

Phenotypic characterisation of indigenous cattle of Meghalaya State

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ABSTRACT

In the present study an attempt has been made to assess the phenotypic variability and know the management of indigenous cattle in the Meghalaya state. A total of 76 farmers from 17 villages of three districts (Ri-Bhoi, East-Khasi Hills and West-Garo Hills) were interviewed to record information on various management practices and 217 animals of different age and sex were recorded for morphometric and physical traits. It was observed that cattle were reared mainly for meat, milk, bullock power and manure. Animals were reared on extensive system of management i.e. grazing from morning to evening, free range during December to March. During April to December fields have crops so controlled grazing was there. Cattle were of small size, well built, hardy and in cylindrical shape. The body colour varies in different colours brown (53%), grey (38%) and black (9%). Bulls were darker in colour and have medium size hump. Horns were smaller in length (9-12 cm). The average body length, height at wither, heart girth, paunch girth, horn length, ear length, face length and tail length without switch in cows (95) were 97.64±1.08 cm, 100.90±0.95 cm, 128.90±1.53 cm, 128.60±1.77 cm, 9.94±0.63 cm, 18.91±0.22 cm, 38.08±0.47 cm and 68.61±0.97 cm, respectively. Males and females did not differ significantly at all stages of age for all the morphometric traits. The average daily milk yield and lactation length were 2.38±0.18 kg (1.50 to 4.0kg) and 138 days (120-180 days), respectively. It may be concluded that indigenous cattle of Meghalaya showed uniformity in physical and morphometric traits and differ in their proportion (type traits) with others cattle of the region.

Key words: Characterisation, Morphometric traits, Meghalaya Cattle, Performance, Physical traits.

INTRODUCTION

In Meghalaya, livestock production systems is mainly extensive based on low cost agro-by-products as nutritional inputs for livestock. Around 80% of livestock are distributed in marginal, small and medium land holdings and 81% people get their livelihood from agriculture sector. There are 45% farmers having land less than one hectare (ha), 27% have 1 to 2 ha, 15% have 2 to 5 ha and 13% farmers had more than 5 ha. The milk productivity of indigenous cattle and crossbred in milch animals was 0.758 kg/day and 8.961 kg/day, respectively in the year 2013-14. The state produced 82,160 tonnes of milk in the year 2013-14 (Anonymous, 2015).

The contribution of indigenous cattle in milk production was 38.93% in the state. There is not a single registered cattle breed from the state and all are known as *desi* cattle. There was no information available on indigenous cattle of Meghalaya in the literature. In the present study, an attempt was made to assess the phenotypic variability and know the management of indigenous cattle in the state so that the genetic improvement programs may be planned to improve the productivity and registration of this population as a breed may be done, if required.

MATERIALS AND METHODS

Surveys were conducted in 3 districts of the Meghalaya state i.e. Ri-Bhoi, East Khasi Hills and West Garo

Hills. A total of 76 farmers from 17 villages were interviewed to record information on various management practices opted by the livestock owners in the state. Farmers were interviewed to know the habitat, status, management, utility and performance of the cattle available. Farmers were also enquired about choice of breed, sale and purchase of animals, animal housing, feeding, breeding and prevalent diseases in the area. Performance traits like body weight at birth, age at first calving, daily milk yield, lactation length, dry period, service period, calving interval and draught performance were collected by conversing with the farmers from the surveyed villages using structured questionnaire. Eight different body measurements and physical characteristics were recorded on 217 animals of different age and sex. The body measurements (body length, height at withers, heart girth, paunch girth, face length, ear length, horn length and tail length without switch) were recorded. The body measurements data were analyzed by least square maximum likelihood program (Harvey 1990) including age within sex as fixed effects. The survey included 76 male and 141 female animals. Age wise distribution of animals were bullocks (43), cows (95), up to 3 months (8), 3 to 6 months (9), 6 to 12 months (22) and 1-3 years (40).

