. This is the main reason for the rural farmer for the preference of these animals for employment and income generation. The rural poor those who could not afford to maintain a cow or a buffalo find goat/ sheep as the best alternative source of supplementary income and milk. Goats are meat-producing animals in India, whose meat is readily preferred (Kumar and Roy, 2013) [8]. Goat secretes proline-rich proteins that complex with tannins, reducing the detrimental effects as well as makes the goats able to consume and digest tannin-rich browse and effectively extract nutrients from it (Basha *et al.*, 2012) [1]. Osmanabadi goat breed is one of the popular goat breed mostly found in the arid and semi-arid region of Maharashtra. This breed has given its name from Osmanabad district of Maharashtra and meat production is an important character of this breed. This breed is reared mainly in Southern India, which are one of the largest contributors to meat production in this region, due to their tasty meat when compared with other local breeds. The breed is expanding over the greater part of the central peninsular region, consisting of semi-arid areas of Maharashtra, Andhra Pradesh and Karnataka. Recently Osmanabadi breed of goat is introduced in the Chhattisgarh state through various societal development extension projects. Abundant availability of natural pastures, wild leaves and grasses in Chhattisgarh state makes the goat farming more attractive and economically viable. There are many goat management practices which are being followed in different regions/zones of the country. A large number of goats are reared in a migratory system of management in many places of our country. The goats are also maintained under either intensive or semi-intensive systems (Kumar, 2007) [9]. The information on the best and appropriate goat management practices for goat rearing is scanty.

Hence the present experiment was aimed to investigate the influence of different management systems on biochemical parameters of Osmanabadi goats under climatic conditions of the Chhattisgarh plains.

Materials and Methods

The present study was conducted at Goat Unit of Krishi Vigyan Kendra, Chhattisgarh Kamdhenu Vishwavidyalaya, Durg. Twenty goats were selected based on live weight randomly and equally divided into two groups of 10 goats in each group i.e extensive management system (group I) and semi-intensive management system (group II). The experiment was carried for one year covering all three seasons to investigate the influence of management systems on the performance of Osmanabadi goats. The experiment was duly approved by the Institutional Animal Ethics Committee. For estimation of biochemical parameters, blood sample from every goat of both the groups was collected at monthly interval throughout the experimental period of one year. The collected blood was subjected to centrifugation @3000 rpm for 10 minutes for separation of serum for estimation of biochemical parameters. Biochemical parameters included glucose, total protein, albumin and blood urea nitrogen (BUN) was analyzed as per the standard methods using analytical kits from BioLab Pvt. Ltd, Mumbai with the help of Clinical Biochemistry Analyser (SYSTRONIC; Type: diaSIL-100). The globulin values were estimated by subtracting the albumin from the estimated total protein values and accordingly Albumin: Globulin ratio was calculated. The total 240 observations were recorded for each parameter.

Statistical Analysis

Mean values and Standard errors were calculated for all biochemical parameters of both groups. The data were subjected to the standard statistical procedures recommended by Snedecor and Cochran (2004). The data was statistically analyzed by GLM-Univariate and Analysis of variance (ANOVA) with the help of Duncan’s Multiple Range Test by IBM SPSS Statistics 22 Software.

Results and Discussion

Blood glucose

The overall glucose level was found to be non-significantly higher ($P < 0.05$) for the semi-intensive management system (Fig. 1) and the values were recorded as 54.78 ± 0.46 and 55.88 ± 0.44 mg/dl for the extensive and semi-intensive management system, respectively (Table 1). While the seasonal glucose values of different management systems are presented in Table 2. Mean values of glucose were 52.00 ± 0.67 , 54.13 ± 0.85 and 58.20 ± 0.53 mg/dl in summer, rainy and winter season for extensive management system whereas the values for semi-intensive management system were found at 52.15 ± 0.80 , 57.05 ± 0.47 and 58.43 ± 0.63 mg/dl in summer, rainy and winter season, respectively (Fig.2). The higher level of glucose in semi-intensive management system may be due to the goats under extensive system might have utilized levels of their blood glucose for physical and grazing activities (Gbolabo *et al.*, 2015) [3]. The results of the present study are in close agreement to the values of glucose reported by Ramprabhu *et al.* (2010) [10]. The serum glucose level is influenced by many factors including nutrition, age, sex, breed, and environment (Sakha *et al.*, 2009) [14].

