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Original article

Variations in body measurements and live weight of indigenous goat populations of Mahoba In Bundelkhand

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ABSTRACT

This study was conducted to describe in morphometrical traits and body weight (BW) of indigenous goat populations reared in Belatal, Ajnar, Chhitarwara, Lamaura and Budhaura village of Jaitpur block in Mahoba. Data were obtained from 549 goats from 107 households. The BW and height at withers (HW) in Ajnar, Belatal and Budhaura doe aged 1-2 years were significantly high compared to others. Doe of Budhaura, Ajnar, Belatal and Chhitarwara had significantly high body length (BL). Significantly high chest girth (CG) values were obtained from Chhitarwara had Budhaura doe. Buck of Ajnar, Belatal and Lamaura had significantly high BW, BL and HW. Body weight of Belatal, Ajnar and Chhitarwara doe aged 1-2 years and bucks were better estimated using CG alone. However, the best predictor for Belatal, Ajnar and Chhitarwara doe aged 1-2 years old were CG, HW and BL. CG was the primary variable to explain most of the variations in BW. Budhaura and Ajnar goat had a relatively large body frame and emphasis may be given for their improvement.

1. Introduction

Goat is commonly known as Cow of poor men and well domesticated in whole Bundelkhand region of Uttar Pradesh. Goat is the most important livestock species in Mahoba district. They are often rearing for multipurpose uses by resource poor farmers in traditional family based production systems. With 185268 goats (livestock censes 2007) populations, there are highly diversified indigenous goat populations in the districts parallel to its diversity in ecology, ethnic communities and production systems. The most common measure of animal performance is live weight which provides reliable and informative measure for selection, feeding requirements, health management (Thiruvenkadan, 2005), and decision on selling price. In Mahoba, goat breeding is generally performed in extensive conditions. The importance of body measurements in estimation of body weight of small ruminants have been addressed for studying the breed standards. Studies relating live weight to body measurement and their possible use in estimating live weight on local goat populations of Mahoba (Mishra et al., 2012). The present study was conducted with the objective of assessing the variations in morphometrical characters and using these traits in estimating the live weight of indigenous goat populations at different rearing areas, sex and age categories in the Mahoba district for further improvement.

2. Materials and methods

The study was purposively carried out in district Mohoba in the Bundelkhand region of Uttar Pradesh. For study, data were collected purposively from 107 households of 5 villages including Ajnar, Budhaura, Belatal, Chhitarwara and Lamaura of Jaitpur block of the Mohoba district during 2012-2013. A well defined pretested schedule was used for personnel interview of goat rears. A total 549 goats population of both sexes (386 doe and163 buck) that were drawn from 107 households covered to collect various information related to the goat during the period. For the selection of villages the cluster sampling approach were followed based on their closeness in geographical terrain and similarity in social and cultural values of the human population. The data on various goat body weight and morphometric characters etc. were collected based on personal observation and information provided by the goat rears. The morphometrical measurements were recorded at the early hours of the day before feeding and Body weights (BW) of the goats were taken early in the morning and evening. The morphometrical traits included in the study were height at withers (HW), chest girth (CG), body length (BL), shoulder width (SW), head width (HDW), head length (HDL), tail length (TL), ear length (EL), ear width (EW), horn length (HL) and Hip length (HIL). The BW and different body measurements namely HL, EL, EW, TL, HW, CG, body girth, hip height and BL were taken according to Rout et al.,1999; Rahman et al. 2008 and the data collected from both sexes were analyzed statistically . The ages of the goats were determined based on the presence of teeth and information collected from the goat rears.

3. Results

3.1. Variations in morphometrical characters

3.1.1. Doe below 1 year old

As shown in Table 1, The BW of the doe reared in the different villages was comparable with each other. The BW value was highest in doe raised in Ajnar but lowest in those of Lamaura. The average HW of the doe raised in Belatal, Ajnar and Budhaura zones were similar being significantly ($P<0.05$) higher than that of doe from Chhitarwara and Lamaura. The study further indicated that the doe raised in Lamaura had significantly lower BL values when compared to those of other study village. Doe from Chhitarwara and Budhaura had ($P<0.05$) higher values of CG and SW than those of other villages. Doe from Ajnar and Chhitarwara had ($P<0.05$) lower HDW values when compared to those from the other studied areas. Doe raised in Ajnar had ($P<0.05$) higher HDL values than those of other villages which had comparable values. Doe with longest TL were observed in the Ajnar and Lamaura whereas the shortest in Chhitarwara and were significantly different than those reared in other villages. The HL value was highest in doe raised in Belatal but lowest in those of Lamaura. The average values for EL and EW of the doe reared in the study areas were comparable except in those of Chhitarwara where the values were ($P<0.05$) lower than the other villages. The HIL value was highest in doe raised in Chhitarwara but lowest in those of Ajnar.

