



Physical features, management and performance of Konkan cattle

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ABSTRACT

The Konkan cattle are reared in all the districts of Konkan region of Maharashtra and Goa. In this study, phenotypic characterization of the Konkan cattle was carried out through systematic survey in its breeding tract and the breed descriptors were developed for its registration as a distinct breed. The population of Konkan cattle in the breeding tract is expected to be more than 6.0 lakhs. Konkan cattle are small to medium sized with compact body. The coat colours of Konkan cattle included Reddish dun, black, white, grey, brown or fawn or mixed, of which first two were in majority of animals. Biometry of 609 animals, which included 9 different body measurements in different age and sex groups, was recorded. When compared with Vechur and Malnad Gidda breeds of cattle of the coastal area of Kerala and Karnataka, the body weight and body measurements of Konkan cattle were found higher. The average horn length of Konkan cattle was 19.82 and 23.91 cm in cows and bullocks, respectively. The animals were kept in herd size varying from 2 to 20 with an average of 6.18 animals under extensive production system. The average age at first calving was 49.27 months with a calving interval of 17.21 months. It was observed that the average daily milk yield and peak milk yield of Konkan cattle were 2.23 and 3.28 kg. Animals of this breed are playing a significant role in the rural livelihood of farming community in terms of milk and bullocks power for agricultural operations in the hilly terrain of Konkan region. The unique physical features, biometry and their production system impart Konkan cattle population a distinct identity, therefore, it has been recently registered as a new cattle breed of India by Indian Council of Agricultural Research with accession number as INDIA_CATTLE_1135_KONKANKAPILA_03043 in the name of Konkan Kapila. Keeping in view the contribution of Konkan breed of cattle, State Animal Husbandry Department should come forward for further development and genetic improvement of the breed.

Key words: Biometry, Cattle, Characterization, Konkan, Performance, Population status

Understanding the diversity, distribution, basic characteristics, comparative performance and the current status of animal genetic resources is essential for their efficient and sustainable use, and conservation. Complete national inventories, supported by periodic monitoring of trends and associated risks are basic requirements for effective management of animal genetic resources. Without such information, some breeds/populations and unique characteristics they contain may decline significantly, or be lost, before their value is recognized and measures taken to conserve them. Konkan region of Maharashtra (Thane, Raigad, Palghar, Ratnagiri and Sindhudurg districts) possess 11.01 lakh cattle, which is about 60% of total livestock in the region. Interestingly, about 95% of total cattle of Konkan region is represented by non-descript indigenous cattle population, which needs to be explored. In view of above, present study was undertaken to characterize the cattle

population of Konkan region of Maharashtra by making systematic surveys in the area.

MATERIALS AND METHODS

The survey was undertaken in 32 villages of 3 districts (Raigad, Ratnagiri and Sindhudurg) of Maharashtra. During the survey, 152 farmers were interviewed to collect information of management and performance of Konkan cattle by using a predesigned questionnaire developed for the purpose. A total of 135 cows and 118 bulls/bullocks were studied for the physical traits of the Konkan cattle. The morpho-metric measurements, viz. body length (BL), height at withers (Height), chest girth (CG), paunch girth (PG), face length (FL), face width (FW), tail length with or without switch (TLS and TL), horn length (HL), horn circumference (HC) and ear length (EL) were recorded on 609 animals belonging to different age groups and sexes. The reproduction and production traits (age at first calving, daily milk yield, lactation period, inter-calving period and number of inseminations per conception) were recorded on 107 lactating cows by interviewing their owners. The data collected from the study were compiled and analyzed by

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using standard statistical procedures.

RESULTS AND DISCUSSION

Origin, geographical distribution and native environment of the breed: Konkan cattle are distributed in Konkan region of Maharashtra and Goa. Konkan is a Marathi term, which means coastal strip. The land of Konkan is bounded by Sahyadri mountain range (western ghats) on the East and the Arabian sea on the West. The region consists of Thane, Raigad, Ratnagiri and Sindhudurg districts. The area extends 720 km. North-South and about 44 km East-West. Konkan cattle are also seen in Goa which is also included in the Konkan region. The area is bounded by latitudes 15°30' to 20°20' North and longitudes 72°45' to 74°54' East. The total geographical area of the region is about 36,740 km². The entire region exhibits peculiar physiographic set up with undulating terrain throughout the region, except coastal plains. The area ranges in elevation from mean sea level up to 200 to 1425.50 meter amsl.

