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Phenotypic characterization of the desi (local) cattle reared by the tribal communities of Wayanad district, Kerala, South India

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According to the 20th Livestock Census (2019), India has 193.46 million cattle, of which, 142.10 million (73.45%) are indigenous animals. The interesting fact is that of the total indigenous cattle, 70.5% belonged to the non-descript group and the rest were purebred and graded animals (Breed-wise Report of Livestock and Poultry based on the 20th Livestock Census). Even though India has a rich and diverse indigenous domestic cattle genetic resource with 53 registered breeds as of August 2022 (https://nbagr.icar.gov.in/en/new-breeds-lines/Accessed 30 March 2023), it is felt that there is an urgent necessity to identify, characterize and document its vast non-descript animal genetic resources, especially the lesser-known native populations of different states.

With this objective, in August 2021, the Indian Council of Agricultural Research-National Bureau of Animal Genetic Resources (ICAR-NBAGR), Karnal launched the Mission towards zero non-descript animal genetic resources (AnGR) of India (https://nbagr.icar.gov.in/wp-content/uploads/2023/02/NBAGR_NWSLTR-Jan-Jun-2022.pdf Accessed on 04-04-2023).

Anilkumar (2016) also gave an account of several lesser-known domestic animal diversity in many South Indian states and underlined the importance of documentation and conservation of these varieties as many of them are unique and best suited for native societies.

In the Indian context, the state of Kerala is special due to the presence of a large crossbred cattle population. About 93.84% of the total population of 13.42 lakhs cattle comprised of crossbreds and only a meagre 6.16% were indigenous/non-descript animals (20th Livestock Census- 019 All India Report). The Vechur cattle is the only recognized breed of Kerala (Accession No. INDIA_CATTLE_ 0900_VECHUR_03030 https://nbagr.icar.gov.in/en/ registered-cattle/ Accessed 14 Dec 2021). However, several workers have reported the existence of some lesser-known cattle varieties like Kasargode, Vadakara, Highrange dwarf, Kuttampuzha dwarf, Cheruvally cattle and Vilwadri cattle in different parts of Kerala (Anilkumar and Raghunandanan 2003, Anilkumar 2016, Manoj 2021).

Here we report the results of research work carried out to study the morphometric traits, production performance and rearing practices of the native cattle of the Wayanad district. In the past, several reports had appeared in the media that the population of non-descript 'Wayandan cattle' was declining alarmingly due to various reasons like crossbreeding and hence, urgent measures were required for its conservation (Manoj 2015). Though some preliminary studies were carried out on the indigenous cattle reared in the tribal settlement of Kurichiat and nearby areas in the Wayanad district (Dinesh *et al.* 2008, Anilkumar 2016), it seems to be quite inadequate. Hence, a detailed study was carried out on the desi cattle reared by the tribal communities of Wayanad from February 2018 to January 2019.

Wayanad is a hill district in the Kerala state, South India with an area of 2132 sq. km of which about 40% is forest land. It lies between north latitude 11°26'28'' and 11°48'22'' and east longitude 75°46'38'' and 76° 26'11''. It has a human population of about 8.17 lakhs and Scheduled tribes constitute 18.55% of the population (https://spb.kerala.gov.in/en/wayanad Accessed 17 Dec 2021).

The study area was selected based on rapid appraisals including discussions in group meetings and focus groups, with individual livestock keepers, stakeholders, officials working in the animal husbandry sector and other knowledgeable key informants.

The morphological attributes and morphometric traits of native cattle were evaluated using the ICAR-NBAGR (2016) guidelines with modifications. The data was collected with the help of a questionnaire and farmer field visits, interviews and direct field appraisals. A total of 38 farmers were interviewed to collect information on the habitat, status, management, utility and performance of animals of different age groups and sex. All the

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Table 1.Qualitative characteristics of Wayanad desi cattle