Table 1: The overall mean and standard error of mean values of biochemical parameters for different management system

	Extensive Management System (Group I)	Semi-intensive Management System (Group II)	T value	Remarks
Glucose	54.78 ± 0.46	55.88 ± 0.44	0.088	NS
Total Protein	6.93 ± 0.04	6.78 ± 0.03	0.004	**
Albumin	3.36 ± 0.03	3.40 ± 0.04	0.316	NS
Globulin	3.57 ± 0.05	3.38 ± 0.04	0.003	**
BUN	14.07 ± 0.24	14.77 ± 0.24	0.043	*
A/G ratio	0.97 ± 0.02	1.04 ± 0.02	0.000	**

* $p < 0.05$ ** $p < 0.01$ NS: Non-significant

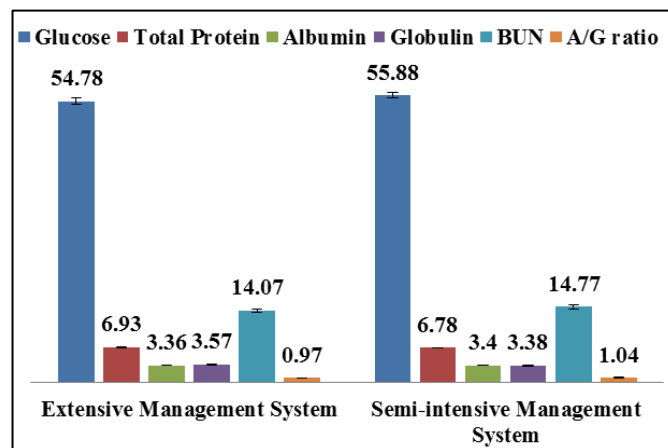


Fig 1: Overall mean values of biochemical parameters

Total protein

The overall total protein level value was found to be significantly higher ($P < 0.01$) in the extensive management system (6.93 ± 0.04 g/dl) than that of the semi-intensive management system (6.78 ± 0.03 g/dl) (Table 1). While the seasonal total protein values for different management systems are presented in Table 2. Mean values of total protein were 7.17 ± 0.07 , 6.84 ± 0.05 and 6.78 ± 0.07 g/dl in summer, rainy and winter season for extensive management system whereas the values for semi-intensive management system were found at 6.87 ± 0.04 , 6.85 ± 0.04 and 6.64 ± 0.07 g/dl in summer, rainy and winter season, respectively (Fig.3). The values of serum total protein observed in the present study were within the normal range of 6 to 7.5 g/dl for goats (Kaneko, 1989) [7]. Sakha *et al.* (2009) [14] also reported a normal value for total protein in goat as 7.0 g/dl. Similar results were reported by Inbaraj *et al.* (2017) [5] and Rasooli *et al.*, (2004) [11].

