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Macherla: A new mutton type sheep population of southern India

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ABSTRACT

Phenotypic characterization and evaluation of Macherla sheep population was done by undertaking survey in Guntur and Prakasham districts of Andhra Pradesh. Macherla animals are medium to large in size, mainly in white coat colour with large brown or black patches in the body, face and legs. The animals with brown patches are known as Macherla brown in breeding area. Convex nasal bridge, leafy ears, black muzzle and black/brown and white coat colour is predominant. Males are horned and females are polled, however some females are noticed with horns in few flocks. The horns are oriented backward, downward and forward. Ears are medium to large in size and leafy/semi-drooping. Tail is very small and thin. The adult body weight ranged from 38 to 69 kg in rams and 25 to 60 kg in ewes. The overall body length, height, chest girth, face length, face width, ear length and tail length were 70.07±0.32, 77.05±0.31, 87.75±0.41, 25.46±0.21, 10.49±0.08, 16.11±0.09 and 9.67±0.15 cm, respectively. The study revealed that the Macherla sheep is phenotypically different from other sheep breeds of the region and famous for mutton production as well as livelihood security of the farmers maintaining this sheep population.

Keywords: Andhra Pradesh, Body biometry, Body weight, Macherla sheep, Phenotypic characterization

Sheep is an important species under the small ruminant category in India. India is bestowed with rich diversity in sheep genetic resources in the form of 44 registered breeds, which are well-adapted in specific agro-climatic regions. India ranks third in the world with 74.26 million sheep and about 13.8% of the total livestock is contributed by sheep (20th Livestock Census). Andhra Pradesh ranks 2nd with 17.63 million sheep and accounts for 23.74% of India's sheep population and is lifeline for large section of landless agricultural laborers, small and marginal farmers. Apart from registered sheep breed, there are some populations which deserves for registration as new breed (Mishra *et al.* 2016) and Macherla sheep is one of them. Keeping this in view, the present study was undertaken to evaluate and characterize Macherla sheep in its breeding tract.

MATERIALS AND METHODS

The present study and survey was conducted in 29 villages belonging to Guntur and Prakasham districts of Andhra Pradesh. For the purpose of study, 31 sheep flocks having a population of about 4000 were surveyed from December 2018 to September 2019. The body biometric traits, viz. body length (BL), height at wither (HW), chest girth (CG), paunch girth (PG), ear length (EL), face length (FL), face width (FW), tail length (TL) and body weight (BW) were measured from 245 adult animals (44 male and 201 females). Body weights of 133 lambs belonging to different age groups from birth to 12 months of age were also recorded. The body weight was recorded using weighing balance and biometric traits were recorded using measuring tape (Cilek 2015a). Information relating to management practices, diseases prevalence and mortality, breeding and reproduction, and disposal of wool, dung and live animals were collected through interaction with the sheep farmers on a Proforma developed for phenotypic characterization of sheep genetic resources. Various physical traits, coat colour pattern, head profile, ear orientation, production performance, reproduction management practices were collected by persona observations and interviewing sheep farmers. The data were statistically analyzed using one way ANOVA technique (Snedecor and Cochran 1989).

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RESULTS AND DISCUSSION

Distribution and habitat: Macherla sheep is famous for mutton production and distributed in the villages adjacent to Krishna river in Guntur, Krishna and Prakasham districts of Andhra Pradesh and Nalgonda district of Telangana. It is also known as Gukkala jala and Guntur local. The name of breed is derived from Macherla town located at 16.48°N 79.43°E with an average elevation of 136 metres above mean sea level in Guntur district. The average rainfall in the district is 830 mm. The rain is experienced mostly by both south-west monsoon and the retreating monsoon.