The climate of the Konkan region is hot and humid. The region witnesses all the seasons, viz. monsoon, winter and summer. Monsoon season is from June to September. Konkan region receive heavy rainfall; July and August are the wettest months of the year. The annual rainfall in the region may go up to 3600 mm with about 100 days in a year as rainy days. Average temperature in summers is 32 to 40°C. During winters (October to February), the temperature is milder with less humid conditions. Day temperature is moderate and cool nights (15°C); average temperature ranges between 20 to 25°C. Relative humidity varied from 60 to 90% during the year. This cattle population is named as Konkan due to its distribution in the Konkan region of Maharashtra. Due to hilly terrain and sloppy agricultural fields comparatively light weight bullocks of Konkan cattle are well suited for all kind of agricultural operations as mechanization of agriculture was less intense in the area.

Population status and average herd size: The population of non-descript indigenous cattle in the Konkan region was 10.46 lakh (Livestock census 2012) which is 95% of total cattle in the area. It was observed that more than 60% indigenous cattle may be kept in the category of Konkan cattle. Cattle is the major livestock species representing more than 60% of total livestock population in the area. The herd size of the Konkan cattle varied from 4 to 20 with an average of 6.18 cattle/household, which include 1.83 cows, 0.70 bulls, 1.74 bullocks, 0.93 young stock between 1–3 years of age and 0.98 calves below one year of age.

General management practices in rearing of Konkan cattle: The Konkan cattle are reared in zero/low input production system of management.

Breeding: Breeding of Konkan cows was through natural mating and sufficient numbers of bulls were available in villages. The bulls were used for breeding as well draft purposes. The bulls were selected on the basis of their physique and body conformation. The knowledge of signs of estrus was reported by 123 livestock keepers out of 132

interviewed in this regard.

Housing: Different aspects of animal housing of Konkan cattle were studied and summarized below.

Parameter	Class	No. of farmer	Per cent
Duration of housing	During day	0	0
	During night	38	25.7%
	Both	110	74.3%
Location of house	With Owner's house	40	26.5%
	Separate	111	73.5%
Type of housing	Open	32	21.6%
	Closed	98	66.2%
	Both	18	12.2%
Floor	Kutchha	118	79.7%
	Pucca	30	20.3%
Roof	Kutchha	91	61.5%
	Pucca	57	38.5%
Air circulation	Airy	93	63.7%
	Not Airy	53	36.3%
Walls	Full	55	37.7%
	Half	47	32.2%
	No	44	30.1%
Shade of tree	Yes	26	83.9%
	No	5	16.1%
Sanitation	Good	46	31.1%
	Poor	102	68.9%
Drainage	Pucca	16	11%
	Kutchha	52	35.6%
	No	78	53.4%

Feeding: Grazing was the main source of feeding. About

44.9% livestock owners reported that they grazed Konkan cows in morning hours only (i.e. 7:00 AM to 12:00 AM) and 1.7% livestock owners reported that it was in the evening hours only (i.e. 3:00 PM to 6:30 PM), whereas, rest 53.4% informed that grazing was done in two shifts of morning (7:00 AM to 12:00 AM) and evening (3:00 PM to 6:30 PM). The distance covered by the animals for grazing ranged from 2 to 5 km. The livestock owners also brought local grasses from nearby area and fed their animals at home. About 45.4% livestock owners offered concentrate (1 to 2.5 kg/day), prepared at home to their lactating cows.

Calf management: A total of 55.9% farmers reported that they allowed the calves to suckle the colostrum. Calves were mainly fed through dam's milk and after 3 months of age, they were offered local grasses/grazing in nearby fields. Most of the livestock owners informed that umbilical cord was not cut rather than it dried and fall in due course of time. De-horning or de-budding was not practiced.

Health management: About 57.9% livestock owners reported vaccination of their cattle for FMD and 21.1% for haemorrhagic septicemia. De-worming was not observed as regular practice. Veterinarians were called for treatment of sick animals and easy access of veterinary services was reported by 92.8% livestock owners. The farmers reported that Konkan cattle are comparatively more resistant to communicable and parasitic disease as compared with

crossbred animals. The placenta was removed in due course naturally without human intervention. Cleaning of udder and teats before milking was reported by 87.5% farmers but none of the farmer reported cleaning of entire animal before milking. A total of 72.4% farmers used to clean all the utensils thoroughly before milking of cows.

