



Characterization of local goats of Chhattisgarh plains

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ABSTRACT

There are 23 descript breeds of goat in India. However there is no recognized breed of goat registered by Chhattisgarh state hence requires systematic study for their characterization. The present study was undertaken to establish the norms of different physical characteristics, reproductive and productive performance traits and haematological profile of local goats of Chhattisgarh plains. Information was collected from Raipur, Durg, Rajnandgaon and Kanker districts of Chhattisgarh plain region. The average measurement for body weight, body length, height, ear length, face length, horn length and tail length for adult male were 31.05 ± 0.49 kg, 71.26 ± 0.6 , 74.44 ± 0.91 , 45.35 ± 0.71 , 16.14 ± 0.21 , 19.47 ± 0.18 , 15.85 ± 0.43 and 16.05 cm respectively. The corresponding values in adult female were 24.55 ± 0.47 kg, 61.13 ± 0.90 , 64.74 ± 0.73 , 37.37 ± 0.52 , 15.74 ± 0.24 , 18.41 ± 0.18 , 11.72 ± 0.57 , and 14.58 ± 0.22 cm respectively. The mean values for the reproductive performance traits i.e. age at first mating in male, age at first mating in female, age at first kidding and kidding interval were observed as 184 ± 0.05 , 216 ± 0.04 , 370 ± 0.4 and 184 ± 0.03 days, respectively, and average litter size 1.5. The mean values for the productive performance traits daily milk yield, total lactation milk yield and lactation length were recorded as 307.25 ± 13.16 ml, 32.29 ± 2.65 litres, and 105.75 ± 2.48 days, respectively. Different haematological parameters such as haemoglobin, packed cell volume, total erythrocytes count, total leukocytes count, mean corpuscular haemoglobin, mean corpuscular volume and mean corpuscular haemoglobin concentration were considered and value estimated as 9.35 ± 0.20 (g%), 28.9 ± 0.66 (%), 8.45 ± 0.17 (million/ μ l), $9,660 \pm 256.33$ (thousand/ μ l), 9.1 ± 0.22 (pg), 27.79 ± 0.0 (fl), and 32.39 ± 0.27 (%) respectively. Hence this study was aimed to phenotypically characterize the local goat in view of establishing a database for the breed and undertaking conservation programme for preserving rich indigenous genetic resources biodiversity.

Key words: Body measurements, Characterization, Goats, Morphological Characterization, Reproductive traits

The goat, a versatile animal, known as the 'poor man's cow' is a multi-purpose animals, producing meat, milk, skin and hair; and has tremendous potential to be projected as the 'Future Animal' for rural prosperity. Chhattisgarh is an agriculture dependent state and its most of the farmers are either small or marginal. Goats can be profitably raised with low investment under intensive and most extensive forms of nomadic grazing. Goat milk is known for its intense medicinal value, less allergic and easy digestible properties and therefore acts as a good source of protein to the poor section of the society. But the indiscriminate use of well recognized breeds like Jamunapari and Beetal etc. for grading up of local goats in the state is resulting in dilution of local germplasm. This has resulted in a drastic reduction in the number of local goats and the loss of their characteristics. The last few decades have witnessed serious

erosion of native germplasm and even extinction of several indigenous animal breeds in the world. Many existing breeds are facing varying degrees of threat, endangerment and are heading towards eventual extinction. It has been globally recognized that conservation and improvement of native animal genetic resources are essential for sustainable development in agriculture and animal husbandry. In view of conservation of animal genetic resources various conservation programmes are running in India (AICRP on cattle, Network Projects etc) and in other countries all over the world like Canadian Animal Genetic Resources Program (CAGR), FAO International Treaty on Genetic Resources for Food and Agriculture (ITGRFA), FAO Measurement of Domestic Animal Diversity (MoDAD), FAO National Focal Point for Animal Genetic Resources (NFP-AnGR), FAO Convention on Biological Diversity (CBD) etc. Hence this study was aimed to characterize the local goat in view of undertaking conservation programmes for preserving rich indigenous genetic resources biodiversity.

