



Berari goats: Characterization, management, performance and population status

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ABSTRACT

Berari is recently recognized as 23rd goat breed of India with accession number INDIA_GOAT_1100_BERARI_0623. The Berari goat, a breed of central region of India (Vidarbha region of Maharashtra), is low yielding prolific meat breed thriving well in tropical wet and dry climate. The data were collected on 1,232 Berari goats from 353 farmers spread over 82 villages of 25 Talukas of 11 district of Vidarbha region of Maharashtra and also from college farms. The average daily milk yield of Berari goats is 533.28 g/day with a total lactation yield of 78 kg in 130 days of lactation, while age at first conception is 10 to 11 months. The breed is having a good prolificacy i.e. 57% twinning, 2% triplets/quadruplets. The coat colour of Berari goat ranges from dark tan to light tan. Horns were noticed in both the sexes and were straight, orientation of horn was mostly found as upward-backward. All the Berari goat had pendulous (drooping), flat and leafy ear and convex forehead. Majority of Berari goats (98%) did not have beard and wattle and does had bowl shaped udder (89%) with conical teat shape and pointed teat tip. The mean chest girth, body length, height at wither, paunch girth, horn length, ear length and tail length for adult animals (above 2 years of age) measured 73.3, 63.1, 71.3, 76.2, 9.6, 15.7 and 13.7 cm, respectively. The body weights in male and female at 1–2 years of age were 27.4 and 24.1 kg and that of adult goats 34.5 and 27.3 kg, respectively. On the basis of body measurements and body weights the Berari goat was decided as medium size goat. Light to dark strip on lateral sides from base of horn to nostrils, black colour ring around neck in adult male, and black hair line along with the vertebral column extending up to tail in both sexes was observed as unique characteristic in Berari goat.

Key words: Berari, Body weight, Goat, Morphological characterization

The Berari is a newly accredited (INDIA_GOAT_1100_BERARI_0623) goat breed of central region of India, which is mainly used for meat purpose by the farmers of this region. The breed derived its name from its native region the Central Provinces and Berar which was a province in central India and covered much of present-day Madhya Pradesh, Chhattisgarh and Maharashtra states. In 1956, the Central Province became the part of Madhya Pradesh and the Marathi-speaking areas of Berar and Nagpur divisions, popularly known as Vidarbha region became part of Bombay state. In 1960, the Bombay state was reorganized as the Maharashtra. The goat found in the Berar region is known as Berari goat. In view of the importance of this breed in its native region present research work was undertaken to study the morphological features, body measurements,

managements practices and the tentative numbers of Berari goat existing in its native tract.

MATERIALS AND METHODS

The survey on Berari goat was conducted in the breeding tract of the breed, which is spread over Vidarbha region of Maharashtra. Morphological and morphometric characteristics were recorded for the Berari goat above one year of age as per the standard format developed by National Bureau of Animal Genetic Resources (NBAGR). In each district, a 2-stage stratified sampling technique was applied, wherein 2 tahsil within each district and 2 villages in each tahsil were selected randomly to obtain data. The data were recorded on 1,232 Berari goat from 353 farmers spread in 82 villages of 25 talukas of 11 districts of Vidarbha region of Maharashtra and also from Berari goat and Deccani sheep research station, Borgaon Manju and Post Graduate Institute of Veterinary and Animal Sciences, Akola farm. Information on management practices were collected through formal interview, using structured questionnaire, from 100 farmers maintaining the goat flocks in the breeding tract.

The data on morphological characters like colour patterns

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(coat colour, skin colour, muzzle colour, eyelids colour, hooves colour, belly colour, thigh colour), horn profile (present or absent, shape, colour and orientation), ear profile (orientation, shape), head profile (forehead, wattle, beard), tail (type and shape) and udder (udder shape, teat shape, teat tips) were recorded as per the proforma.

The data on body weight, hearth girth, body length, height at wither, paunch girth, horn length, ear length and tail length were also recorded for analysis of 1 to 2 years and above 2 years of age. Least squares analysis of variance technique (Harvey 1990) was used to study the influence of non genetic factors, viz. location, sex and district on body weight and morphometrical character. The means were tested for those fixed effects which were found statistically significant by Duncan's multiple range test (DMRT) modified by Kramer (1957).