Physical characteristics: Different parameters of physical characteristics of Konkani cattle are presented in the Table 1. The animals were small to medium in size with

compact body. The several coat colours of cows and bulls were observed, which included black, white, grey, reddish dun, mixed colours and few other colours like brown and fawn. Reddish dun colour was predominant both in cows (45.2%) and bulls (44.9%) followed by black (23% in cows and 26.3% in bulls). Other coat colours were less than 10%. (Fig. 1). Face was moderate in length and width (41.09 and 19.43 cm in cows, and 44.70 and 23.13 cm in bullocks, respectively), muzzle was black (77.1% in bulls and 82.2%

Table 1. District-wise and overall physical characteristics of Konkani cattle

Trait	Class	Ratnagiri		Sindhudurg		Raigad		Overall	
		Cow (46)	Bullock/ Bull (39)	Cow (42)	Bullock/ Bull (47)	Cow (47)	Bullock/ Bull (32)	Cow (135)	Bullock/ Bull (118)
Coat colour	Black	15	10	5	11	11	10	31 (23%)	31 (26.3%)
	White	3	0	5	2	3	2	11 (8.1%)	4 (3.4%)
	Grey	1	1	2	2	1	0	4 (3%)	3 (2.5%)
	Reddish dun	15	19	18	23	28	11	61 (45.2%)	53 (44.9%)
	Mixed red	2	2	5	3	2	2	9 (6.7%)	7 (5.9%)
	Mixed black	2	1	4	6	2	5	8 (5.9%)	12 (10.2%)
	Others (brown/fawn)	8	6	3	0	0	2	11 (8.1%)	8 (6.8%)
Muzzle colour	Black	36	24	35	38	40	29	111 (82.2%)	91 (77.1%)
	Pinkish	5	9	7	9	7	3	19 (14.1%)	21 (17.8%)
	Mixed	5	6	0	0			5 (3.7%)	6 (5.1%)
Tail colour	Black	42	36	38	42	44	28	124 (91.9%)	106 (89.8%)
	Creamy	3	3	4	5	3	4	10 (7.4%)	12 (10.2%)
	Mixed	1	0	0	0			1 (0.7%)	
Horn colour	Black	44	33	40	40	44	27	128 (94.8%)	100 (84.7%)
	Creamy	1	4	0	7	3	5	4 (3.0%)	16 (13.6%)
	Mixed	1	2	2	0			3 (2.2%)	2 (1.7%)
Horn shape	Curved	5	3	2	2		0	7 (5.2%)	5 (4.2%)
	Straight	41	36	40	45	47	32	128 (94.8%)	113 (95.8%)
Horn orientation	OUB	24	29	36	36	35	27	95 (70.4%)	92 (78%)
	BU	18	10	5	10	12	5	35 (25.9%)	25 (21.2%)
	OUI	4		1	1			5 (3.7%)	1 (0.8%)
Ear orientation	Horizontal	46	39	42	47	47	32	135 (100%)	118 (100%)
	Drooping	0	0	0	0			0	0
Hump	Large	4	9	0	18		6	4 (3.0%)	33 (28%)
	Medium	21	30	7	29	13	23	41 (30.4%)	82 (69.5%)
	Small	21	0	35	0	34	3	90 (66.6%)	3 (2.5%)
Dewlap	Large		28		28		5	0	61 (51.7%)
	Medium	16	11	13	19	24	23	53 (39.3%)	53 (44.9%)
	Small	30	0	29	0	23	4	82 (60.7%)	4 (3.4%)
Naval flap	Large								
	Medium	18		5		16		39 (28.9%)	
	Small	28		37		31		96 (71.1%)	
Penis sheath flap	Large		1		8		1		10 (8.5%)
	Medium		36		39		25		100 (84.7%)
	Small		2		0		6		8 (6.8%)
Shape	Bowl	46		42		47		135 (100%)	
	Round								
	Trough								
Rear-udder size	Large	0		0					
	Medium	13		6		23		42 (31.1%)	
	Small	33		36		24		93 (68.9%)	
Teat shape	Cylindrical	43		40		47		130 (96.3%)	
	Funnel	3		2				5 (3.7%)	
	Pear								
Teat tip	Pointed	44		40		40		124 (91.9%)	
	Round	2		2		7		11 (8.1%)	

in cows) in majority of animals but sometimes carroty/ Pinkish (17.8% in bulls and 14.1% in cows) or mixed (5.1% in bullocks and 3.7% in cows) in colour, forehead was fairly broader and straight or slightly concave. Neck was short and stout. Horns were generally wide-spread, long, thick at bottom and pointed at tips. The shape of horns was straight in majority of animals (95.8% in bulls and 94.8% in cows) but 4.2% bulls and 5.2% cows had curved horns. The overall orientation of horns was mostly outward, upward and backward in 78% bulls and 70.4% of cows. The colour of horn was generally blackish (84.7% bulls and 94.8% cows), however creamy and mixed colours of horn were also observed in few cases. Majority of cows (66.6%) possessed small hump and 30.4% cows were with medium sized humps. On the contrary, 69.5% bulls had medium sized and 28% large sized hump. Colour of eyelid and hooves were generally black. The ears were short, erect and horizontal in orientation in all the cases. Dewlap was large in majority of bulls (51.7%) but in 44.9% of the bulls medium sized dewlap was seen. In case of cows, dewlap was mostly small sized (60.7%) and in 39.3%, it was medium sized. The naval flap was also small in majority of cases (71.1%) and in majority of the bulls penis sheath flap was of medium size (84.7%). The shape of udder was bowl in all the cases. The teat shape was cylindrical in majority of cows (96.3%) with pointed tips (91.9%). The tail was broader at base and tapered towards the end. It was long with large tuft of hair, mostly black in colour (89.8% of bulls and 91.9% of cows). Basic temperament of animals was docile to moderate.

