



Physical characteristics of Kosali breed of cattle in its native tract

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ABSTRACT

Kosali, the first breed of cattle from Chhattisgarh, was registered as 36th breed. Characterization is essential to guide decision-making in livestock development and breeding programmes. Hence, a survey was carried out to characterize the Kosali breed of cattle in Central Plain Region of Chhattisgarh state. The coat colour of most animals was red followed by white and black. Mostly muzzles, tail switch, eyelashes, and hooves were black in colour. Body size, hump, dewlap, naval flap, penis sheath flap, udder and teats were small in size. Horns were stumpy, small and slightly inward and ears were horizontal. The estimated average live weight of adult female and male were 168.7±2.82 and 212.5±3.8 kg, respectively. The mean linear measurements of female vs male Kosali cattle were height at wither (99.79±2.76 vs 103.4±2.11 cm), body length (96.56±1.87 vs 99.89±2.32 cm) and chest girth (119.98±1.98 vs 137.12±2.8 cm). Kosali cattle are smaller in size and are well adapted to the existing agro-climatic conditions of the region. Appropriate breeding strategies and conservation models should be designed for overall improvement of this breed.

Key words: Central plain region, Characterization, Chhattisgarh, Kosali cattle, Physical characters

In India, there are 41 registered breeds of cattle adapted to a wide range of agro-ecological conditions (<http://www.nbagr.res.in/cattle.html>). In Chhattisgarh, livestock are raised as a part of mixed farming systems and are closely associated with socio-economic and cultural ethos of the farming community. Chhattisgarh is very rich in its livestock wealth and has 9.81 million cattle heads (19th Livestock Census) which is 65% of total livestock population (Anonymous 2014). Kosali is one of the 41 well characterized breeds of Indian cattle (Accession No. INDIA_CATTLE_2600_KOSALI_03036). Kosali is the first and only breed of cattle from Chhattisgarh registered as the 36th breed. Kosali derives its name in view of the historical name of the Chhattisgarh as 'Kosal Pradesh'. Kosali breed is mainly distributed in Central Plain Region of Chhattisgarh. In general, these animals are smaller in size with poor milk production potential and are well adapted to the existing agro-climatic conditions of the region.

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Characterization is essential to describe geographical distribution, managerial practices, physical and functional characteristics, morphometric measurement, production and reproduction performances, breeding practices, constraints in efficient utilization of the breed and to use the information generated as baseline data to guide decision-making in livestock development and breeding programs. Hence, the present survey was undertaken to study the characteristics of the Kosali breed of cattle.

MATERIALS AND METHODS

Study area and data collection: From the breeding tract of Kosali, 3 districts viz. Rajnandgoan, Baloda bazaar and Bilaspur were selected. In each district, 4 blocks and in each block 5 to 7 villages were selected at random by stratified two-stage random sampling technique. Data were collected in structured questionnaires as designed by ICAR-NBAGR, Karnal through interviews and group discussion. Based on the outcome of discussion and earlier studies, information was gathered about the origin, its geographic distribution, special distinguishing features of the breed and existence of sub-groups within the breed etc.

Direct count of Kosali cattle was carried out in the *Gowthan* (common gathering place of animals) or sampled households within the villages and in some communal grazing lands. Based on this information, the proportion of Kosali cattle out of the total cattle population in the villages

was calculated and subsequently superimposed on all corresponding similar villages in the district to estimate the Kosali population at the district level. Linear body measurements were taken using a standard textile measuring tape, and qualitative and quantitative traits were recorded.

Types of data: Various qualitative traits (coat colour pattern, coat colour type, skin colour, muzzle colour, eyelids colour, hooves colour, facial profile, horn shape, horn orientation, horn colour, ear orientation, hair type, hair colour, tail switch colour, udder size, teat size, type of milk vein and hump size) were observed on 2,400 animals. Similarly, quantitative traits (weight, chest girth, body length, height at wither) were also recorded at least on 400 animals at different ages. Weight of adult animals was calculated using Agarwal’s modified shaffer’s formula (<http://ecoursesonline.iasri.res.in/mod/page/view.php?id=58053>). Udder size and shape, teat and milk vein were judged in both dry and milking cows. Adult females (942) were considered for these traits.

Data management and analysis: The data collected from the field and secondary sources were entered in to database using Excel 2007 software. The data were subjected to statistical analyses as per Snedecor and Cochran (1989) and the results obtained are presented as mean and standard error.