RESULTS AND DISCUSSION

Breeding tract and climate: The habitat of Berari breed of goat is the Vidarbha region Maharashtra and comprise 11 district having three agro-climatic zones. The region lies between 17°57' - 21°46' N Latitude and 75°57' - 80°59' E longitude. Total geographical area of Vidarbha region is 97, 321 sq. km which is 31.61% of Maharashtra. The elevation of the breeding tract ranges from 300 to 1,000 m above mean sea level with mean of 553 m. Total forest cover under breeding tract is 27, 250 sq. km (28%). The Vidarbha region has a tropical wet and dry climate with dry conditions prevailing for most of the year marked by extreme of temperature reaching from 46°C to 48°C during the summer and dropping 8°C to 10°C in winter. Hot summer and moderately cool winter characterize the Vidarbha region. Annual rainfall varies from 700 to 950 mm in the western parts to more than 1250 mm in the eastern parts of Vidarbha. The region experiences sub-humid to humid conditions in monsoon season, semi-arid in winter and arid in summer. Berari goats true to type mainly occur in Nagpur, Wardha, Amravati and Akola districts, however, also occur in rest of the districts of Vidarbha region and are reared by farmers of backward communities of Vidarbha.

Management: Animals under field conditions are kept on extensive (82%) management followed by semi-intensive (18%) indicating that goat rearing is mainly on the basis of extensive production system in the area. It is observed that 91% farmers provided housing during night time to protect them from the wild animals and thefts, whereas 9% farmers housed their animals during day and night time. The animals are kept in close housings (73%) as well as in open houses (37%). In case of close housing, the roofs were made up of locally available materials like paddy straw, jowar straws, tree leaves, dry grasses, wooden logs or tiles and fenced with wooden or stone poles walls constructed with locally available materials. In open houses the goat were kept under trees, open areas and fenced with thorny bushes etc. Goats

were also kept free in temporary enclosures made up of bamboo sticks or wooden logs. Majority of the farmers (89%) used *kutchha* type of floors in goat houses, while 11% farmers provided *pucca* type of floor in shelter. In small flocks (3–4 animals) there was no separate housing and goats live with the owner and share the houses. It was found that 39% farmers constructed the shelters separately while 61% farmers maintained shelters as part of their houses to safeguard the animals during night time. Similar findings were also reported by Singh (2001) and Gokhale *et al.* (2002) and reported that 66% of farmers maintained shelters as part of residence. The results on type of house, thatched roof and *kutchha* floor systems adopted by Berari goat farmers in the study were in close proximity to the findings of Thiruvankadan *et al.* (2005) in Tamil Nadu, Kumar *et al.* (2006) in Gujarat, Rao *et al.* (2007) in Odisha, Verma *et al.* (2007) in Rajasthan and Ekambaram *et al.* (2011b) in Andhra Pradesh.

Feeding: The most commonly used practice of feeding was grazing, observed in 100% of goat keepers. Availability of common resource properties, community lands and forests and crop by-products could be the reasons behind the adoption of extensive system of rearing and low cost for maintenance under field conditions. Most of the farmers followed group feeding (98%) rather than individual feeding to save the time and all farmers collected feed from fields. This may be due to a large section of landless and marginal farmers maintaining goats as main source of income. In the present survey, the source of water was either well (45%), village common place (49%) or reservoir etc. (9%). Due to hot climate farmers prefer to graze their animals either in morning or evening hours. The grazing hours in morning were 5 to 6 h and during evening 2 to 3 h. The flock size ranges from 1 to 40 animals consisting of kids and adults of both sexes and average flock size was 5.4. Animals are fed with local green grass and tree leaves. The major fodder resources available in area are *anjan* (*Hardwickia binata*), *babhul* (*Acacia Arabica*), *banyan* (*Ficus benghalensis*), *ber* (*Ziziphus nummularia*), *giripuspa* (*Gliricidia sepium*), *jamun* (*Syzygium cumini*), *khair* (*Acacia catechu*), *maharukh* (*Ailanthus excelsa*), *pipal* (*Ficus religiosa*), *shami/khejari* (*Prosopis cineraria*), *shevari* (*Acacia sesbania*), *shevga* (*Moringa oleifera*), *subabul* (*Leucaena leucocephala*), *tamarind* (*Tamarindus indica*) and *umbar* (*Ficus racemosa*), *majaor* grass resources in the breeding tract are *dongari* grass (*Chrysopogon fulvus*), *hariyali* (*Cynodon dactylon*) and *pavana* (*Sehima nervosum*). It was observed that none of goat owners had feeders for their animals.