3.1.2. Doe between 1 and 2 years old

The different quantitative morphometrical traits in doe aged between 1 and 2 years reared in the different study villages are presented in Table 2. Doe reared in Ajnar and Budhaura had significantly higher BW and HW values than those of other villages. Doe from Chhitarwara, Lamaura and Budhaura had significantly ($P < 0.05$) higher values of CG and SW than those of Belatal and Ajnar which had similar values. No significance difference was observed in BL between doe of all villages except Lamaura who had the lowest value. The HDW values were significantly ($P < 0.05$) higher in doe reared in Belatal, Lamaura and Budhaura than those of Chhitarwara and Ajnar. The HDL values were higher in doe reared in Ajnar and lowest values in doe of Budhaura. Doe from Ajnar and Lamaura had significantly longer TL than those of other villages. The HL value in Belatal and Budhaura doe was significantly higher than those of Ajnar and Chhitarwara which had comparable values. The highest values for EL and EW of the doe reared in the Ajnar comparable except in those of Budhaura where the values were ($P < 0.05$) lower than the other villages. Doe from Chhitarwara and Budhaura had significantly longer HIL than those of other villages and lowest in Ajnar.

Table 1
Quantitative variations in morphometrical measurements (cm) and body weight (kg) of doe below one year old (Means ± SD; N = 167).

Quantitative traits	Belatal	Ajnar	Chhitarwara	Lamaura	Budhaura
Body weight	21.46±3.6	25.95±2.8	19.62±3.2	18.86±3.4	20.73±4.9
Chest girth	61.16±4.1	60.42±2.7	63.49±3.5	61.68±3.9	62.85±2.8
withers height	61.75±3.6	60.21±3.1	54.57±4.8	56.54±2.0	62.20±1.8
Body length	84.21±2.9	82.87±4.1	80.44±3.6	78.73±4.3	83.48±3.8
Horn length	8.67±1.1	8.20±1.4	8.09±0.9	7.89±1.3	8.49±1.7
Shoulder width	12.76±2.5	11.94±3.4	14.82±3.1	13.57±3.5	14.19±0.4
Head width	11.25±0.5	8.98±1.7	9.69±1.9	10.91±1.5	10.12±0.5
Head length	17.64±1.4	18.11±2.0	16.79±2.5	17.15±2.1	16.27±1.8
Tail length	13.42±5.4	14.76±3.2	13.04±3.1	14.42±2.7	13.89±1.1
Hip length	58.97±2.5	58.26±2.7	60.64±3.4	59.72±2.9	60.12±3.1
Ear length	14.17±1.7	13.90±1.2	12.72±2.0	13.46±2.1	13.41±1.4
Ear width	5.71±0.4	5.58±0.8	4.94±1.2	5.23±.6	5.08±1.0

Significantly different ($P < 0.05$).

3. 2. Bucks

The results pertaining to the morphometrical measurements in bucks (Adults) have been presented in Table 3. Bucks of Belatal, Ajnar and Lamaura had significantly ($P < 0.05$) higher BW than those of Budhaura and Chhitarwara. The HW values were significantly ($P < 0.05$) higher in Belatal, Lamaura and Budhaura bucks than those of Chhitarwara and Ajnar. The highest ($P < 0.05$) BL values were observed in bucks of Ajnar and Belatal and lowest of Lamaura. The highest ($P < 0.05$) CG values were observed in bucks of Lamaura and Chhitarwara and lowest of Belatal. The SW value was significantly higher in bucks raised in Budhaura and Chhitarwara than those of other villages which had comparable values. The highest HDW was obtained from Belatal bucks while the lowest from Ajnar being significantly different from other villages. The HDL values obtained from bucks reared in Ajnar, Chhitarwara, Lamaura and Belatal were comparable but significantly higher than those of Budhaura. The longest TL was observed in Ajnar bucks which differed significantly from those of other villages. The EW values were significantly higher in bucks reared in Belatal, Ajnar and Lamaura than those of Chhitarwara and Budhaura. The EL values were significantly higher in bucks reared in Lamaura, Belatal and Ajnar than those of Budhaura and Chhitarwara. The longest HL was observed in Belatal and Lamaura bucks which differed significantly from those of other villages. Bucks of Chhitarwara and Budhaura had significantly ($P < 0.05$) higher HIL than those of other villages which had comparable values.