RESULTS AND DISCUSSION

Meghalaya is a hilly strip in the eastern part of the country with a total area of about 22,720 km². The state is

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bounded on the north by Assam and by Bangladesh on the south. In the year 2012, the state had 9,05,753 cattle, 24894 buffalo, 20991 sheep, 472,325 goats, 569301 pigs, 1301 horses and ponies and 3567244 poultry (Livestock Census, 2012). The human population of the state was 29.66 lakhs in the year 2011. Literacy rate in the state was 91.58%. Khasi, Bengali, Garo, Hindi and English are the most commonly spoken languages in the state. The climate in Meghalaya is salubrious in general. The average temperature ranged from 12 to 36°C in summer and 02 to 15°C in winter, however, sometimes it goes to below zero. Average rainfall is 1150 mm mostly during months of May to September. Sohra and Mawsynram are places in the East-Khasi Hills district considered as the rainiest places (> 2000 mm annually) in the World. Soil type of surveyed area was loamy to sandy loamy and dark brown to reddish brown in colour. In the state, rice and maize were the major food crops and potato, jute, mesta, cotton, areca nut, ginger, turmeric, betel leaf cashew nut and black pepper were the main commercial crops. In the surveyed area, age of the farmers ranged from 18 to 65 years. Majority of the farmers were from 28 to 55 years (78%). Education level of farmers ranged from illiterate to graduate and 87% were literate. Land holdings ranged from 0.50 ha to 22.5 ha but majority of the farmers had below 2 ha of land (54%). The family size of farmers ranged from 2 to 12, majority of them were in between 4-8 members/ family. The annual income ranged from Rs. 20,000 to Rs. 60,000 from agriculture and livestock both. Proportion of income from agriculture and animal husbandry was almost similar. Cattle herd size ranged from 2 to 40 and around 65% farmers kept 2-20 cattle per family.

Population trends: The local cattle of Meghalaya belong to the non-descript type and called *desi*. District-wise cattle population in the state is given in Table 1. The state had 9,05,753 cattle heads including 26,458 crossbred and 87,9295

Table 1: District wise cattle population in Meghalaya state in the year 2012.

Name of District	Cattle		Total Cattle
	Crossbreds	Indigenous	
East Khasi Hills	12807	69410	82217
Ri – Bhoi	9295	27614	36909
West Khasi Hills	498	95150	95648
South West Khasi Hills	331	25652	25983
East Jaintia Hills	622	62981	63603
West Jaintia Hills	663	33610	34273
East Garo Hills	196	66400	66596
North Garo Hills	241	76379	76620
West Garo Hills	1631	239283	240914
South West Garo Hills	134	113390	113524
South Garo Hills	40	69426	69466
State (Overall)	26458	879295	905753
Trends (2003-07)	16.48	15.64	15.67
Trends (2007-12)	-2.72	2.19	2.08
Trends (2003-12)	14.79	18.19	18.08

Source: Livestock Census (2012), Govt. of India

indigenous in the year 2012. The total cattle, indigenous and crossbred cattle increased in the state by 18.08%, 18.19% and 14.79%, respectively during the years 2003 to 2012. The trends in crossbred, indigenous and total cattle populations over the different years showed that there was around 15% increase in all the three categories from the years 2003 to 2007. While during the years 2007 to 2012 crossbred cattle declined by 2.72% and almost in similar proportion, indigenous and total cattle increased. As per the livestock Census-2012, the largest population of indigenous cattle was in the West Garo Hills (2,39,283) district followed by South West Garo Hills (1,13,390), West Khasi Hills and East Khasi Hills.

Management practices: Feeding, cleaning and milking were mostly done by women. Cattle were reared mainly for meat, milk, bullock power and manure. Most of the animals were farm born. Animals were reared on extensive system of management i.e. grazing from morning (8.00 AM) to evening (4.00 PM) at free range during December to March. During April to December, fields were occupied by crops so controlled grazing was practiced. Very few farmers provided small amount of fodders at home during night (6%). Chaffing of fodder was not observed. Tying of animals was done in night only. Animal houses were mostly open with wall of bricks/wood and tin/thatched roof (92%). Animal houses were separated from the residence of farmers (76%). Drainage system of the animal houses was inadequate. Floor of the animal houses were kachcha in all the cases. Calves reared mainly through suckling and colostrums feeding. Dehorning and de-worming practices were not adopted. Castration was there at the age of 6 months. All the farmers used to clean their milking pots and udder before milking. Milking was twice in a day i.e. morning and evening. Semen of indigenous cattle was not available in veterinary hospitals in the area. Therefore, breeding was through natural mating and bulls were available in the cattle herds. Vaccinations for prevention of HS, FMD and BQ were observed (74%). Herd size ranged from 2-40.