Performance: Berari goats attain early maturity and conceive at the age of 10 to 11 months. The age at first kidding in Berari goat was 15 to 16 months. The breed is having a good prolificacy i.e. 57% twinning, 2% triplets/ quadruplets. Although these goats are reared mainly for meat purpose but some animals showed good milch potential. They have well developed bowl shape udder with conical shaped teat. The

milk is mostly used for feeding the kids. The data recorded on Berari goats maintained under farm conditions indicated the average daily milk yield of 533.28 g with a range of 91 to 1,025 g and lactation yield of 78 kg in 130 days of lactation. Berari breed has low milk yield, however has lower age at first oestrous and age at first kidding and higher litter size also, which indicated that Berari goats have early maturity with high prolificacy.

Breeding: Natural matings are practised by using pure breed bucks by farmers for breeding purpose. The Osmanabadi and Sangamneri goat bucks were also used in the breeding tract of Berari goats which lead to crossbreeding in the goat. About 40% of the flocks maintained the breeding bucks and number of males in a flock varied from 1 to 2. Average age of first mating in males was 17 to 18 months and average weight at first mating was 31 kg.

Population: As per the livestock census conducted in 2007 the population of goats in Maharashtra state has 10.39 million and population in Vidarbha region is 3 million. According to rough estimate, nearly 10% of the total goat population of the Vidarbha belong to Berari goat.

Morphological characteristics

Colour pattern: The colour pattern of coat, skin, muzzle, eyelids, hooves, belly of Berari goats are presented in Table 1 and Figs 1, 3, 4. Dark tan coat colour (60.1%) is more prominent than light tan (39.9%) in Berari goats. The skin

Table 1. Morphological characteristics (colour pattern) of Berari goat

Characteristic	Males		Females		Total	
	n	%	n	%	n	%
Coat colour						
Dark tan	49	57.0	691	60.3	740	60.1
Light tan	37	43.0	455	39.7	492	39.9
Skin colour						
Gray	86	100.0	1146	100.0	1232	100.0
Muzzle colour						
Black	73	84.9	917	80.0	990	80.4
Brown	13	15.1	229	20.0	242	19.6
Eyelids colour						
Tan	70	81.4	1032	90.1	1102	89.5
Light tan	16	18.6	100	8.7	116	9.4
Black	0	00.0	14	1.2	14	1.1
Hooves colour						
Black	86	100.0	1145	99.9	1231	99.9
Brown	0	0.0	1	0.1	1	00.1
Belly colour						
Light tan	70	81.4	634	55.3	704	57.1
Dark tan	15	17.4	469	40.9	484	39.3
Blackish	1	1.2	43	3.8	44	3.6
Thigh hair colour						
Tan	84	97.7	1082	94.4	1166	94.7
Black	2	2.3	60	5.2	62	5.0
Mix	0	0.0	4	0.4	4	0.3

colour of all Berari goats was found to be grey. Deokar *et al.* (2006) reported grey white skin in all Osmanabadi goats, while, Deokar *et al.* (2007) reported brown skin colour (93.99%) in Sangamneri goats and Deshpande *et al.* (2009) reported pink (76.05%) and black (23.95%) skin colour in Surti goats. The colour of muzzle mostly found black in 80.4% followed by brown in 19.6%. Deokar *et al.* (2006), Verma *et al.* (2007) and Kumar *et al.* (2006) also observed the black colour of muzzle in Osmanabadi, Gohilwadi and Kutchi goats, respectively. It was observed that the percentage values for eyelid colour in Berari goat were highest for tan (89.5%) followed by light tan (9.4%) and black (1.1%). Deokar *et al.* (2006) and Verma *et al.* (2007) reported black colour of eyelid in Osmanabadi and Gohilwadi goats, respectively, while, Deokar *et al.* (2007) reported white colour of eyelids in Sangamneri goats. The colour of hooves was observed almost black (99.9%) in all Berari goats (Table 1). Deokar *et al.* (2006) reported the black hooves colour in all Osmanabadi goats. Deokar *et al.* (2007) observed white (69.12%) and black (30.88%) hooves in Sangamneri goat and Deshpande *et al.* (2009) reported brown (76.05%) and black (23.95%) hooves in Surti goats. Majority of Berari goats have light tan belly and tan colour thigh.



