

Article

Identification and characterization of dwarf cattle available in Dinajpur district

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Abstract: The present study was undertaken from January to June, 2014 to investigate the morphometric, productive and reproductive characteristics of Dwarf cattle available in Dinajpur District. The data obtained from 200 Dwarf cattle of different categories (yearling bull, adult bull, heifer, cow, male calf and female calf). A wide variety of coat colors among the cattle of the selected areas were found. The head length and width, ear length and width, horn length and diameter, neck length and width, body length at shoulder, wither height, heart girth, fore leg and hind leg length, tail length and diameter, teat length and diameter, distance between fore teats and rear teats, length and width of testis, weight of testis, live weight, daily milk yield, lactation length, gestation length, calving interval, dry period, post partum heat period, age at first heat and service per conception were recorded. The Dwarf cattle in Dinajpur District are comparatively smaller in size than most of the recognized breeds or types of cattle, however coat color showed remarkable variation. The data generated for Dwarf cattle in Dinajpur District would be useful to characterize them.

Keywords: dwarf cattle, morphometric, productive, reproductive, traits

1. Introduction

Livestock is one of the major components of agricultural output of Bangladesh which plays a vital role in national economy. In 2013, the contribution of livestock sub-sector to the GDP was 2.95%, which was estimated about 17.3% GDP to agriculture (DLS, 2014). About 36% of the total animal protein comes from the livestock products in our everyday life and 25% people are directly engaged in livestock sector, and 50% peoples are partly associated with livestock production (DLS, 2014). Livestock population in Bangladesh is currently estimated about 25.7 million cattle, 0.83 million buffaloes, 14.8 million goats, 1.9 million sheep, 118.7 million chicken and 34.1 million ducks (Banglapedia, 2012). In spite of a high density of livestock population, the country suffers from an acute shortage of livestock products like milk, meat and eggs. The shortage accounts for 85.9, 88.1 and 70.7% for milk, meat and eggs, respectively (Banglapedia, 2012). The shortage is so acute that alternative protein sources like rabbit meat is under research to fulfill the deficiency (Mobarak *et al.*, 2015).

However, the cattle population of Bangladesh is mostly of the indigenous type (*Bos indicus*) with high amount of Holstein-Friesian, Sindhi, Sahiwal, and Jersey crossbreds. Indigenous cattle possess late maturity, short lactation length, long calving interval and poor production of milk and draught power but are more disease resistant and capable of thriving in harsh conditions (Majid *et al.*, 1992). Exotic breeds often lack of resistance

to local diseases and climatic conditions, produce poorly and lack persistency without considerable high quality feed and management. Although milk production of non-descriptive cattle is low, it shows very high adoption to agro climatic condition of the respective region (Khirari *et al.*, 2014).

Depending upon the climate, soil type and availability of fodder, different varieties of cattle genetic resources are available in different parts of the country like non-descriptive Local Red Chittagong, Pabna, North Bengal Grey, Madaripur, Hilly and Munshigong (Bhuiyan *et al.*, 2005). Another type of cattle is called Dwarf cattle found in Northern areas of Bangladesh which is very short in size and can produce milk almost throughout the year without sufficient grazing. The Dwarf cattle may be one of such promising variety of domestic animal genetic resource in Bangladesh. The history of the development of this variety is not clear. The productive and reproductive performance of Dwarf cattle has not yet been evaluated. The documented scientific information on various traits of these cattle were not available. Therefore, the present study was undertaken with the following objectives:

- a) To identify and characterize the Dwarf cattle reared in Dinajpur District of Bangladesh.
- b) To assess their productive and reproductive performances and comparing with other cattle available in Bangladesh.

2. Materials and Methods

2.1. Animal selection

In this study, a total of 200 animals were selected from different areas of Dinajpur District. Animals were selected randomly as milch cows, dry cows, heifers, bulls, bullocks and calves. In order to collect relevant information, an interview technique was used focusing on issues such as the livestock population, morphometric characteristics, production potential and reproductive performance.

2.2. Questionnaire development

Simple and direct questions were included in the questionnaire for the purposes of collecting information relating to the farmers such as age, production potential, reproductive characteristics, disease incidence, control measures and management of Dwarf cattle. In general, most farmers are not used to keeping any written information (records) on their livestock, so the researchers had to depend on the memory of the respondent for obtaining information.

2.3. Measurement procedure

2.3.1. Morphometric traits

Almost all the morphometric traits were measured by measuring tape and expressed as centimeters (cm) except coat color and weight of testicle. The measurement procedure of morphometric traits is shown in Figure 1.



Figure 1. Measuring of body length of a dwarf heifer.