MATERIALS AND METHODS

Habitat and management: The Chhattisgarh a land locked state, is located between $80^{\circ} 15'$ and $84^{\circ} 20'$ East of

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Longitude and 17° 46' and 24° 5 North of Latitude and is about 300 m above the mean sea level. The climate of Chhattisgarh is tropical. It is hot and humid because of its proximity to the Tropic of Cancer and its dependence on the monsoons for rains. The state is broadly divided into 3 agro-climatic zones, comprising Northern hills, Chhattisgarh plains, and Bastar plateau. Local peoples call out goats as “Cheri” in their local language. Goats in Chhattisgarh are primarily maintained on grazing (either in morning or evening hours). Goats are also fed with local green grass and tree leaves of neem (*Azadirachta indica*), subabool (*Leucaena leucocephala*), peepal (*Ficus religiosa*), babul (*Vachellia nilotica*), ber (*Ziziphus nummularia*) etc. Farmers graze them at the outside areas of villages commonly known as ‘Khar’. Majority of farmers provide housing especially during night in small sheds made up of mud and straw commonly known as ‘Khottha’. Twin kidding is also very common in these local goats.

The information was obtained by survey conducted in Rajnandgaon, Durg, Raipur, and Kanker districts of Chhattisgarh plain region. During the survey the farmers were interviewed as per the standard questionnaire prepared by National Bureau of Animal Genetic Resources, Karnal (NBAGR). The data were recorded on about 783 goats (of different age groups) from 320 farmers spread in 4 districts of Chhattisgarh plain regions. Within each area of different

Table 1. Frequency distribution (%) of different qualitative parameters of local goats of Chhattisgarh Plains

Characteristics	Percentage	N
Body coat color		
Brown	58.45 %	187
Black	19.69 %	63
White	17.19 %	55
Multicolor	4.69 %	15
Belly color		
White Belly	43.13 %	138
Black Belly	8.75 %	28
Nil	48.13 %	154
Top line color		
Black Top Line	50.31 %	161
Nil	49.68 %	159
Horn orientation		
Erect	45.31%	145
Erect Twisted	40.62%	130
Backward Twisted	7.18%	23
Absent	6.87%	22
Ear orientation		
Horizontal	65.63%	210
Drooping	34.37 %	110
Head profile		
Straight	100%	320
Beard		
Present	24.38%	78
Absent	75.62%	242
Wattle		
Present	5.62%	18
Absent	94.38%	302

Table 2. Average values of body weight and different morphological parameters (at different age groups) of local goats of Chhattisgarh Plains

Morphological parameters	Age group							
	6-12 month		1-2 year		2-3 year		3-4 year	
	Male (n=144)	Female (n=133)	Male (n=77)	Female (n=81)	Male (n=110)	Female (n=140)	Male	Female (n=56)
Body weight (kg)	14.45±0.43	16.18±0.29	24.72±0.4	23.02±0.43	31.05±0.49	24.55±0.47	-	30.31±0.82
Body length (cm)	50.52±0.69	54.81±0.45	61.04±0.79	62.42±0.4	71.26±0.6	61.13±0.90	-	65.56±0.93
Height at wither (cm)	56.79±0.46	58.63±0.29	65.32±0.81	64.18±0.67	74.44±0.91	64.74 ±0.73	-	66.45±0.9
Height at belly (cm)	34.47±0.49	35.18±0.26	38.83±0.05	38.52±0.77	45.35±0.71	37.37±0.52	-	37.16±0.61
Ear length (cm)	14.56±0.37	14.3±0.38	16.41±0.29	16.76±0.29	16.14±0.21	15.74 ±0.24	-	16.08±0.38
Face length (cm)	17.52±0.2	14.78±0.17	17.65±0.31	18.44±0.23	19.47 ±0.18	18.41±0.18	-	18.29±0.22
Horn length (cm)	8.45 ±0.42	8.84±0.63	10.02 ±0.7	10.83±0.42	15.85±0.43	11.72±0.57	-	12.97 ±0.51
Tail length (cm)	13.36 ±0.24	13.93±0.1	15.44±0.25	14.71±0.15	16.05 ±0.23	14.58±0.22	-	15.41±0.30
							Male	Female (n=42)
							> 4 yrs	
							-	31.07±0.61
							-	67.71±0.75
							-	68.85 ±0.76
							-	39.33 ±0.57
							-	17.95±1.06
							-	19.04 ±0.2
							-	16.44±0.65
							-	15.45±0.35

In the last 2 age groups i.e. 3-4 yrs and > 4yrs only few male goats were available because farmers generally sell their male goats up to the age at 3 yrs, hence male goats were excluded from the study.