Fig. 1. Coat colour pattern in Berari goats (light to dark tan).



Fig. 2. Head, horn and ear profile of Berari goat.

Table 2. Horn characteristics of Berari goats

Characteristic	Males		Females		Total	
	n	%	n	%	n	%
Horned pattern						
Horned	86	7.0	1142	92.7	1228	99.7
Polled	0	0.0	4	0.3	4	0.3
Horn colour						
Gray	86	100.0	1136	99.5	1222	99.5
Black	0	0.0	6	0.5	6	0.5
Horn shape						
Straight	78	90.7	1040	91.1	1118	91.1
Curved	8	9.3	102	8.9	110	8.9
Horn orientation						
Upward-backward	76	88.4	995	87.1	1071	87.1
Upward-inward	1	1.2	27	2.4	28	2.3
Upward-outward	2	2.2	54	4.7	56	4.6
Upward	1	1.2	12	1.0	13	1.1
Backward-outward	4	4.7	35	3.1	39	3.2
Other	2	2.3	19	1.7	21	1.7

Horn pattern: Horns were noticed in both the sexes in majority (99.7%) of Berari goats while only 0.3% goats were polled (Table 2, Fig. 2). The medium size horn of 9.6 ± 0.4 cm length was observed in adult Berari goats. The 99.5% Berari goat had grey colour of horn. Most of Berari goats (91.1%) had straight horn, while, 8.9% had curved horn. The orientation of horn was mostly upward-backward (87.1%) followed by upward-outward (4.6%). Presence of horn in both the sexes was also reported in Sangamneri (Deokar *et al.* 2007), Jakhrana (Verma *et al.* 2007), Surti (Deshpande *et al.* 2009) and Mahabubnagar (Ekambaram *et al.* 2011a) goats. Deokar *et al.* (2006) reported grey colour horn in all Osmanabadi goats, Deokar *et al.* (2007) reported whitish



Fig. 3. Black coloured ring around neck in adult male of Berari goats.

brown (75.05%) and grey (27.95%) colour horn in Sangamneri goats while, Deshpande *et al.* (2009) reported brown (70.70%) and black (29.90%) colour horn in Surti goats. The straight horn was reported by Deokar *et al.* (2006) in Osmanabadi (67.17%), Deokar *et al.* (2007) in Sangamneri (30.68%) and Deshpande *et al.* (2009) in Surti (52.45%) goats. Kumar *et al.* (2006) reported curved horn in Kutchi goats, while, Verma *et al.* (2007) reported slightly twisted type horn in Gohilwadi goats.

Head, ear and tail pattern: The head, ear and tail pattern of Berari goat are given in Table 3. Majority of Berari goats had convex forehead (99.8%). The percentage of absence of wattle in Berari goats was 98.2 and absence of beard was 98.9. This clearly indicated that both wattle and beard characteristics were not the common feature of Berari goats. The ear orientation of Berari goat was pendulous (drooping), flat leafy shape (Fig. 2) with medium length (15.7 ± 0.6 cm). The tail of Berari goats was bunchy type (99.6%) with curved shape. Deokar *et al.* (2006), Deokar *et al.* (2007), Deshpande *et al.* (2009) reported pendulous ear, convex head and absence of beared and wattle in majority of cases in Osmanabadi, Sangamneri and Surti goats, respectively. However, Verma *et al.* (2007) reported presence of wattle and beard in both the sexes of Gohilwadi goats. Rao *et al.* (2009) reported pendulous ear, slightly convex forehead and wattle in both the sexes but common in female and presence of beard in adult male in Ganjam goats.