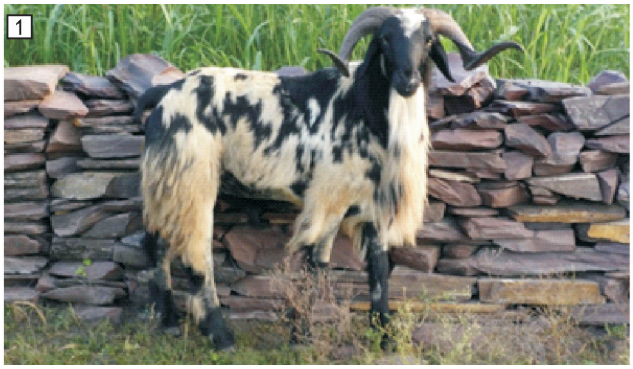

Fig. 1. Macherla male

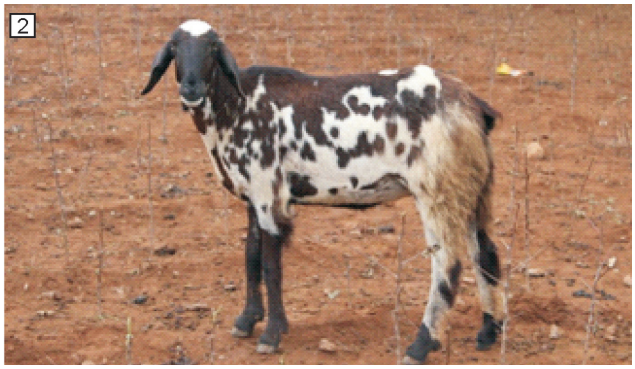

Fig. 2. Macherla female

Phenotypic characteristics: Macherla animals (Figs 1 and 2) are medium to large in size with coat colour mainly white with large black or brown patches in the body, face and legs, which is the characteristic of this breed. The brown patches animals are known as Macherla brown in breeding tract. The nasal bridge is convex, leafy ears; black muzzle and black/brown and white coat colour are predominant. Females are polled and males are horned. However, some females are noticed with small horns. In majority of animals, horns were oriented backward, downward and forward. The average horn length is 38.47±1.75 cm which vary from 16 to 63 cm in males. The ears are leafy/semi-drooping type and medium to large in size. The pendulous lobules (wattles) hanging from the throat region are seen in both males and females and are present in about 70% of animals. Chaudary *et al.* (2015) studied Macherla brown sheep population and reported that wattles are present only in 42.86% of animals. The tail is very small and thin and most of farmers practiced docking with a belief that there is better growth rate. The udder is medium sized and developed with medium teats. The body of animals covered with coarse hair and shearing is not at all practised by the sheep farmers. Farmers reported rearing of Macherla sheep since more than last 40–50 years.

Body weight and biometry: The mean body weight and biometry of adult Macherla sheep and average body weight of lambs are given in Tables 1 and 2, respectively. There is significant difference between male and female for all the biometric traits under study except face length and tail length in accordance with some previous studies (Cilek 2015a, Mishra *et al*. 2016). The body weight and body biometry of Macherla in present study is in accordance with Nellore sheep (Harini *et al.* 2019) of Andhra Pradesh, which is the most populous sheep breed of the India also. The body weight of Macherla is also in accordance with recently registered mutton type Kajali sheep of northern India (Mishra *et al*. 2016). Body weight of lambs in the age groups of 1–3, 3–6 and 9–12 months ranged between 4–26, 18–37 and 24 – 50 kg, respectively. Although this value is lower than the lambs of some sheep breeds (Cilek and Gotoh 2015, Korkmaz and Emsen 2020) but it is better than the lambs of some breeds (Mishra *et al*. 2016). It can be said that the lambs of this sheep breed have a good growth performance under extensive conditions. The perusal of body weight of lambs indicates that Macherla is a promising sheep for mutton production. The study also revealed that about 75% Macherla adult males weighed more than 50 kg and 49.24% adult females weighed from 40 to 60 kg and 14.72% more than 60 kg. The body biometry and body weight of lambs as well as of adults (Table 1 and 2) reflect that growth of lambs is suitable for mutton production and Macherla animals are comparatively large in size.

Management: The average flock size of Macherla was observed to be 141.10, and varied from 50 to 313 animals. The composition of Macherla sheep flocks consisted of 3.48 male, 108.35 female and 24.13 lambs. Among total surveyed flocks, 71.19% are of pure Macherla flock. Besides rearing sheep, almost all sheep farmers rear goat and some farmers also rear cattle and buffalo along with goat.

Table 1. Body weight (kg) and body measurements (cm) of adult Macherla sheep

Trait	N	BW	BL	Height	CG	PG	FL	FW	EL	TL
Overall	245	45.81± 0.53	70.07± 0.32	77.05± 0.31	87.75± 0.41	88.84± 0.51	25.46± 0.21	10.49± 0.08	16.11± 0.09	9.67± 0.15
Sex		**	**	**	**	**	NS	**	NS	**
Male	44	55.76± 1.17	72.89± 0.71	81.11± 0.59	93.30± 0.96	92.11± 1.33	25.82± 0.44	11.36± 0.26	15.99± 0.23	10.84± 0.28
Female	201	43.59± 0.46	69.46± 0.35	76.16± 0.32	86.53± 0.40	88.12± 0.54	25.38± 0.23	10.29± 0.08	16.14± 0.10	9.37± 0.16
Range M		38–69	64–82	65–88	80–107	71–107	22–36	8–14	13–20	6–14
	F	25–60	56–83	65–93	70–102	63–110	19–33	7–13	10–19	4–14

**Significant at P≤0.01; NS, non-significant.

Table 2. Body weight of Macherla brown lambs (kg)

Age	1–3 months	3–6 months	9–12 months
Overall	13.69±0.61 (78)	25.47±0.84 (35)	37.27±2.08 (17)
Sex	*	NS	NS
Male	11.71±1.12 (28)	26.60±3.67 (5)	40.69±3.03 (8)
Female	14.81±0.67 (50)	25.28±0.81 (30)	34.22±2.59 (9)
Range	4–26	18–37	24–50

**Significant at P≤0.05; figures within parentheses are number of observations.

The sheep are maintained in extensive system of management; however, 25.81% farmers provide concentrate to sheep especially during breeding season, pregnant ewes and lambs up to weaning. Few farmers feed neem leaves to the lambs. The grazing practices and other management practices are given in Table 3. Majority of Macherla sheep farmers grazed their sheep from 9 or 9:30 AM to 6 or 6:30 PM (9–11 h). The distance covered by majority of sheep farmers (71%) for grazing was approximately 8 to 10 km. The long distance covered by farmers is mainly due to reduction of grazing materials in nearby area. Farmers also informed that they utilized roadsides, harvested field, and barren lands as main resource for grazing their sheep. This finding is similar to Chaudary *et al.* (2014).