2.3.2. Live weight

Body weight measurements were taken indirectly using Shaffer's method with the help of a measuring tape, i.e.,

$$\text{Body weight (kg)} = \frac{(L \times G^2)}{(300 \times 2.2)} \times 100$$

Where, L is length (inch) from shoulder point to buttock and G is heart girth (inch).

2.4. Data analysis

The collected data of this study were analyzed and presented using simple statistical techniques. The raw data were entered and sorted into MS Excel spread sheet, then transferred to the analytical software SPSS (Statistical Package for the Social Sciences, version, 16) for descriptive analysis. Compare mean values under pair simple T-test to know different factors. All data were expressed as mean \pm SEM.

3. Results and Discussion

3.1. Morphometric traits

3.1.1. Coat color

The Dwarf cattle possesses different coat color. Out of 200 cattle 54.5, 13.5, 12.0, 20.0 and 4.0% were red, black, white, gray and brown coat color, respectively (Table 1). Khirari *et al.* (2014) found that 44.4, 21.7, 33.9 and 10.0% for white, black, grey and mixed coat color, respectively in non-descriptive cattle. Among the local cattle of Sylhet region, different coat colors were observed as 43.4, 16.2, 12.5, 8.8, 7.6, 7.8, 3.0, 0.4 and 0.2% were roan, black, white, brown, dark brown, light brown, red, ash and cream coat color, respectively (Koirala *et al.*, 2011).

3.1.2. Head length and width

The average head length and width of Dwarf cattle: yearling bull, adult bull, heifer, cow, male calf and female calf were 36.6, 14.7; 39.6, 15.9; 34.9, 13.9; 37.5, 15.2; 20.9, 9.21 and 21.3, 9.17 cm, respectively. The head length and width of North Bengal Grey cattle was 38.0 and 16.0 cm, respectively (Al-Amin *et al.*, 2007). The head length of non-descriptive cattle of India was found 40.5 cm (Khirari *et al.*, 2014). Kayastha *et al.* (2011) observed almost similar head length (35.0 cm) in indigenous cattle of Assam, India.

3.1.3. Ear length and width

The average ear length and width of Dwarf cattle: yearling bull, adult bull, heifer, cow, male calf and female calf were 16.6, 10.1; 17.7, 10.6; 17.4, 9.73; 17.8, 9.89; 11.5, 7.29 and 12.3, 7.16 cm, respectively. The length and width of ear in North Bengal Grey cattle were 18.0 and 11.0 cm, respectively (Al-Amin *et al.*, 2007), which is almost similar with the present results. The ear length of non-descriptive cattle in India (Khirari *et al.*, 2014) was (18.1 cm) nearly similar with the present results. Kayastha *et al.* (2011) found almost similar ear length (18.1 cm) in indigenous cattle of Assam, India.

3.1.4. Horn length and diameter

The average horn length and diameter of Dwarf cattle: yearling bull, adult bull, heifer and cow were 3.25, 8.67; 4.82, 10.2; 3.67, 9.83 and 5.74, 8.21 cm, respectively. The horn size of native cattle of Sylhet was (3.94 cm) almost similar with that of Dwarf cattle (Koirala *et al.*, 2011). Horn length and diameter of non-descriptive cattle in India were 18.1 and 11.4 cm, respectively (Khirari *et al.*, 2014). The horn length and diameter of North Bengal Grey cattle were 9.0 and 10.0 cm, respectively (Al-Amin *et al.*, 2007).

3.1.5. Neck length and width

The average neck length and width of Dwarf cattle: yearling bull, adult bull, heifer, cow, male calf and female calf were 36.9, 35.0; 40.9, 37.6; 34.4, 34.0; 40.5, 37.8; 19.4, 20.6 and 19.8, 21.5 cm, respectively. Kayastha *et al.* (2011) found that almost similar neck length (32.7 cm) in indigenous cattle of Assam, India.

3.1.6. Body length

The average body length of Dwarf cattle: yearling bull, adult bull, heifer, cow, male calf and female calf were 79.6, 86.1, 77.9, 89.7, 49.8 and 51.9 cm, respectively. Hadiuzzaman *et al.* (2010) reported that the body length of Red Chittagong cows at 60 months of age was 108.3 cm which was higher than the result (106.9 cm) obtained by Bag *et al.* (2010). Koirala *et al.* (2011) observed that the body length of native cattle of Sylhet was 119.9 cm. Body length of non-descriptive cattle in India was 97.3 cm (Khirari *et al.*, 2014).

Table 1. Morphometric traits of dwarf cattle available in Dinajpur District, Bangladesh.