Table 3. Ear, head and tail characteristics of Berari goats

Characteristic	Males		Females		Total	
	n	%	n	%	n	%
Ear						
Orientation						
Pendulous (drooping)	86	100.0	1146	100.0	1232	100
Shape						
Flat and leafy	86	100.0	1146	100.0	1232	100
Head						
Type						
Convex	86	100.0	1144	99.8	1230	99.8
Concave	0	0.00	2	0.2	2	0.2
Wattles						
Absent	84	97.7	1126	98.3	1210	98.2
Present	2	2.3	20	1.7	22	1.8
Beard						
Absent	82	95.3	1136	99.1	1218	98.9
Present	4	4.7	10	0.9	14	1.1
Tail						
Type						
Bunchy	86	100.0	1141	99.6	1227	99.6
Slender	0	0.0	5	0.4	5	0.4
Shape						
Curved	81	94.2	1090	95.1	1171	95.0
Straight	5	5.8	56	4.9	61	5.0

Table 4. Udder characteristics of Berari goats

Characteristic	n	%
Udder shape		
Bowl	962	89.2
Pendulous	117	10.8
Teat shapes		
Conical	859	79.6
Cylindrical	132	12.2
Funnel	82	7.6
Pear	6	0.6
Teat tip		
Pointed	872	80.8
Round	207	19.2

Udder pattern: Udder characteristics were observed in 1,079 does including lactating as well as dry (Table 4). The Berari goat had bowl shape (89.2%) and pendulous shape (10.8%) udder. The shape of teat was classified as conical, cylindrical, funnel and pear shape. It was found that 79.6% doe had conical shape teat, 12.2% does had cylindrical shape teat, 7.6% does had funnel shape teat and 0.6% does had pear shaped teat. The teat tips were recorded as either pointed or round in shape and it was observed that 80.8% Berari does had pointed tips and 19.2% had round teat tips. Similar findings were also reported by Kuralkar *et al.* (2010) who reported bowl shape udder in higher frequency (85.16%) followed by round shape (14.28%) in Berari goats.

Distinct characteristics: Light to dark strip on lateral sides

from base of horn to nostrils, black coloured ring around neck in adult male and black hair line along with the vertebral column extending up to tail in both sexes were observed as unique characteristic in Berari goats. These characteristics are not noticed in adjoining goat breeds as well as other recognized goat breed of the India.

Body measurement and body weights: The least squares means for body weight and morphometric character of 1–2 years of age in Berari goats are given in Table 5. The least squares mean for body weight, heart girth, body length, height at wither, paunch girth, horn length, ear length and tail length for 1–2 years of age were 25.7±0.5 kg, 69.5±0.6 cm, 57.0±0.8 cm, 69.6±0.7 cm, 71.0±0.9 cm, 9.3±0.4 cm, 15.3±0.4 cm and 12.3±0.3 cm in Berari goats. The effect of location was significant source of variation for body weight, chest girth, body length, height at wither and tail length. DMRT showed that field goats had higher weight, chest girth, body length, height at wither than farm goats. The effect of sex was significant source of variation for body weight, chest girth, body length, height at wither, paunch girth, ear length and tail length. DMRT showed that male had higher body weight, chest girth, body length, height at wither whereas, lower paunch girth than the female. District had significant source of variation for all the traits except horn length. The Berari goats of Wardha district had significantly higher body weight than Berari goats of other district.

The least squares means above 2 years of age (adults) for body weight and morphometric character in Berari goats are presented in Table 6. The least squares mean for body weight

Table 5. Least squares mean for body weight and morphometric characteristic of 1 to 2 years of age in Berari goats