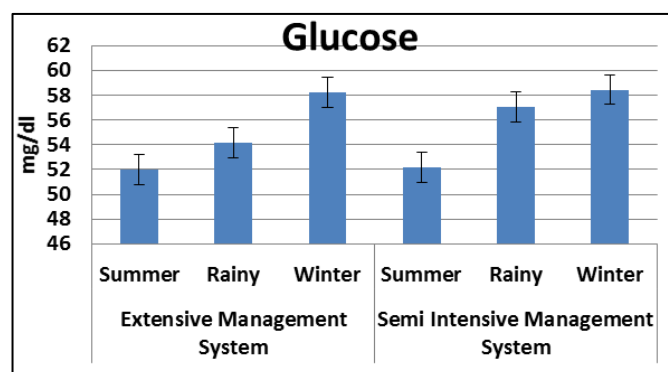


Fig 2: Seasonal mean glucose values under different management system

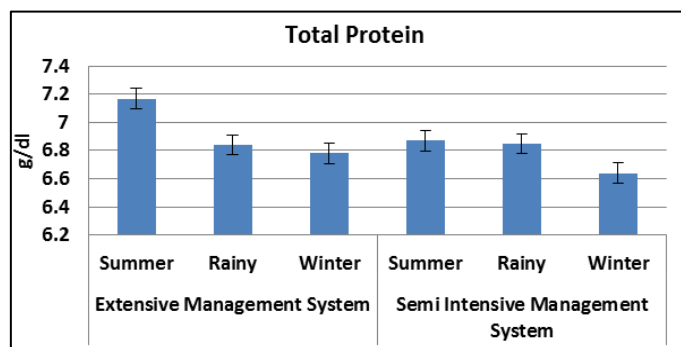


Fig 3: Seasonal mean total protein values under different management system

Albumin

The recorded overall mean value of albumin was non-significantly higher ($P < 0.05$) in the semi-intensive management system (3.40 ± 0.04 g/dl) than that of the extensive management system (3.36 ± 0.03 g/dl) (Table 1). While the seasonal albumin values for different management systems are presented in Table 2. Mean values of albumin were 3.22 ± 0.04 , 3.37 ± 0.04 and 3.48 ± 0.06 g/dl in summer, rainy and winter season for extensive management system whereas the values for semi-intensive management system were found at 3.20 ± 0.05 , 3.60 ± 0.04 and 3.41 ± 0.08 g/dl in summer, rainy and winter season, respectively (Fig.4). The values of serum albumin were found to be within the normal range for goat. The values are in close agreement to those of 3.3 g/dl as reported by Zubcic (2001) [17] in grazing German fawn goats. The normal albumin levels are the indicator of nutritional as well as the health status of the animal while low albumin concentration indicates sickness (Solaiman *et al.* 2010) [15].