Out of total farmers surveyed, 48.39% of farmers kept sheep in open area and rest provided night shelter to their animals. Farmers are getting some money for penning the flocks in harvested agriculture land (₹ 3/sheep per night) and also earning by selling the sheep droppings (₹ 800 to 1000 per tractor trolley) in conditions of 2021 year. The marketing age for sale of male lambs was 3 months as reported by 63.33% farmers and the price of male lambs was ₹ 2000 to 4000 (Table 3), however the cost of old aged ewes varied from ₹ 3000–6000. The sale price of aged/ culled ewes depends upon condition of individual sheep. However, the price of breeding ewes ranged from ₹ 8000 to 10000. The price of Macherla breeding ewes is higher side than that reported by Mishra *et al.* (2020) for Chitaragi sheep, of north-western India. On every Saturday, there is an animal sandy at Macherla town for sale and purchase of animals, especially sheep and goat, that may be a reason for higher cost of animals. The lamb mortality is 10–15% as informed by 74.19% of sheep farmers. Lamb mortality rate has been found to be lower than some studies (Cilek 2015b). Adult sheep mortality is ≤5% (Table 3). These values are indicative of a successful breeding. The farmers vaccinate their animals against FMD, PPR, sheep pox, ET and BT through Department of Animal Husbandry, Andhra Pradesh and the major diseases noticed were FMD, PPR, Pox and ET in adults and pneumonia in lambs. Few farmers used to make ear notches as marks for identifying their animals, when it goes for grazing (Fig. 3).

Reproductive performance: The sheep farmers follow natural mating system for the breeding of their sheep with 3.23 breeding rams per flock and ram-ewe ratio of 1:33.59. For estimating the number of rams per flock, the total

Table 3. Management practices adopted by Macherla sheep farmers

Particular	Item	% of sheep farmers
Management		
Grazing	< 8 km	26.67
Distance travelled	8 to 10 km	71.00
	>10 km (up to 20 km)	3.33
Grazing hours	≤ 8 h	19.35
Time: 9 or 9:30 AM to 6 or 7 PM	9 to 11 h	80.65
Housing pattern		
Nature of housing	Separately	77.41
	Part of residence	22.58
Type of housing	Open	48.39
	Closed	51.69
Marketing age	< 3 months	13.33
	3 months	63.33
	3–4 months	23.33
Lamb cost at marketing age (₹)	2000 to 4000	76.67
	4000 to 5000	23.33
Breeding practices		
Age at first breeding	<12 moths	3.33
Males	12–15 months	73.33
	18 months	23.37
Age at first lambing	< 18 months	33.33
	18–24 months	63.33
	> 24 months	3.33
Lambing %	70–80	31.03
	80–85	68.97
Twinning %	0	6.67
	1–5	30.00
	5–15	26.67
	15–20	23.33
	>20	13.33
Disposal age	8–9 years	20.00
	>9 years	80.00
Health management		
Lamb mortality (until weaning)	≤10%	12.90
	10–15%	74.19
	15–20%	12.90
Adult mortality	≤ 5%	61.29
	5–10%	32.26
	>10%	6.45

Fig. 3. Notched ear marking.

number of breeding ewes was divided by number of breeding rams available. The farmers select their rams based on body conformation, size and colour pattern. Chaudary *et al.* (2014) reported 1 breeding ram for 30 to 50 ewes and Saravanakumar (2003) reported ram to ewe sex ratio as 1:20 in Nellore sheep breed. We can say ram to ewe sex ratio is at ideal value. The females show sexual maturity at about 12 months of age and the age at first lambing is reported as 18 to 24 months by 63.33% farmers with an average of 80 to 85% of annual lambing (Table 3). This rate is similar to that reported by Mishra *et al*. (2020). In the native tract of Macherla sheep, two lambing season is reported one is January to March and other from August to October. Twinning was 5 to 15% by 26.67% of farmers and 13.33% farmers reported it even >20%. This rate is comparable with Mishra *et al.* (2016) and Mishra *et al*. (2020).

The study reveals that Macherla sheep is phenotypically distinctive from the other registered sheep breeds of that region and farmers preferred it because of its size and better growth rate. This new sheep population should be register as a new sheep breed of India and yield levels should be increased.

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