Classes	No. of observation	Body weight (kg)	Chest girth (cm)	Body length (cm)	Height at wither (cm)	Punch girth (cm)	Horn length (cm)	Ear length (cm)	Tail length (cm)
Overall mean (μ)	461	25.7±0.5	69.5±0.6	57.0±0.8	69.6±0.7	71.0±0.9	9.3±0.4	15.3±0.4	12.3±0.3
Locations		**	**	**	**	NS	NS	NS	**
Field	425	26.8 ^a ±0.4	70.8 ^a ±0.4	60.9 ^a ±0.6	71.3 ^a ±0.5	71.7±0.7	9.5±0.3	15.6±0.3	14.3 ^a ±0.2
Farm	36	24.7 ^b ±0.8	68.3 ^b ±1.0	53.1 ^b ±1.3	67.9 ^b ±1.1	70.2±1.5	9.2±0.7	14.9±0.6	10.3 ^b ±0.5
Sex		**	**	**	**	*	NS	NS	NS
Male	56	27.4 ^a ±0.7	70.9 ^a ±0.9	58.9 ^a ±1.1	71.2 ^a ±0.9	69.6 ^b ±1.3	9.7±0.6	15.0±0.5	12.4±0.4
Female	405	24.1 ^b ±0.4	68.2 ^b ±0.6	55.2 ^b ±0.7	68.0 ^b ±0.6	72.3 ^a ±0.8	9.0±0.4	15.5±0.3	12.3±0.3
District		**	**	**	**	**	NS	**	**
Gadchiroli	42	24.1 ^c ±0.8	66.9 ^c ±0.9	53.2 ^c ±1.2	65.9 ^f ±1.0	67.8 ^{de} ±1.4	8.9±0.6	13.8±0.5	12.1±0.4
Gondia	10	26.6 ^b ±1.3	69.4 ^{bcd} ±1.7	56.9 ^{cd} ±2.2	65.9 ^f ±1.8	66.8 ^e ±2.5	9.0±1.1	15.0±0.9	12.4±0.8
Chandrapur	15	25.9 ^b ±1.1	69.7 ^{bc} ±1.4	57.5 ^{bcd} ±1.8	70.1 ^{bcd} ±1.5	70.6 ^{cd} ±2.1	9.1±0.9	14.4±0.8	12.4±0.6
Bhandara	21	26.0 ^b ±0.9	70.0 ^{bc} ±1.2	61.1 ^a ±1.6	69.4 ^{de} ±1.3	73.3 ^{abc} ±1.8	9.4±0.8	14.5±0.7	10.6±0.6
Nagpur	39	26.9 ^b ±0.7	70.5 ^{ab} ±0.9	59.6 ^{ab} ±1.2	72.3 ^b ±1.0	73.7 ^{abc} ±1.4	8.6±0.6	15.4±0.5	12.3±0.4
Wardha	27	28.6 ^a ±0.8	72.3 ^a ±1.1	59.5 ^{ab} ±1.4	74.9 ^a ±1.1	75.6 ^a ±1.6	9.9±0.7	16.6±0.6	12.2±0.5
Amraoti	70	24.0 ^c ±0.6	67.2 ^{de} ±0.8	52.2 ^c ±1.1	68.4 ^{de} ±0.9	68.5 ^{de} ±1.2	9.3±0.5	15.5±0.5	11.8±0.4
Yeotamal	20	26.1 ^b ±1.0	70.0 ^{bc} ±1.2	53.1 ^c ±1.6	69.7 ^{cd} ±1.3	71.0 ^{bcd} ±1.9	9.4±0.8	15.6±0.7	12.7±0.6
Washim	18	25.3 ^b ±1.0	71.1 ^{ab} ±1.3	54.6 ^{de} ±1.7	71.8 ^{bc} ±1.4	74.4 ^{ab} ±2.0	9.3±0.9	16.6±0.7	13.07±0.6
Buldhana	13	25.1 ^b ±1.2	69.8 ^{bc} ±1.5	58.8 ^{abc} ±1.9	70.6 ^{bcd} ±1.6	70.9 ^{cd} ±2.2	10.9±1.0	14.5±0.8	12.2±0.7
Akola	186	24.6 ^c ±0.4	67.9 ^{cde} ±0.5	61.1 ^a ±0.7	67.0 ^{ef} ±0.5	67.8 ^{de} ±0.8	9.0±0.3	16.1±0.3	13.7±0.2

Means bearing same superscript for particular effect in a column do not differ significantly. **, Significant at 1%, *, significant at 5%, NS, nonsignificant.