RESULTS AND DISCUSSION

Kosali cattle are mainly concentrated in Central Plain Region (15 districts) spread in 68.49 lakh hectare of geographical area of state with 31.32 lakh estimated population. It is situated between 19.8 to 22.7°N and 80.3 to 83.6°E, latitude and longitude, respectively.

Colour and hair characteristics: Three main coat colours namely red, white and black were observed but some mixed coloured animals were also observed (Fig. 1). Approximately, 54% of Kosali cattle were had red coat colour followed by white (36%), black, and greyish white (5.5%) and mixtures of other colours (4.5%). Different coat colours were also reported in other breed of cattle (Pundir *et al.* 2015a, b, Singh *et al.* 2008b, Sharma *et al.* 2013). The most frequent skin colour was brownish followed by greyish black and whitish black. Majority of Kosali animals (90%) had black muzzle, eyelashes, tail switch and hooves followed by brown or white. There seems to be association between the hoof, muzzle, eyelash and tail switch colour, and may be these traits are controlled by a common gene with pleiotropic effect or the genes controlling these traits may have close linkage. Majority of Kosali cattle (77%) had short hairs followed by medium and long hairs. In general, animals had shining hairs (71%), however, some animals (29%) had dull hairs. Almost all the animals (98%) had straight hairs.

Facial profile: The shape of the forehead was little concave or flat. Pole was prominent and horns were stumpy and straight or slightly curved inward (Fig. 1) (noticed in 62% cases). Ears were horizontal i.e. parallel to the ground.

Body and udder characteristics: Adult males had better-

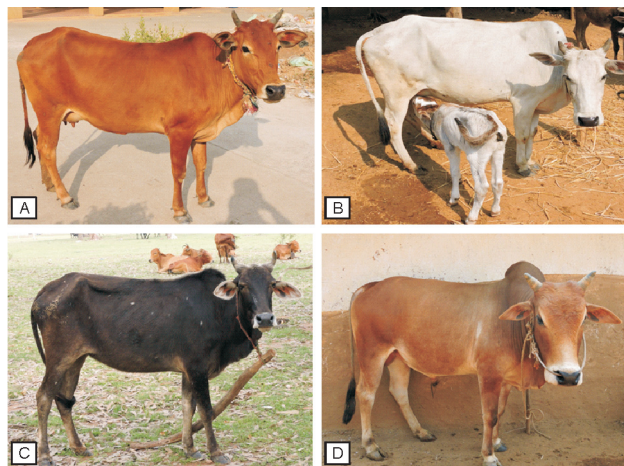


Fig. 1. Different coat colour and facial characteristics in adult Kosali female (A, B, C) and male (D).

developed hump and dewlap than the females. Frequency of small sized hump and dewlap were proportionately higher (more than 55%) followed by medium and large size. Loose skin was not observed in Kosali cattle which is why these animals are being used for draft purpose. Naval flap was mostly small (72%) followed by medium and large naval flap size. Large number of cattle falling under small naval flap size indicates that the breed is draft purpose and especially useful for transportation and agriculture operations. Size of penis sheath was also small in majority of the male animals (58.5%).

Udder was small and rounded (56%) or bowl (41%) in shape. In present study, 87% cows had cylindrical teat followed by funnel (11%) and pear (2%) shaped. Teat tip was rounded in majority of the cases. Milk vein was small in size (77%). Different types of udder shape and teats were also reported in different breeds of cattle (Pundir *et al.* 2015a, Singh *et al.* 2008b, Sharma *et al.* 2013).

Temperament: Kosali is an alert breed with moderate temperament. It was observed that when animals were with their owners, they exhibited docile temperament. Most of the animals showed docile to moderate temperament (78%). About 14% animals exhibited tractable temperament while 8% animals were ferocious in nature. These tendencies were more in males than in females.

Functional characteristics of the breed: Growth trait is one of the important functional traits which plays an important role in reproduction and production. The growth

Table 1. Body weights (kg) of Kosali cattle at different ages

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	14.3±0.69	12–18	35	13.4±0.89	11–16	42
6–12 months	62.4±1.58	53–70	103	59.3±1.18	50–65	167
12–24 months	92.3±1.93	75–101	78	85.6±1.89	70–95	103
Adult weight	212.5±3.8	180–250	98	168.7±2.82	155–190	300