Morphometric traits	Yearling bull (22)	Bull (29)	Heifer (22)	Cow (23)	Calf (M) (14)	Calf (F) (12)
Body length at shoulder ± SEM	79.64±1.55	86.14±1.22	77.86±1.25	89.74±1.01	49.79±1.63	51.92±0.96
Ear length ± SEM	16.59±0.22	17.72±0.22	17.36±0.25	17.83±0.21	11.50±0.42	12.33±0.31
Ear width ± SEM	10.07±0.26	10.59±0.22	9.73±0.23	9.89±0.18	7.29±0.13	7.17±0.13
Horn diameter ± SEM	8.67±0.65	10.16±0.42	9.83±0.17	8.21±0.47	-	-
Horn length ± SEM	3.25±0.25	4.82±0.88	3.67±0.88	5.74±0.86	-	-
Head length ± SEM	36.64±0.67	39.62±0.42	34.91±0.61	37.48±0.37	20.93±0.68	21.25±0.45
Head width ± SEM	14.73±0.41	15.93±0.22	13.86±0.32	15.22±0.17	9.21±0.33	9.17±0.21
Neck length ± SEM	36.86±1.10	40.90±0.47	34.41±0.97	40.48±0.68	19.36±1.20	19.75±0.90
Neck width ± SEM	35.0±0.63	37.62±0.39	34.0±0.69	37.87±0.60	20.57±1.22	21.50±0.87
Foreleg length ± SEM	52.84±0.43	54.72±0.58	51.55±0.34	56.30±0.89	38.93±0.76	37.83±0.41
Hind leg length ± SEM	57.27±0.52	59.79±0.59	55.73±0.40	60.48±0.83	43.0±0.83	41.67±0.40
Tail length ± SEM	72.23±1.87	79.21±1.11	69.64±1.26	78.39±1.14	36.79±2.13	35.75±0.69
Tail diameter ± SEM	11.0±0.19	12.72±0.36	11.09±0.15	11.74±0.41	7.71±0.15	7.83±0.15
Heart girth ± SEM	110.68±1.65	116.79±0.83	108.36±1.81	120.30±1.27	67.43±1.78	67.92±1.28
Wither height ± SEM	85.59±1.19	90.41±0.95	82.82±1.03	92.22±0.57	63.14±1.36	63.33±0.88
Teat length ± SEM	-	-	3.25±0.32	4.37±0.11	-	-
Teat diameter ± SEM	-	-	4.88±0.43	5.20±0.18	-	-
Distance between fore teats ± SEM	-	-	5.88±0.66	5.71±0.30	-	-
Distance between rear teats ± SEM	-	-	4.0±0.41	4.28±0.23	-	-
Length of testis ± SEM	15.68±0.28	16.59±0.22	-	-	-	-
Width of testis ± SEM	11.09±0.25	11.55±0.20	-	-	-	-
Live weight ± SEM	91.32±3.81	109.10±2.7	85.73±3.89	120.83±3.57	21.71±1.85	22.42±1.03

Table 2. Productive traits of dwarf cattle available in Dinajpur District, Bangladesh.

	Productive traits								
	Average milk yield (liter/day)	Lactation length (day)	Peak milk yield (liter)	Age at first heat (month)	Gestation period (day)	Dry period (day)	Service per conception (no.)	Calving interval (day)	Post partum heat (day)
Mean ± SEM	1.70±0.07	240.0±4.24	2.84±0.09	19.08±0.28	275.80±1.03	190±0.07	1.62±0.32	408.64±1.84	110.64±1.84

3.1.7. Wither height

The average wither height of Dwarf cattle: yearling bull, adult bull, heifer, cow, male calf and female calf were 85.6, 90.4, 82.8, 92.2, 63.1 and 63.3 cm, respectively. The wither height of indigenous cattle of Sylhet (Koirala *et al.*, 2011) was (89.0 cm) almost similar with that of the present study. Al-Amin *et al.* (2007) and Khirari *et al.* (2014) observed almost similar wither height in North Bengal Grey cattle (91.0 cm) and non-descriptive cattle (84.6 cm) with Dwarf cattle.

3.1.8. Heart girth

The average heart girth of Dwarf cattle: yearling bull, adult bull, heifer, cow, male calf and female calf were 110.7, 116.8, 108.4, 120.3, 67.4 and 67.9 cm, respectively. The heart girth of North Bengal Gray adult cows was (127.0 cm; Al-Amin *et al.*, 2007) almost similar with that of the present study (120.3 cm). Khirari *et al.*, (2014) also found similar heart girth (126.9 cm) in non-descriptive cattle. The heart girth observed in indigenous cattle of Sylhet region was 112.1 cm (Koirala *et al.*, 2011).