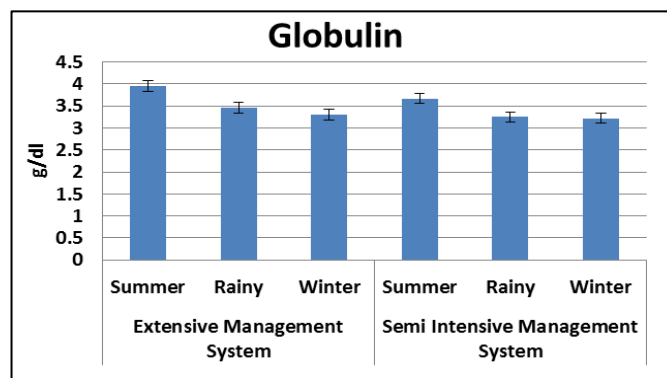


Fig 5: Seasonal mean globulin values under different management system

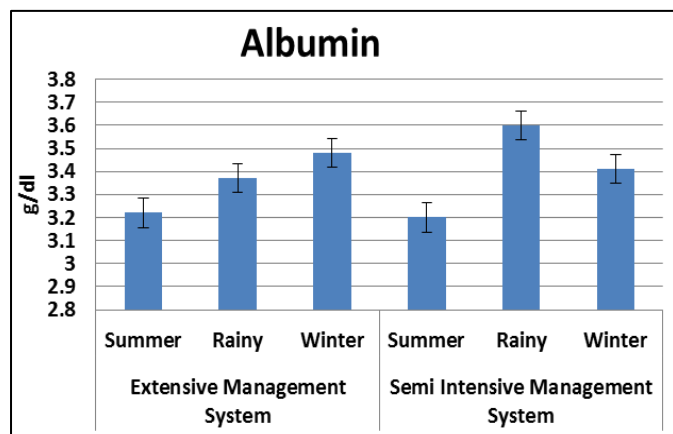


Fig 4: Seasonal mean albumin values under different management system

Globulin

The recorded overall mean value of globulin was significantly higher ($P < 0.05$) in the extensive management system (3.57 ± 0.05 g/dl) than that of the extensive management system (3.38 ± 0.04 g/dl) (Table 1). While the seasonal globulin values for different management systems are presented in Table 2. Mean values of globulin were 3.95 ± 0.08 and 3.30 ± 0.07 g/dl in summer, rainy and winter season for extensive management system whereas the values for semi-intensive management system were found at 3.67 ± 0.06 , 3.25 ± 0.05 and 3.22 ± 0.09 g/dl in summer, rainy and winter season, respectively (Fig.5). The values of serum globulin were found to be within the normal range for goat. The values were within the normal range of serum globulin for goat. High globulin values attributed to parasitic infestations (Rumosa Gwaze *et al.*, 2010) [13]. However, during the current study routine deworming was carried out to protect the goats against internal parasites. The higher globulin level might be due to consumption of tannin-rich browse species during summer (Chikwanda and Muchenje, 2017) [2].

Table 2: Seasonal mean and standard error values of biochemical parameters under different management systems

Season	Extensive Management System(Group I)			Semi-Intensive Management System(Group II)		
	Summer	Rainy	Winter	Summer	Rainy	Winter
Glucose	52.00 ^a ±0.67	54.13 ^b ±0.85	58.20 ^c ±0.53	52.15 ^a ±0.80	57.05 ^c ±0.47	58.43 ^c ±0.63
Total Protein	7.17 ^b ±0.07	6.84 ^a ±0.05	6.78 ^a ±0.07	6.87 ^b ±0.04	6.85 ^b ±0.04	6.64 ^a ±0.07
Albumin	3.22 ^a ±0.04	3.37 ^b ±0.04	3.48 ^b ±0.06	3.20 ^a ±0.05	3.60 ^b ±0.04	3.4 ^c ±0.08
Globulin	3.95 ^b ±0.08	3.46 ^a ±0.06	3.30 ^a ±0.07	3.67 ^b ±0.06	3.25 ^a ±0.05	3.22 ^a ±0.09
BUN	15.09 ^c ±0.33	14.13 ^{ab} ±0.51	13.00 ^a ±0.36	15.77 ^b ±0.40	14.53 ^a ±0.46	14.02 ^a ±0.36
A/G ratio	0.83 ^a ±0.02	0.99 ^b ±0.02	1.08 ^b ±0.04	0.89 ^a ±0.02	1.12 ^b ±0.03	1.10 ^b ±0.05

^{abc}: Means with different superscripts within a row differ within the group significantly.

Albumin: Globulin ratio

The overall mean value for Albumin: Globulin ratio was

significantly higher ($P < 0.01$) in the semi-intensive management system (1.04 ± 0.02) than that of an extensive

management system (0.97 ± 0.02) (Table 1). While the seasonal Albumin: Globulin ratio values for different management systems are presented in Table 2. Mean values of Albumin: Globulin ratio were 0.83 ± 0.02 , 0.99 ± 0.02 and 1.08 ± 0.04 in summer, rainy and winter season for extensive management system whereas the values for semi-intensive management system were found at 0.89 ± 0.02 , 1.12 ± 0.03 and 1.10 ± 0.05 in summer, rainy and winter season, respectively (Fig. 6). Sharma and Puri (2013) also reported similar observations in Marwari goats.