Physical traits: Cattle were of small size, well built, stout, hardy and in cylindrical shape. The body colour varied in different colours which included brown (53%), grey (38%) and black (9%). Skin was grey. Muzzle was black (76%) and brown. Hump and dewlap were small to moderate. Bulls were darker in colour and had medium sized hump. Fore-head was small and straight. Ears were moderate in length (18 cm) and horizontal in orientation. Horns were smaller in length (9-12 cm), stumpy and outward, foreword and then upward in orientation. Udder was small (93%), not well developed and milk veins were not prominent. Size of fore and rear udder was small. Teats were small 6-15 cm long and mostly funnel in shape (76%). Tips of the teats were mostly round (72%). Naval flap was almost absent. Tail was up to the hock with black (77%) and brown switch. Temperament of animals was docile. As compared to indigenous cattle of Tripura, Manipur

and Mizoram, there was no distinct physical trait based on that these cattle populations could be differentiated. However, proportion of colours, shape and size of different body parts varied from other states cattle of the region. The typical cow, bull, housing pattern and grazing of the indigenous cattle of Meghalaya are shown in Fig 1, 2, 3 and 4, respectively.

Morphometric traits: Mean, standard error and number of observations of different morphometric traits are given in Table 2. All the data were analyzed according to age and sex. All morphometric traits in different age groups differ significantly. The average body length, height at wither, heart girth, paunch girth, horn length, ear length, face length and tail length without switch in cows (95) were 97.64 ± 1.08 cm, 100.90 ± 0.95 cm, 128.90 ± 1.53 cm, 128.60 ± 1.77 cm, 9.94 ± 0.63 cm, 18.91 ± 0.22 cm, 38.08 ± 0.47 cm and 68.61 ± 0.97 cm, respectively. The corresponding estimates in bullocks (43) were 101.58 ± 1.97 cm, 105.72 ± 1.84 cm, 134.04 ± 2.61 cm, 134.11 ± 3.43 cm, 12.62 ± 1.04 cm, 18.90 ± 0.31 cm, 39.09 ± 0.43 cm and 70.87 ± 1.30 cm, respectively. Males and females did not differ significantly at all stages of age. The estimates of body length, height at wither, heart girth and paunch girth were within the ranges as reported in indigenous cattle of Manipur (Pundir *et al.* 2015b) and Mizoram (Pundir *et al.* 2015a). The smaller corresponding estimates as compared to the present study were observed in indigenous cattle of Tripura (Pundir *et al.* 2014) and in Garhwal cattle of Uttarakhand (Pundir *et al.* 2013), while higher estimates were observed in Siri cattle of Sikkim (Pundir *et al.* 2016) and Kumaun cattle of Uttarakhand (Pundir *et al.* 2013). The estimates of horn length were similar to the Manipur cattle (Pundir *et al.* 2015b) and smaller to the indigenous cattle of Mizoram (Pundir *et al.* 2015a), Tripura (Pundir *et al.* 2014), Uttarakhand cattle (Pundir *et al.* 2013) and Siri cattle of Sikkim (Pundir *et al.* 2016). Ear length and face length estimates were in close agreement with the reports of indigenous cattle of Manipur (Pundir *et al.* 2015b), Mizoram (Pundir *et al.* 2015a), Tripura (Pundir *et al.* 2014), Uttarakhand cattle (Pundir *et al.* 2013) and Siri cattle (Pundir *et al.* 2016). Tail length without switch was similar to the indigenous cattle of Manipur (Pundir *et al.* 2015b), Mizoram (Pundir *et al.* 2015a), Tripura (Pundir *et al.* 2014) and Uttarakhand (Pundir *et al.* 2013) and smaller than the Siri cattle of Sikkim (Pundir *et al.* 2016).