Table 6. Least squares mean for body weight and morphometric characteristic of above 2 years of age in the Berari goat breed

Classes	No. of observation	Body weight (kg)	Chest girth (cm)	Body length (cm)	Height at wither (cm)	Punch girth (cm)	Horn length (cm)	Ear length (cm)	Tail length (cm)
Overall mean (μ)	771	31.4 $\pm$ 0.6	73.3 $\pm$ 0.6	63.1 $\pm$ 0.7	71.3 $\pm$ 0.6	76.2 $\pm$ 0.8	9.6 $\pm$ 0.4	15.7 $\pm$ 0.3	13.7 $\pm$ 0.3
Locations		**	**	**	**	**	**	**	**
Field	691	34.1 $\pm$ 0.5	75.8 $\pm$ 0.5	65.5 $\pm$ 0.6	75.0 $\pm$ 0.6	78.7 $\pm$ 0.7	11.4 $\pm$ 0.4	16.6 $\pm$ 0.3	15.1 $\pm$ 0.2
Farm	80	28.7 $\pm$ 0.8	70.8 $\pm$ 0.9	60.8 $\pm$ 1.0	67.6 $\pm$ 0.9	73.7 $\pm$ 1.2	7.8 $\pm$ 0.6	14.8 $\pm$ 0.5	12.2 $\pm$ 0.4
Sex		**	**	**	**	NS	NS	NS	NS
Male	30	34.5 $\pm$ 1.0	74.6 $\pm$ 1.0	65.6 $\pm$ 1.2	73.5 $\pm$ 1.1	75.7 $\pm$ 1.4	9.8 $\pm$ 0.7	15.8 $\pm$ 0.6	14.1 $\pm$ 0.4
Female	741	27.3 $\pm$ 0.4	72.0 $\pm$ 0.4	60.7 $\pm$ 0.5	69.2 $\pm$ 0.4	76.8 $\pm$ 0.6	9.5 $\pm$ 0.8	15.6 $\pm$ 0.2	13.2 $\pm$ 0.2
District		**	**	**	**	**	**	**	**
Gadchiroli	43	31.0 $\pm$ 1.4	69.8 $\pm$ 1.0	58.7 $\pm$ 1.2	66.9 $\pm$ 1.0	71.4 $\pm$ 1.3	8.00 $\pm$ 0.6	14.0 $\pm$ 0.6	13.0 $\pm$ 0.4
Gondia	24	30.3 $\pm$ 1.0	71.5 $\pm$ 1.2	61.0 $\pm$ 1.4	70.1 $\pm$ 1.3	72.8 $\pm$ 1.7	9.7 $\pm$ 0.8	16.6 $\pm$ 0.7	13.8 $\pm$ 0.5
Chandrapur	16	32.6 $\pm$ 0.8	72.4 $\pm$ 1.5	62.7 $\pm$ 1.7	67.1 $\pm$ 1.5	73.0 $\pm$ 2.0	9.9 $\pm$ 0.9	13.9 $\pm$ 0.8	13.7 $\pm$ 0.6
Bhandara	39	34.2 $\pm$ 0.7	72.7 $\pm$ 1.0	65.1 $\pm$ 1.2	72.3 $\pm$ 1.1	75.7 $\pm$ 1.4	8.7 $\pm$ 0.7	15.2 $\pm$ 0.6	13.0 $\pm$ 0.4
Nagpur	91	34.6 $\pm$ 0.8	74.3 $\pm$ 0.8	64.7 $\pm$ 0.9	73.7 $\pm$ 0.8	76.1 $\pm$ 1.1	9.2 $\pm$ 0.5	15.8 $\pm$ 0.4	13.5 $\pm$ 0.3
Wardha	96	34.8 $\pm$ 0.9	74.8 $\pm$ 0.8	64.4 $\pm$ 0.9	75.6 $\pm$ 0.8	78.4 $\pm$ 1.0	9.7 $\pm$ 0.5	16.6 $\pm$ 0.4	14.2 $\pm$ 0.3
Amraoti	77	32.9 $\pm$ 0.8	73.1 $\pm$ 0.8	58.4 $\pm$ 1.0	70.4 $\pm$ 0.9	77.3 $\pm$ 1.1	9.3 $\pm$ 0.6	15.6 $\pm$ 0.5	13.4 $\pm$ 0.4
Yeotamal	57	30.1 $\pm$ 1.0	74.4 $\pm$ 0.9	60.9 $\pm$ 1.1	71.7 $\pm$ 1.0	77.9 $\pm$ 1.2	9.0 $\pm$ 0.6	16.1 $\pm$ 0.5	13.6 $\pm$ 0.4
Washim	75	32.0 $\pm$ 0.6	76.3 $\pm$ 0.8	62.4 $\pm$ 1.0	74.2 $\pm$ 0.9	80.7 $\pm$ 1.1	10.8 $\pm$ 0.6	16.9 $\pm$ 0.5	13.8 $\pm$ 0.4
Buldhana	34	30.1 $\pm$ 1.0	74.5 $\pm$ 1.1	64.9 $\pm$ 1.3	74.0 $\pm$ 1.1	79.4 $\pm$ 1.4	11.1 $\pm$ 0.7	15.5 $\pm$ 0.6	13.2 $\pm$ 0.5
Akola	219	34.0 $\pm$ 0.6	72.8 $\pm$ 0.6	71.2 $\pm$ 0.7	68.8 $\pm$ 0.6	75.8 $\pm$ 0.8	11.5 $\pm$ 0.4	16.7 $\pm$ 0.3	15.1 $\pm$ 0.3