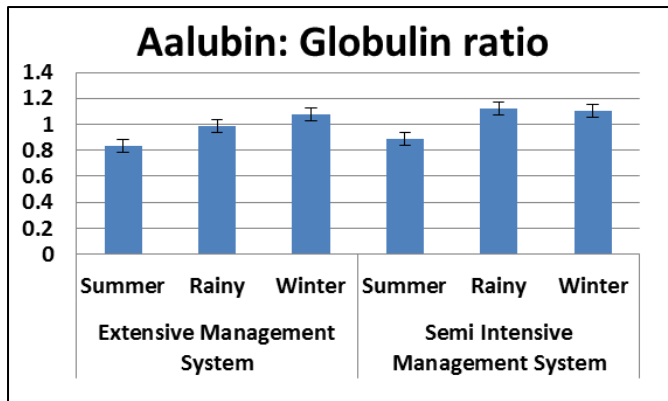


Fig 6: Seasonal mean AG ratio under different management system

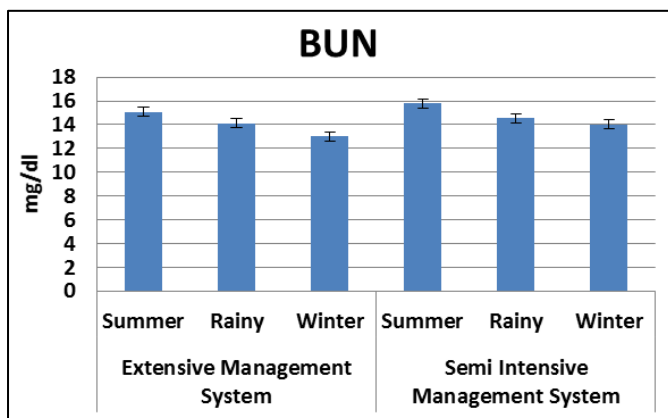


Fig 7: Seasonal mean BUN values under different management system

Blood urea nitrogen (BUN)

The overall glucose level was found to be significantly higher ($P < 0.05$) in the semi-intensive management system (Fig. 1) and the values were recorded as 14.07 ± 0.24 and 14.77 ± 0.24 mg/dl for the extensive and semi-intensive management system, respectively (Table 1). While the seasonal glucose values of different management systems are presented in Table 2. Mean values of glucose were 15.09 ± 0.33 , 14.13 ± 0.51 and 13.00 ± 0.36 mg/dl in summer, rainy and winter season for the extensive management system whereas the values for semi-intensive management system were found at 15.77 ± 0.40 , 14.53 ± 0.46 and 14.02 ± 0.36 mg/dl in summer, rainy and winter season, respectively (Fig.7). The mean values of BUN reported in the present study were similar as reported by Rathwa *et al.* (2003)^[12], Suhair (2012)^[16], Ghosh *et al.* (2013)^[4] and Indu *et al.* (2014)^[6]. Higher BUN level during hot seasons may be due to the loss of extra-cellular fluid (Rasooli *et al.*, 2004)^[11].

Conclusion

The present study revealed that there was a significant

influence of management on values of serum total protein, globulin, Albumin: Globulin ratio and BUN whereas the variation in albumin and glucose values was found to be non-significant in Osmanabadi goats reared under different management systems. The mean values of serum total protein, globulin and Albumin: Globulin ratio was found to be significantly higher ($P < 0.01$) for the extensive management system. However, the mean values of BUN were significantly higher ($P < 0.05$) and the values of glucose, albumin were found non-significantly ($P < 0.05$) higher for the semi-intensive management system.

Acknowledgements

The authors acknowledge the facilities provided by the Dean, College of Veterinary Science and Animal Husbandry, Anjora, Durg and the Director of Extension Services, Chhattisgarh Kamdhenu Vishwavidyalaya (CGKV) Durg, Chhattisgarh (India).

Conflict of Interests

The authors declare that there is not any conflict of interests.

Authors Contribution

The research article is a part of PhD work by the first author under the guidance of the second. Other authors have equally contributed to analyzing the experimental data.