4. Discussion

Sharma et al. (2008) observed Genetic analysis of morphometric traits of Sirohi goats. (Ekambaram et al. 2011) observed Morphological characterization of Mahabubnagar goats. (Verma et al. 2010) observed Phenotypic and genetic characterization of Sangamneri goat breed. Body weight of about 62 and 48 kg for adult male and female goats has been recorded by (Bhusan et al.2010).(Rout et al.1999) reported that female Jamunapari weighed about 3.7 kg at birth, 18.6 kg at six months, and 39.7 kg at 12 months. (Bhoite et. al.1994) and (Deokar et. al.2007) observed higher body weights in male animals of any age group than the female. The birth weight of male and female kid is about 1.90 kg as reported by (Deokar et. al.2007). The body weight at different ages and physical traits were comparable to Jakhrana (Rai and Singh 2005) and Zalawadi (Singh et al., 2007) and higher than Marwari (Rai and Singh 2004). The means for body weight at different ages reported in present study were comparable to those reported by (Barhat et al., 2000), (Barhat, 2005) and (Rohilla and Patel 2003). Alam (2006) reported 1.18,4.17, 6.78, 10.91 and 13.22 kg body weight of bucks at birth, 3, 6,9 and 12 months, respectively which were more or less similar with the results of the present study. Similar findings were also observed from the result of many other investigators (Hasanat et al., 2003; Islam et al., 1991 and Singh and Sengar, 1990).

Table 2

Quantitative variations in morphometrical measurements (cm) and body weight (kg) of doe between one and two years age (Means ± SD; N = 219).

Quantitative traits	Belatal	Ajnar	Chhitarwara	Lamaura	Budhaura
Body weight	23.85±4.1	26.26±4.1	23.01±3.8	24.58±3.1	25.82±2.6
Chest girth	72.94±3.6	73.59±4.2	75.57±3.9	74.72±4.7	75.19±3.1
withers height	66.82±3.1	67.18±2.3	63.84±4.0	65.78±3.4	67.63±1.7
Body length	92.81±4.3	94.70±4.1	91.37±3.6	87.38±3.5	90.84±2.9
Horn length	10.07±1.1	9.72±1.4	9.52±0.9	9.37±1.3	9.89±1.7
Shoulder width	13.13±1.1	12.76±1.6	16.02±2.3	15.29±0.8	16.86±0.6
Head width	12.14±1.1	9.78±1.2	10.50±1.4	11.6±0.5	11.09±0.3
Head length	18.64±0.6	19.77±1.3	17.64±1.2	18.12±0.6	17.09±0.5
Tail length	17.12±6.2	17.98±3.3	15.84±3.5	16.38±2.0	15.28±1.3
Ear length	20.43±0.9	21.78±1.3	18.89±2.0	19.97±0.8	18.15±0.6
Ear width	7.12±0.9	7.41±1.3	6.68±2.0	6.96±0.8	6.33±0.6
Hip length	68.97±2.5	68.16±2.7	71.64±3.4	69.82±2.9	70.42±3.1

Significantly ($P < 0.05$) different.

Table 3

Mean values (±SD) of quantitative morphometrical measurements (cm) and body weight (kg) of adult bucks (N = 163).

Quantitative traits	Belatal	Ajnar	Chhitarwara	Lamaura	Budhaura
Body weight	27.14±3.5	28.26±3.6	26.34±4.4	27.79±2.4	26.90±2.3
Chest girth	75.95±2.6	77.08±4.1	77.82±4.5	78.40±3.3	76.51±3.5
withers height	72.68±3.3	70.82±4.3	69.54±4.7	71.68±3.5	72.14±2.3
Body length	109.61±4.6	110.80±3.5	108.89±3.4	107.10±3.6	107.95±2.9
Shoulder width	17.03±2.1	17.85±1.7	18.48±3.0	17.38±2.2	18.80±1.3
Head width	14.76±2.2	13.10±2.1	13.58±1.9	14.34±1.5	13.97±2.4
Head length	16.95±0.8	17.84±1.3	17.39±1.3	17.25±1.0	16.14±0.6
Tail length	21.00±2.7	22.15±1.6	21.84±1.2	21.36±2.5	20.56±2.1
Ear length	24.56±0.8	23.87±1.2	22.85±2.3	24.91±1.0	23.45±1.5
Ear width	8.64±1.9	8.31±1.3	7.98±1.0	8.18±1.8	7.73±1.6
Horn length	14.35±1.3	13.71±2.3	13.36±2.3	14.15±1.1	12.80±1.7
Hip length	73.09±2.5	72.86±2.7	74.64±2.4	73.42±2.9	73.92±2.1