Figs 1-7 Coat colour in local goats: 1. Brown; 2. black; 3. white; 4. multi-colour; 5. white belly; 6. Black belly; 7. Black ring at neck and Black top line in bucks.

districts goats were selected randomly. Information regarding managerial practices, feeding practices, different physical qualitative parameters (body coat color, horn orientation, ear orientation etc), was collected. The milk yield was estimated on test day milk record basis. The information for productive and reproductive parameters was basically obtained by the information given by the farmers as in the villages the farmers generally do not maintain records.

Animals of both sexes were measured using a standard measuring tape as per standard procedure described by Jimcy *et al.* (2011). The different morphological parameters measured in the present study were body weights, body length, height at wither, height at belly, ear length, face length, horn length and tail length. The reproductive parameters recorded in this study were age at sexual maturity in males and females, age at first kidding, kidding interval and litter size. The productive parameters recorded were daily milk yield, total lactation milk yield and lactation length. To study the haematological parameters (total erythrocyte count, total leukocyte count, haemoglobin content, packed cell volume and mean corpuscular volume) 20 blood samples were collected randomly from each district (10 sample from adult buck and 10 from adult doe). From each goat about 5 ml blood was collected in EDTA coated vacutainer tube. All the haematological parameters were estimated using automatic haematological analyzer.

Statistical analysis: Mean, standard deviation, standard error and coefficient of variation of different parameters

were calculated as per the standard method given by Snedecor and Cochran (1989).

RESULTS AND DISCUSSION

General morphological characteristics: The frequency distribution (%) of different qualitative parameters of local goats of Chhattisgarh Plains is presented in Table 1. The local goats of Chhattisgarh state are small sized, strong and hardy having short to medium size legs. Head is straight. Forehead is medium to broad in size. Beard is also observed in some goats. Males have significantly more proportion (37 %) of beard than female (16%). Wattles are also seen in these local goats but with very low frequency (6%). In

Table 3. Average values of reproductive and productive parameters of local goats of Chhattisgarh Plains

Reproductive traits	N	Mean±SE
Age at first mating in males	127	184±0.05 days
Age at first mating in females	118	216±0.04 days
Age at first kidding		370±0.4 days
Kidding interval		187±0.03 days
Litter size		1.5
Single birth%		47% (n= 56)
Twin birth%		51% (n=61)
Multiple birth%		2% (n=03)
Productive traits		
Daily milk yield	118	307.25±13.16 ml
Total lactation milk yield		32.29 ±2.65 liters
Lactation length		105.75±2.48 days



Fig. 8. Horn patterns and ear pattern of Chhattisgarhi goats (a,b,c,d,e).

Table 4. Average values of hematological parameters of local goats of Chhattisgarh Plains

	Hb (g %)	PCV (%)	TEC (million/ μ l)	TLC (thousand/ μ l)	MCV (fl)	MCH (pg)	MCHC (%)
Male (n= 40)	9.28 $\pm$ 0.27	28.2 $\pm$ 0.92	8.61 $\pm$ 0.22	9770 $\pm$ 0.76	27.72 $\pm$ 0.09	9.13 $\pm$ 0.32	32.95 $\pm$ 0.38
Female(n= 40)	9.42 $\pm$ 0.30	29.6 $\pm$ 0.93	8.3 $\pm$ 0.26	9550 $\pm$ 0.74	27.85 $\pm$ 0.1	8.87 $\pm$ 0.31	31.83 $\pm$ 0.33

males, incidence of wattle is negligible, only 2%, whereas in females, incidence is 8%.