Performance: The body weight at birth ranged from 10 to 16 kg. The estimated average body weights in cow and bullock were 160 kg and 175 kg, respectively. The average age at first calving, daily milk yield, lactation length, dry period, service period, calving interval, herd life and number of calving during life time were 1200 days (34 to 46 months), 2.38 ± 0.18 kg (1.50 to 4.0kg), 138 days (120-180 days), 162 days (90-230 days), 140 days (90-200 days), 510 days (18-36 months), 15-20 years and 6-8 calving, respectively. The estimates of age at first calving, daily milk yield and calving interval were within the range as reported by (Singh *et al.*



Fig 1: Indigenous Cow of Meghalaya.



Fig 2: Indigenous Bull of Meghalaya.



Fig 3: Housing system.



Fig 4: Grazing in field.

Table 2: Age and sex wise different morphometric traits (cm) of Meghalaya indigenous cattle.

Age & Sex	No	Body length	Height at wither	Heart girth	Paunch girth	Horn length	Ear length	Face length	Tail length without switch	Tail length (62)
0-3 Months, Male	1	57.00	64.00	71.00	79.00		12.00	23.00	39.00	.
0-3 Months, Males	7	68.85 ±1.20	78.28 ±2.77	84.42 ±3.04	88.00 ±4.42		15.28 ±0.52	26.50 ±1.20	50.80 ±7.20	59.00 ±2.56
3-6 Months Female	9	65.00 ±5.56	75.33 ±2.59	80.00± 2.69	83.75 ±2.93		15.88 ±0.42	24.55 ±1.11	45.50 ±2.29	47.33 ±2.18
6-12 Months Male	16	73.31 ±1.93	85.81 ±2.20	99.33 ±3.38	98.20 ±4.02	4.84 ±0.60	16.43 ±0.41	30.06 ±0.81	50.60 ±2.10	72.14 ±4.55
6-12 Months Female	6	68.22 ±2.65	82.66 ±4.47	96.37 ±7.40	95.83 ±7.49	5.66 ±1.45	15.50 ±0.99	30.40 ±2.76	51.33 ±5.73	60.75 ±7.45
1-3 Yrs Male	9	87.77 ±2.59	94.33 ±3.68	121.2 ±6.60	121.00 ±7.37	8.50 ±1.10	17.77 ±0.52	35.44 ±1.55	65.50 4.13	86.40 ±8.13
1-3 Yrs Female	31	83.12 ±1.75	90.61 ±2.03	113.10 ±3.64	113.23 ±3.73	6.96 ±0.67	17.32 ±0.29	34.26 ±0.91	59.34 ±1.61	84.72 ±2.46
Bullocks	43	101.58 ±1.97	105.72 ±1.84	134.04 ±2.61	134.11 ±3.43	12.62 ±1.04	18.90 ±0.31	39.09 ±0.43	70.87 ±1.30	91.27 ±3.05
Cows	95	97.64 ±1.08	100.90 ±0.95	128.90 ±1.53	128.60 ±1.77	9.94 ±0.63	18.91 ±0.22	38.08 ±0.47	68.61 ±0.97	87.78 ±1.40

2004) and in Manipur cattle (Pundir *et al.* 2015b). Higher estimates of daily milk yield were reported by (Pundir *et al.* 2016) in Siri cattle. The average daily milk yield obtained in the study was higher than the Tripura cows (Pundir *et al.* 2014) and cows of Kumaun region of Uttarakhand (Pundir *et al.* 2013). The average daily milk yield was lower than the Malnad Gidda cattle (Singh *et al.* 2008). Milking was twice in a day. Similar estimates of age at first calving and calving interval but lower dry period and service period were observed in Malnad Gidda cattle by Singh *et al.* (2008) as compared to the present study. A pair of bullock may plough about 0.50 acre of land in 5-6 hours. The bullock performance was lower than the hill cattle of Uttarakhand (Pundir *et al.* 2013).

It may be concluded that the indigenous cattle of Meghalaya showed uniformity in physical and morphometric traits and contributes significantly in the economy of the state.

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Management across the states in the north-east region is almost similar i.e. extensive type. It was observed that there is a need to enhance the productivity of indigenous cattle through genetic improvement programs. Possibilities of organic livestock farming need to be explored as the state had good potential in this regard which may proven a boon for the tribal farmers to enhance their livelihood and nutritional security in the region.

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