Significantly ($P < 0.05$) different

The Chest Girth values of the bucks and doe across the age groups studied are comparable to those of (Abegaz et al., 2011) and (Tajebe et al. 2011) for various goat types of Ethiopia.

Rout et al. (1999), Horns projected backwards. (Singh et al., 2007) Horns are medium in length, twisted (1–2 folds), moving upward and backward. The findings of horn length and orientation are corroborated with the reports on KanniAdu (Thiruvenkadan, 2000), Sangamneri (Deokar et al., 2005) and Osmanabadi (Deokar et al., 2006) goats.

Ear length was similar to results reported by (Rout et al., 2002). Ears are black, pendulous with medium length 15–19 cm. There is 4–8 cm width between the horns unlike Zalawadi goats in which gap between the horns is either very small 2–4 cm or nil (Singh et al., 2007). (Alam, 2006) reported 11.58, 11.94, 12.62 and 5.30, 5.75, 5.90 cm ear length and breadth at 6, 9 and 12 months of age respectively which was in agreement with the results of the present study. (Gall 1996) observed that the ear length of Black Bengal goats was 11.5 to 14.1 cm at 12 months of age which also collaborated with this study and similar result was also observed from the investigation of (Hasanat et al., 2003). On the contrary, (Singh et al., 1981) reported the average ear length of Black Bengal goats at 0-3, 3-6 and 6-12 months of age were 7.7, 8.7 and 9.8 cm respectively which are lower than the present study.

Rout et al. (1999) reported lower body length (77.4 ± 1.2) than the present findings. The average body length of the present study at 6, 9 and 12 months of age was in consistent with the findings of (Alam, 2006) who reported the body length of White Bengal bucks were 42.83, 47.18 and 50.69 cm respectively at the similar age groups. In another study, (Hasanat et al., 2003) reported the average body length of Black Bengal buck was 47.07 ± 0.43 cm at 12 months of age which strongly supported the present result. But the present result contradicted to some extend with the findings of (Islam et al., 1991) who reported comparatively lower body length.

Alam (2006) who reported the average head lengths of white Bengal bucks were 15.00, 16.64 and 18.00 cm respectively which were in close agreement with the result of the present study. (Hasanat et al.,2003) observed 15.53 and 9.71 cm head length and width respectively at 12 months of age in Black Bengal bucks which were 7% and 22% lower than the results of the present study.

Body height, body length, and body girth these findings are in agreement with (Tomar et al., 2001) and Pathodiya et al. (2004). Body height, body length and body girth at birth, 3, 6, 9 and 12 months ages. These finding are in consonance with that of (Kumar et al., 1992) in Jamunapari and (Karna et al., 2001)

Hasanat et al. (2003) reported that the height at wither was 48.50 ± 0.42 cm at 12 months of age in Black Bengal buck which is similar to the present result. (Alam,2006) reported 42.11, 45.00 and 48.00 cm height at wither respectively at the similar age group in White Bengal bucks.

Singh et al. (1979) conducted an experiment with Black Bengal goat and found that the tail length at 12 months of age was 11.3 ± 0.25 cm which was higher than the result of the present study. (Singh et al., 1981) reported the average tail length of Black Bengal goat at 0-3, 3-6 and 6-12 months of age were 7.9 ± 0.29, 10.0 ± 0.24 and 10.1 ± 0.29 cm respectively which also differed from the results of the present study.

5. Conclusion

The study indicates that significant variations were observed in all studied quantitative morphometrical parameters of goat among the studied villages. Accordingly, the goat of Jamunapari, Barbari and Bundelkhandi can be classified as comparatively better goat type with a relatively large body frame and emphasis may be given for their improvement. Hence, this morphometrical trait alone or in combination with body length and withers height could be used as reliable predictors of live weight for all age groups of both sexes across the studied villages. However, as the goat in the present study were raised under varying agro ecological conditions and under different nutritional regimes.

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