Qualitative trait		Frequency
Coat colour (N=66)	Dark Brown	39 (59.09)
	Black	13 (19.70)
	Fawn	13 (19.70)
	White	1 (1.52)
Colour pattern (N=66)	Plain	61 (92.42)
	Patchy	5 (7.58)
Skin colour (N=66)	Pigmented	66 (100)
Hair sheen (N=66)	Glossy	66 (100)
Hair curl (N=66)	Straight	66 (100)
Hair length (N=66)	Medium	66 (100)
Muzzle pigmentation (N=66)	Pigmented	64 (96.97)
	Non-pigmented	2 (3.04)
Eyelid pigmentation (N=66)	Pigmented	65 (98.48)
	Non-pigmented	1 (1.52)
Hoof pigmentation (N=66)	Pigmented	65 (98.48)
	Non-pigmented	1 (1.52)
Horn colour (N=57)	Black	56 (98.25)
	White	1 (1.75)
Horn orientation (N=35)	Outward and upward	24 (68.57)
	Outward upward and forward	9 (25.71)
	Outward upward and backward	1 (2.86)
	Downward	1 (2.86)
Horn shape (N=45)	Straight	24 (53.33)
	Curved	9 (20)
	Stumpy	7(15.56)
	Polled	3 (6.67)
	Lyre	2 (4.44)
Horn attachment (N=58)	Fix	57 (98.28)
	Loose	1 (1.72)
Ear orientation (N=66)	Horizontal	64 (96.97)
	Lateral	2 (3.03)
Ear tip shape (N=66)	Straight edged	63 (95.45)
	Round	3 (4.55)
Forehead (N=66)	Straight	64 (96.97)
	Concave	2 (3.03)
Facial (head) profile (N=66)	Straight	66 (100)
Dewlap (N=39)	Small	39 (100)
Hump size (N=64)	Small	63 (98.44)
	Medium	1 (91.56)
Hump shape (N=64)	Erect	64 (100)
Hump position (N=64)	Cervicothoracic	64 (100)
Rump profile (N=66)	Sloping	66 (100)
Backline profile (N=66)	Straight	64 (96.97)
	Dipped	2 (3.03)
Udder shape (N=36)	Bowl	36 (100)
Udder size (N=36)	Small	35 (97.22)
	Medium	1 (2.78)
Milk vein (N=36)	Not prominent	36 (100)
Teat shape (N=36)	Funnel	29 (80.56)
	Cylindrical	7 (19.44)
Teat tip (N=36)	Round	34 (94.44)
	Pointed	2 (5.56)
Tail switch colour (N=66)	Pigmented	65 (98.48)
	White	1 (1.52)
Tail length (N=66)	Short	35 (53.03)
	Medium	17 (25.76)
	Long	14 (21.21)
Temperament (N=66)	Wild	61 (92.42)
	Moderately tactile	4 (6.06)
	Docile	1 (1.52)

N indicates the sample size. The numbers in the parenthesis indicate percentages.

measurements were recorded using a simple tape measure on upright animals while they are standing on level ground. The observations on the qualitative characteristics are presented as a frequency distribution in Table 1. The observations on the quantitative characteristics are presented as the mean values along with the standard error in Table 2. The observations of the breeding males were based on a fewer number of animals as they were very sparsely populated in the study area.

The study revealed that the breeding tract of the Wayanad desi cattle was spread over an area comprising Thavinhal and Thondernad Panchayaths (Mananthavady Thaluk), and Ambalavayal and Noolpuzha Panchayaths (Sulthan Bathery Taluk) of Wayanad district. Asif *et al.* (2020) reported that five tribal hamlets in the Thirunelly panchayath (Mananthavady Taluk) also rear these animals in addition to the area mentioned above. These animals were mainly reared under an extensive system of management under the loose house system. The herd size ranged from 3 to 45 animals. In some cases, farmers pool their animals in groups of 20 to 50 animals for grazing. The animals were let out for grazing in the forest land from morning to evening. During the nighttime, the animals were kept in kachha-type sheds, that were made from locally available materials like bamboo and wood and the roof was made of stacks of paddy straw. Cattle dung was used for agricultural purposes. Natural breeding was generally practiced. Weaning of calves was not done and they were allowed to suckle the dam. The farmers do not practice any scientific animal husbandry practices like deworming and vaccinations. On many of these aspects, similar findings were also reported by others (Dinesh *et al.* 2008, Asif *et al.* 2020, 2021a).