Means bearing same superscript for particular effect in a column do not differ significantly.

**, Significant at 1%, *, significant at 5%, NS, nonsignificant.



Fig. 4. Black hair line along the vertebral column extending up to tail in Berari goats

(BW), heart girth (HG), body length (BL), height at wither (HW), paunch girth (PG), horn length (HN), ear length (EL) and tail length (TL) above 2 years of age were 31.4 $\pm$ 0.6 kg, 73.3 $\pm$ 0.6 cm, 63.1 $\pm$ 0.7 cm, 71.3 $\pm$ 0.6 cm, 76.2 $\pm$ 0.8 cm, 9.6 $\pm$ 0.4 cm, 15.7 $\pm$ 0.3 cm and 13.7 $\pm$ 0.3 cm in Berari goats. The effect of location had significant source of variation for body weight and all morphometric character in Berari goats. DMRT showed that field had heavier goats (34.1 $\pm$ 0.5 kg) than farm (28.7 $\pm$ 0.8 kg), whereas, the field goats had higher morphometric character than farm goats. This might be due to the regular culling of old age goats at farm. Sex was

significant source of variation for body weight, chest girth, body length and height at wither. DMRT showed that male (34.5 $\pm$ 1.00 kg) had higher body weight than the female (27.3 $\pm$ 0.4 kg) also male had higher chest girth, body length and height at wither than female. Ravimurugan *et al.* (2009) reported higher body weight, height at a wither, body length, chest girth and horn length in Pallai Adu male than the female. The effect of district was found to be significant source of variation for body weight and all morphometric characters, and Berari goats at Nagpur, Wardha, Bhandara and Akola performed better than rest of the districts. The mean body height, length, girth and weight of Berari goats indicated that they belong to medium size goat category. Kumar *et al.* (2006) reported higher values for body weight, body height, body length and lower values for hearth girth and paunch girth in adult male and female for Kutchi goats than the present findings. The body weight and morphometric characteristics were comparable to Malbari (Verma *et al.* 2009), Sangamneri (Verma *et al.* 2010) and Kokan Kanyal (Verma *et al.* 2012) goats, lower than Gohilwadi (Verma *et al.* 2007) and Ganjam (Rao *et al.* 2009) goats and higher than Kanni Adu goats (Thiruvankadan and Panneerselvam 2009). Acharya (1982) reported that Sirohi, Beetal, Jhakrana, Jamunapari, Kutchi, Ganjam, had higher estimates with respect to chest girth, body length and height at wither than Berari goats. However, Mehsana, Gohilwadi, Zalwadi, Osmanabadi, Kanni Adu, had near about similar estimate for body measurement and Marwari, Barbari, Surti, Sangamneri, Malbari, Bengal, Gaddi, Changthangi and

Chegu had lower estimates for chest girth, body length and height at wither than present findings on Berari goats.

The Berari goat is low yielding medium size meat breed thriving well in tropical wet and dry climate. The breed had lower age at first oestrous, age at first kidding and higher litter size, which can be exploited for improving the breeding efficiency of local nondescript goat population.

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