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 Goats 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) [6]. Goat secretes proline-rich proteins that complex with tannins, reducing the detrimental effects as well as makes the goat 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.

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

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

*p< 0.05  **p< 0.01NS: 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
The recorded overall mean value of albumin was non-significantly higher ($P < 0.05$) in the semi-intensive management system ($3.40 \pm 0.04$ g/dl) than that of the extensive management system ($3.36 \pm 0.03$ g/dl) (Table 1). While the seasonal albumin values for different management systems are presented in Table 2. Mean values of albumin were $3.22 \pm 0.04$, $3.37 \pm 0.04b$ and $3.48 \pm 0.06$ g/dl in summer, rainy and winter season for extensive management system whereas the values for semi-intensive management system were found at $3.20 \pm 0.05$, $3.60 \pm 0.04$ and $3.41 \pm 0.08$ 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)\textsuperscript{[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)\textsuperscript{[15]}.

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

<table>
<thead>
<tr>
<th>Season</th>
<th>Extensive Management System (Group I)</th>
<th>Semi-Intensive Management System (Group II)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Summer</td>
<td>Rainy</td>
</tr>
<tr>
<td>Glucose</td>
<td>$52.00^a \pm 0.67$</td>
<td>$54.13^b \pm 0.85$</td>
</tr>
<tr>
<td>Total Protein</td>
<td>$7.17^b \pm 0.07$</td>
<td>$6.84^a \pm 0.05$</td>
</tr>
<tr>
<td>Albumin</td>
<td>$3.22^a \pm 0.04$</td>
<td>$3.37^b \pm 0.04$</td>
</tr>
<tr>
<td>Globulin</td>
<td>$3.95^b \pm 0.08$</td>
<td>$3.46^a \pm 0.06$</td>
</tr>
<tr>
<td>BUN</td>
<td>$15.09^c \pm 0.33$</td>
<td>$14.13^b \pm 0.51$</td>
</tr>
<tr>
<td>A/G ratio</td>
<td>$0.83^a \pm 0.02$</td>
<td>$0.99^b \pm 0.02$</td>
</tr>
</tbody>
</table>

\textsuperscript{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±0.021) than that of an extensive
management system (0.97±0.02) (Table 1). While the seasonal Albumin: Globulin ratio values for different management systems were 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) [14] and Indu et al. (2014) [16]. 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**
Udaipur, 2013, 57-80.