The Wayanad desi cattle are low milk producers and the average daily yield was just above one litre and the peak yield was about two litres, as also reported in other studies (Dinesh *et al.* 2008, Asif *et al.* 2020). However, their milk yield was less than that of Vechur, Kasargode, Vatakara and High range dwarf (Anilkumar and Raghunandanan 2003), Dinesh *et al.* (2008) reported that the Kurichiat desi cattle were milked only in the morning and the average lactation length was only 5 to 6 months. Asif *et al.* (2020) also found

Table 2. Quantitative traits of Wayanad desi cattle according to sex and different age groups

Trait	Males		Females		
	1-3 Years	3 Years and above	0-1 Year	1-3 Years	3 Years and above
Chest girth	115.67±6.54 (6)	137.68±4.94 (11)	85.5±3.5 (2)	133.33±20.37 (3)	132.74±2.72 (25)
Body length	88.55±5.33 (11)	103.27±4.23 (11)	63.67±1.86 (3)	79.83±5.09 (3)	93.65±1.49 (34)
Height at withers	96.91±3.35 (11)	105±3.07 (11)	74.33±0.67 (3)	91±7.02 (3)	97.14±1.18 (35)
Pelvic width	26.17±2.18 (6)	31.92±1.89 (6)	19.5±1.76 (3)	26.50 (1)	31.56±0.79 (17)
Muzzle circumference	35±2.17 (7)	37.13±1.31 (4)	26±1.26 (3)	32±1 (2)	37.93±0.68 (20)
Horn size	10.6±1.29 (5)	14.81±2.98 (8)	-	14.00 (1)	15.15±1.23 (32)
Ear length	18.15±0.41 (10)	19.95±0.84 (10)	14.33±0.33 (3)	17.17±0.73 (3)	17.9±0.29 (32)

The measurements are in centimetres. The sample size is indicated in the parenthesis.

that the average lactation length in 86.7% of Wayanad dwarf cattle was seven months or less.

The Wayanad desi cattle, also called Wayanad dwarf cattle, are mainly reared by the Kuruma tribal communities of the Wayanad district (Asif *et al.* 2020, 2021b).

These animals were small in size and predominantly solid brown in colour with glossy hair coats (Fig. 1). Black- and fawn-coloured animals were also present. Animals with white colour were rare. The horns were black in colour, generally straight in shape and oriented outward and upwards. Their horns were longer than the horns of the other native cattle of Kerala and the orientation was also different. The ears were horizontally oriented with straight-edged ear tips like other desi cattle varieties of Kerala. The forehead and face were straight and the dewlap and hump were small. The udder was small and bowl-shaped like that of Vatakara and High range dwarf, and the teat was funnel-shaped with a round teat tip. The milk vein was not prominent. The tail was typically short with pigmented tail switch. However, animals with long and medium tails were also present. The temperament of these animals was generally wild. The average height at withers of Wayanad desi was similar to Vatakara. However, the Vechur, Kasargode and High range dwarf cattle were shorter than Wayanad desi (Iype and Venkatachalapathy 2001, Anilkumar and Raghunandanan 2003). Dinesh *et al.* (2008) also reported that the average height of indigenous cattle from the Kurichiat tribal region was 102.09±0.92 cm. In brief, Wayanad desi cattle share several qualitative and quantitative features with other desi cattle populations of Kerala. However, their geographic distribution is different. Hence, it is concluded that molecular characterization of the Wayanad desi cattle and other verities is needed to determine whether they can be categorized into different breeds.

Fig. 1. Wayanad desi bull (A) and cow (B).

SUMMARY

This study pertained to the phenotypic characterization of Wayanad desi cattle, a lesser-known indigenous cattle population reared mainly in the tribal hamlets of Wayanad district, Kerala, South India. Information on the habitat, status, management, utility and performance of the cattle and data on the morphological and morphometric traits were recorded using the ICAR-NBAGR guidelines with modifications. The main breeding tract of Wayanad desi cattle was in Thavinhal, Thondernad, Ambalavayal and Noolpuzha panchayaths of Wayanad district. These animals were reared under an extensive system of management and a loose house system in simple kachcha housing. They are low milk producers and the average daily yield was just above one litre. These animals were small in size, predominantly solid brown in colour, with a straight forehead and face. These desi cattle share several qualitative and quantitative features with other varieties of cattle in Kerala, eventhough their geographic distribution was different.

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