References

- Basha NAD, Scogings PF, Dziba LE, Nsahlai IV. Diet selection of Nguni goats in relation to season, chemistry and physical properties of browse in a sub-humid subtropical savanna. *Small Ruminant Research*. 2012; 102:163-171.
- Chikwanda AT, Muchenje V. Grazing system and floor type effects on blood biochemistry, growth and carcass characteristics of Nguni goats. *Asian-Austral. J Anim. Sci*. 2017; 30(9):1253-1260.
- Gbolabo OO, Florence OO, Timothy MS, Aliyu IM. Parameters Influencing Haematological, Serum and Bio-Chemical References in Livestock Animals under Different Management Systems. *Open Journal of Veterinary Medicine*. 2015; 5:181-189.
- 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*). *J Endocrinol. Reprod*. 2013; 17(2):113-122.
- Inbaraj S, Kundu A, De AK, Sunder J, Sejian V. Seasonal changes in blood biochemical and endocrine responses of different indigenous goat breeds of tropical island agro-ecological environment. *Biol. Rhythm Res*. 2018; 49(3):412-421.
- Indu S, Sejian V, Naqvi SMK. Impact of stimulated heat stress on growth, physiological adaptability, blood metabolites and endocrine responses in Malpura ewes under semi-arid tropical environment. *Anim. Prod. Sci*. 2014; 55(6):766-776.
- Kaneko SJ. *Clinical Biochemistry of Domestic Animals*. 9th edn. Academic Press, California, 1989.
- Kumar S, Roy MM. Small Ruminant's Role in Sustaining Rural Livelihoods in Arid and Semiarid Regions and their Potential for Commercialization. In: *New Paradigms in livestock production from traditional to commercial farming and beyond*. Agrotech publishing academy,

- Udaipur, 2013, 57-80.
9. Kumar S. Commercial goat farming in India: An emerging agri-business opportunity. *Agricultural Livestock Production Sci.*, 67: 1-18. *Economics Research Review*. 20 (Conf. Issue), 2007, 503-520.
 10. Ramprabhu R, Chellapandian M, Balachandran S, Jonhson J Rajeswar. Influence of age and sex on blood parameters of Kanni goats in Tamil Nadu. *Indian Journal of Small Ruminants*. 2010; 16(1):249-251.
 11. Rasooli A, Nouri M, Khadjeh GH, Rasekh A. The influences of seasonal variation on thyroid activity and some biochemical parameters of cattle. *Iranian J Vet. Res.* 2004; 5:1383-2004.
 12. Rathwa SD, Vasava AA, Pathan MM, Madhira SP, Patel YG, Pande AM. Effect of the season on physiological, biochemical, hormonal and oxidative stress parameters of indigenous sheep. *Vet. World*. 2017; 10(6):650-654.
 13. Rumosa Gwaze F, Chimonyo M, Dzama K. Relationships between nutritionally-related blood metabolites and gastrointestinal parasites in Nguni goats of South Africa. *Asian-Australas J Anim Sci*. 2010; 23:1190-7.
 14. Sakha M, Shamesdini M, Mohamad-Zadeh F. Serum biochemistry values in Raini goat of Iran. *Internet J. Vet. Med.* 2009, 6:1-6.
 15. Solaiman S, Thomas J, Dupre *Yet al.* Haenlein effect of feeding *Sericea Lespedeza* (*lespedeza cuneate*) on growth performance, blood metabolites and carcass characteristics of Kiko crossbred male kids. *Small Rumin Res.* 2010; 93:149-56.
 16. Suhair MS. Effects of the level of feeding and season on rectal temperature and blood metabolites in desert rams. *Acad. J Nutr.* 2012; 1(2):14-18.
 17. Zubcic D. Some biochemical parameters in the blood of grazing German improved fawn goats from Istria, Croatia. *Vet. Archiv.* 2001; 71(5):237-244.