Table 2. Morphometric measurement of Kosali cattle at different ages

Parameter (Trait)	Years (Month)	Male			Female		
		Range	N	Average	Range	N	Average
Chest girth (cm)	0–6 M	41–60	162	55.18±2.19	34–56	298	54.22±2.43
	12–24 M	65–80	191	84.67±3.11	60–75	278	81.12±2.39
	Adult	127–149	223	137.12±2.18	114–131	491	119.98±1.98
Body length (cm)	0–6 M	42–58	162	48.67±1.87	43–53	298	47.48±2.21
	12–24 M	68–78	191	72.56±1.59	65–73	278	68.56±1.43
	Adult	90–102	223	99.89±2.32	88–98	491	96.56±1.87
Height at withers (cm)	0–6 M	45–60	162	49.14±2.10	43–55	298	48.67±1.89
	12–24 M	65–79	191	72.11±1.69	60–75	278	69.45±1.96
	Adult	93–112	223	103.34±2.11	88–101	491	99.79±2.76

rate serves as a check on feeding systems and management efficiency for rearing calves and it influences the maturity age and lifetime productivity of cows. Body size is evaluated as weight at a stated level of condition or body fatness. Kosali cattle were small to medium in its stature. Percentage of small sized adult animals was 58.80 while the remaining were medium sized. Since the animals are meant for draft purpose, the weights recorded were quite less than well known milch breeds of India. The body weights of Kosali cattle at various ages estimated based on Agarwal's modified shaffer's formula are given in Table 1. The birth weight of Kosali calves varied between 11 to 18 kg. Pooled mean birth weight of the Kosali calves was 13.78 kg under the rural management conditions. Males of all ages weighed more than females. The average weight at first calving in Kosali cows was 160.3±1.94 kg. Mean body weight of Khariar (Dhal *et al.* 2007), Ghumusar (Samantray *et al.* 2009), Manipur (Pundir *et al.* 2015b), and maturity weight of Malnad Gidda (Singh *et al.* 2008b) and Vechur (Iype 1996) cattle were lesser than the mean adult body weight of Kosali cattle. However, Kosali cattle weighed lesser than Khillar (Gokhale *et al.* 2009), Bachure (Chandran *et al.* 2014) Hallikar (Singh *et al.* 2008a) and Red Kandhari (Pundir *et al.* 2008) cattle.

Morphometric measurements: Body length, chest girth and height at withers are major body measurements, which reflect the growth and general physiological status of the animal. Overall mean values along with standard error of the morphometric traits, viz. body length (BL), height at withers (HW), chest girth (HG) for adult males and females were estimated and are given in Table 2. Height at withers and body length of Kosali cattle were almost similar to each other whereas the chest girth was higher than these measurements at all ages. All the measurements were higher in males than females. Tail reached to below the fetlock joint point. Sex effect was found to be significant for the chest girth only. The district effect was non-significant for rest of the traits studied, which indicates that Kosali cattle of Central Plain region of Chhattisgarh are more or less consistent in respect to body measurement traits.

The mean values of morphometric traits observed in the adult Kosali cattle were comparable to the findings of Dhal *et al.* (2007) in Khariar, Sharma *et al.* (2013) in Purnea,

Pundir *et al.* (2015a, 2015b) in cattle of Manipur and Mizoram. Adult Kosali cattle had comparatively lesser mean morphometric values than those reported by Singh *et al.* (2008a) in Hallikar, Pundir *et al.* (2008) in Red Kandhari, Gokhale *et al.* (2009) in Khillar, Chandran *et al.* (2012) in Red Purnia, Chandran *et al.* (2014) in Bachaur and Pundir *et al.* (2007) in Kenkatha cattle. However, mean morphometric values of adult Kosali cattle observed in present study were higher than those reported by Singh *et al.* (2008b) in Malnad Gidda, Susamma (1996) in Vechur and Punganur (https://en.wikipedia.org/wiki/Punganur_cattle) cattle. The variations in these traits among different Indian breeds might be due to different genotypes, environmental factors and the interactions between these factors.

To the best of authors knowledge, this is the first systematic study on Kosali breed of cattle in Central Plain Region of Chhattisgarh. From this study, it may be concluded that Kosali cattle have unique physical characteristics. Kosali cattle are small sized, draft purpose breed, possessing most frequent red coat colour, stumpy horn, horizontal ear and are well adapted to the existing agro-climatic conditions of the region. Hence, it has been registered as a distinct breed. True genetic potential should be assessed by providing adequate nutrition, management and healthcare. There is large variation in production parameters and above average animals should be selected for breeding. Studies are also required on disease resistance parameters, economic viability of the breed and evaluation of milk quality.

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