Morpho-metric measurements: The height at withers,

body length, chest girth, paunch girth, horn length, horn circumference, ear length, face length, face width and tail length with and without switch were measured in 609 animals of 5 age/sex groups (Table 2). The body length, chest girth, height at withers, paunch girth in cows and bulls/bullocks were obtained as 101.48, 134.10, 100.78 and 141.05; and 109.29, 146.55, 106.54 and 151.71 cm, respectively. Singh *et al.* (2008) reported biometrical parameters of 188 cows and 15 adult males of Malnad Gidda cattle breed in the coastal belt of Karnataka and found lower estimates for all these biometric parameters. This clearly indicates that Konkan cattle are heavier as compared to the cattle population of coastal belt of Karnataka. Horn length, horn circumference, ear length, face length and face width of Konkan cattle were estimated as 19.82, 14.11, 18.30, 41.09 and 19.43 cm, respectively in cows and 23.91, 19.05, 18.45, 44.70 and 23.13, respectively in bulls/bullocks. If we compare these 5 parameters with the Malnad Gidda cattle of Karnataka and Vechur cattle of Kerala, Konkan cattle possessed higher estimates of these parameters as compared to Malnad Gidda as reported by Singh *et al.* (2008) and to Vechur as reported by Iype (1996 and 2013). The tail length with and without switch of Konkan cattle was 85.37 and 67.82 cm, respectively in cows, and 92.10 and 72.12 cm, respectively in bulls/bullocks; which was again higher than that of Malnad Gidda cattle. The biometrical parameters of Konkan cattle found in this study indicated that this population is different from Malnad Gidda cattle of Karnataka and Vechur cattle of Kerala, which are also found in coastal belt of respective states. Therefore, Konkan cattle of Konkan region of Maharashtra deserve a

Table 2. Biometry of Konkan cattle

Trait	Cow	Bulls/Bullock	Young male	Young female	Calves
Body length	101.48±0.41 (84–117; N=204)	109.29±0.63 (81–132; N=164)	92.43±1.36 (59–117; N=67)	90.73±1.00 (67–110; N=70)	66.85±1.21 (40–95; N=104)
Chest girth	134.10±0.60 (117–162; N=204)	146.55±0.95 (110–179; N=164)	119.75±1.91 (81–150; N=67)	118.09±1.44 (86–140; N=70)	82.13±1.53 (48–120; N=104)
Height at withers	100.78±0.50 (88–158; N=204)	106.54±0.53 (85–121; N=164)	94.60±1.13 (56–111; N=67)	93.06±0.90 (74–106; N=70)	72.91±1.03 (52–96; N=104)
Paunch girth	141.05±0.71 (120–170; N=204)	151.71±1.07 (102–186; N=164)	124.42±1.96 (92–159; N=66)	121.81±1.61 (91–146; N=70)	83.57±1.66 (45–122; N=104)
Face length	41.09±0.19 (35–49; N=204)	44.70±0.25 (31–50; N=164)	38.82±0.52 (29–49; N=67)	37.57±0.44 (28–48; N=70)	27.69±0.49 (16–39; N=104)
Face width	19.43±0.14 (14–28; N=203)	23.13±0.15 (18–28; N=163)	21.03±0.31 (16–27; N=67)	17.91±0.23 (15–25; N=70)	15.11±0.24 (10–26; N=104)
Horn length	19.82±0.54 (4–40; N=199)	23.91±0.67 (4–50; N=161)	13.60±1.34 (2–48; N=52)	9.95±0.97 (1–28; N=44)	4.00±0.91 (2–10; N=10)
Horn circumference	14.11±0.21 (8–24; N=176)	19.05±0.25 (9–28; N=147)	15.00±0.62 (5–22; N=44)	12.41±0.49 (9–19; N=29)	12.00±1.41 (10–14; N=2)
Ear length	18.30±0.13 (14–25; N=204)	18.45±0.14 (13–24; N=164)	17.54±0.22 (14–23; N=67)	17.39±0.20 (14–21; N=70)	14.52±0.24 (7–19; N=104)
Tail with switch	85.37±0.59 (59–108; N=198)	92.10±0.85 (58–115; N=160)	76.93±1.53 (39–105; N=67)	75.79±1.17 (45–98; N=70)	50.24±1.20 (19–84; N=104)
Tail without switch	67.82±0.56 (49–98; N=184)	72.12±0.68 (47–92; N=145)	60.54±1.20 (35–83; N=65)	59.69±0.95 (41–85; N=68)	41.47±0.95 (13–68; N=96)