Body coat color: The most predominant body coat color is brown (58%) (Fig. 1) followed by black (20%) (Fig. 2), and white (17%) (Fig. 3). In the present study 5% animals having multi-color patterns were also observed (Fig. 4). The local goats showed some distinct color marking at belly region i.e. white or black color (Figs 5, 6). Black ring around the neck and top line is predominantly seen in males (Fig. 7). Ekambaram *et al.* (2011) observed that in Mahabubnagar goats the predominant coat colour is bicolour (63.5%) followed by single colour (25%) and multicolour (11.5%). Mishra *et al.* (2012) observed that in Bundelkhandi goats predominant color is jet black. Kuralkar *et al.* (2013) found that in Berari goat of Maharashtra predominant color is brown (95%), while about 5% animals having blackish brown color with glossy hair.

Horn orientation: Horns were noticed in both the sexes (93%) of local goats while only 7% goats were polled (Fig. 8 a-c). In Chhattisgarhi goats the proportion of straight horn, and curved horns was nearly equal (40–45%). The orientation of horn was mostly upward-backward (87.1%). Ekambaram *et al.* (2011) reported curved horns (96.04%) in animals of both sexes in Mahabubnagar goats. Kuralkar *et al.* (2013) reported straight horn pattern in most goats of Berari breed.

Ear pattern: The horizontal ear orientation is predominant (65%) among goats of Chhattisgarh plains (Fig. 8 d-e). Drooping ear is less frequent close to 33% in all the districts. Deshpande *et al.* (2010) reported leafy pendulous or tubular orientation of ear in Surti goat. Ekambarm *et al.* (2011) reported that in Mahabubnagar goat 91.50% goats had pendulous, 4.59% erect and 3.84% horizontal ear orientation.

Body measurement and body weights: The average body weight, body length, height at wither, height at belly, ear length, face length, horn length and tail length at different age groups (in both sexes) are presented in Table 2. In the first age group i.e. at 6–12 month of age body weight and all morphological parameters of male goats are significantly lesser than female (as compared to other groups) may be due to hormonal effect that is non release of androgen (which is known to have growth and weight-stimulating effects) in male animals until the testes are well developed. Body weight and all morphological parameters showed an increasing trend (in both the sexes) in all age groups. The body weight and morphometric characteristics of local goats of Chhattisgarh plains were comparable with Pallai Adu goats (Ravimurugan *et al.* 2009), Sangamneri goats (Verma *et al.* 2010b), and lower than Berari goat of Maharashtra

(Kuralkar *et al.* 2013).

Reproductive traits: The mean values for different reproductive (in both sexes) parameters are presented in Table 3. The Chhattisgarhi local goats attains quicker maturity and the incidence of twins kidding is very common in these local goats (Table 3). The lower value of age at first kidding indicated that this local goat is well adapted in this agro climatic region. The reproductive parameters are comparable with Pallai Adu goat (Ravimurugan *et al.* 2009) and lower than Konkan Kanyal goat (Verma *et al.* 2010a).

Productive traits: The mean values for different productive parameters are presented in Table 3. Milk production of local goats is very less and is sufficient to feed their kids only. Generally farmers do not milk the animal. Kids are let loose and suck the does, moreover the kids grow and start to take fodder or concentrate at the age of 3–3.5 months as a result udder dries up. Hence short lactation period of this local goat may be due to lack of attention by the local people for this trait. People of this region keep this local goat for meat purposes hence improvement in this trait received no attention during the course of evolution. The productive parameters are comparable with non-pashmina goat at Laddakh (Roy *et al.* 2007), and lower than Mehasana goat (Singh *et al.* 2010) and Bundelkhandi goat of central India (Mishra *et al.* 2012).

Haematological parameters: The mean values for haemoglobin, packed cell volume, total erythrocytes count, total leukocytes count, mean corpuscular haemoglobin, mean corpuscular volume and mean corpuscular haemoglobin concentration in both sexes are presented in Table 4. Values of all the haematological parameters except haemoglobin and pack cell volume were higher in males than in females.

From the present investigation it may be concluded that the local non-descript goats of Chhattisgarh plains have unique physical, reproductive and productive performance characteristics, which are quite different from the animals of other regions/state and also from the other recognized breeds. Hence, they may be considered for registration as distinct breed/strain.

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