Figures in parenthesis indicate range and number of animals used for estimation respectively.



Fig. 1. Coat colour variation in Konkani cattle.

Table 3. Production and reproduction performance

Trait	Mean	Range
Birth weight (kg)	14.74±0.25 (N=87)	10–25
Age at first Service (Male) (months)	37.82±0.50 (N=91)	24–60 months
Age at first calving (Female) (months)	49.27±0.56 (N=102)	36–60 months
Calving interval (months)	17.21±0.35 (N=89)	12–24 months
Service period (months)	6.63±0.44 (N=38)	2.5–14 months
Lactation period (days)	226.53±6.22 (N=98)	130–450 days
Dry period (months)	7.88±0.39 (N=85)	2–18 months
Average daily milk yield (kg)	2.23±0.11 (N=107)	0.5–6.0 kg
Peak yield (kg)	3.28±0.13 (N=93)	1.5–7.0 kg
Lactation milk yield (kg)	555.66±39.18 (N=38)	150–1100 kg
Average service per conception	1.79±0.08 (N=82)	1–3.5

status of a distinct breed of cattle of Indian origin.

Performance: The milk yield of the Konkani cows varied from 0.5 to 6 kg/day with an average of 2.23 kg/day, majority of cows were producing 1 to 3 kg of milk in a day (Table 3). The milk productivity of Konkani cattle of Maharashtra was comparable with the productivity of Malnad Gidda cattle of Karnataka. The average peak yield was 3.28 kg ranging from 1.5 to 7 kg. The milk samples were analyzed and had following composition—1.0274±0.0002 specific gravity; 13.11±0.14% total solid; 4.55±0.14% fat; 8.62±0.02% SNF; 3.39±0.05% protein; 0.13±0.001 titrable Acidity; Negative COB.

The age at first service in males was 37.82 months ranging from 2 to 5 years and age at first calving of cows

was 49.27 months ranging between 3–5 years of age. On an average, 8–10 calving in a life span of 20 years of age were found in the herds. The cow in the herd showed good reproductive health and repeat breeding was rarely observed. The lactation length was 226.53 days which varied from 130–450 days. The inter calving period was 17.21 months, varied between 12–24 months. The service period was obtained as 6.63 months (2.5–14 months) and dry period as 7.88 months (2–18 months). Average service for conception was 1.79 with a range of 1–3.5.

Utility of animals: Livestock owners were interviewed for knowing the utility of Konkani cattle. A total of 20% farmers informed that the utility of Konkani cattle is for milk only, 15% draft only, 63% milk and draft both whereas 2% farmers informed that Konkani cattle are utilized for medicines from their products and byproducts. As informed by 92.6% farmers, the utility of milk was only for consumption in their families whereas 7.4% farmers used to sell the milk produced from Konkani cattle. Farmers also prepared ghee from Konkani milk and mostly opted ghee making procedure by curd (91.3%); whereas a few (8.7%) by cream. The Konkani animals are adapted to hot and humid climate in the native tract and survive better than other cattle breeds/crossbreds in that area. The animals can well survive on grazing and in the open housing system during all kinds of weather. The animals are more resistant to communicable and parasitic diseases as compared to crossbreds in that area under hot and humid climate. The bullocks of this breed are active and well suited to agricultural operations and transport.

Based on this study, the Konkani Kapila has been registered as 43rd breed of cattle with accession number INDIA_CATTLE_1135_KONKAN_03043 in the

registration system of livestock and poultry breeds of India developed by Indian Council of Agricultural Research in September 2018. After registration of the population as breed, an organized herd of Konkan cattle may be established in the native tract for further research and development of this breed and attempts may be made to establish Breed Society of Livestock Keepers rearing this cattle population for development, marketing and conservation. State Animal Husbandry Department may take care for census, genetic improvement and further development of this cattle breed. The male calves born to elite cows in terms of milk production may be reared and developed into breeding bulls to be used for natural mating of cows at farmer's door.

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