3.1.9. Fore leg and hind leg length

The average fore leg and hind leg length of Dwarf cattle: yearling bull, adult bull, heifer, cow, male calf and female calf were 52.9, 57.3; 54.7, 59.8; 51.6, 55.7; 56.3, 60.5; 38.9, 43.0 and 37.8, 41.7 cm, respectively. The

fore leg and hind leg lengths of North Bengal Gray cattle were 65.0 and 71.0 cm, respectively (Al-Amin *et al.*, 2007).

3.1.10. Tail length and diameter

The average tail length and diameter of Dwarf cattle: yearling bull, adult bull, heifer, cow, male calf and female calf were 72.2, 11.0; 79.2, 12.7; 69.6, 11.1; 78.4, 11.7; 36.8, 7.71 and 35.8, 7.83 cm, respectively. The tail length (71.0 cm) of North Bengal Gray cattle (Al-Amin *et al.*, 2007) was almost similar with the present findings. Kayastha *et al.* (2011) found that the tail length of indigenous cattle of Assam, India was 54.2 cm.

3.1.11. Teat characteristics

The average teat length and diameter of heifers and cows were 3.25, 4.88 and 4.37, 5.20 cm, respectively. The teat length and teat diameter in North Bengal Gray cows (Al-Amin *et al.*, 2007) were 5.0 and 6.0 cm, respectively. The average distance between fore teats and rear teats of Dwarf cattle (heifers and cows) were 5.88, 4.0 and 5.71, 4.28 cm, respectively. The distance between fore teats and between rear teats in North Bengal Gray cattle (Al-Amin *et al.*, 2007) were 7.0 and 7.0 cm, respectively, which are slightly higher than that of the present results.

3.1.12. Testis length, width and weight

The average length and width of testis of Dwarf cattle: yearling bull and adult bull were 15.7, 11.1 and 16.6, 11.6 cm, respectively. The average weight of testis of Dwarf cattle: yearling bull and adult bull were 104.1 and 110.6 g, respectively.

3.2. Productive traits

3.2.1. Live weight

The average live weight of Dwarf cattle: yearling bull, adult bull, heifer, cow, male calf and female calf were 91.3, 109.1, 85.7, 120.8, 21.7 and 22.4 kg, respectively. The approximate live weight of indigenous cattle of Sylhet region (Koirala *et al.*, 2011) was significantly higher (162.8 kg) than the Dwarf cattle. Al-Amin *et al.* (2007) observed that the body weight of North Bengal Grey cow of Pabna District was 241.0 kg, which is higher than the present findings.

3.2.2. Daily milk yield

The average daily milk yield of Dwarf cows was 1.70 liter per day. The milk yield per day was lower (1.33 liter) in native cattle of Sylhet (Koirala *et al.*, 2011) than that of Dwarf cows. Bhuiyan *et al.* (2007) also observed higher milk yield in Pabna cattle (2.81 liters). Khirari *et al.* (2014) found that the daily milk yield was 1.62 liters in non-descriptive cattle. Al-Amin *et al.* (2007) found daily milk yield in North Bengal Gray cattle was 3.0 liters.

3.2.3. Lactation length

The average lactation length of Dwarf cows was 240.0 days per lactation. Uzzaman *et al.* (2011) found almost similar lactation length (253.5 days) in Munshiganj cattle. The lactation length of native cows in Sylhet region (Koirala *et al.*, 2011) was lower (187.9 days) than that of Dwarf cattle. Al-Amin *et al.* (2007) observed that the lactation length of North Bengal Grey cattle of Bangladesh was 219.0 days, which is slightly lower than that of the present finding.

3.3. Reproductive traits

3.3.1. Gestation length

The average gestation length of Dwarf cows was 275.8 days. The gestation length of indigenous cows of Sylhet region (Koirala *et al.*, 2011) was slightly higher (299.2 days) than that of present result. Al-Amin *et al.* (2007) observed almost similar gestation length (281.0 days) in North Bengal Grey cows. Bhuiyan *et al.* (2007) observed almost similar gestation length for Red Chittagong and Pabna cattle (283.0 and 282.0 days, respectively). Uzzaman *et al.* (2011) found significantly higher gestation length (309 days) in Munshiganj cattle than that of the Dwarf cows.

3.3.2. Age at first heat

The average age at first heat of Dwarf cows was 19.1 month. The age at first heat of North Bengal Grey cow (Al-Amin *et al.*, 2007) was significantly higher (29.0 months) than that of the present result. Uzzaman *et al.* (2011) found higher age at first heat (33.8 months) in Munshiganj cattle than that of Dwarf cattle. Bhuiyan *et al.* (2007) observed different age at first heat for Red Chittagong and Pabna cattle (40.5 and 15.6 months, respectively).

3.3.3. Service per conception

The average service per conception of Dwarf cows was 1.62. Bhuiyan *et al.* (2007) observed lower service per conception in Red Chittagong and Pabna cattle (1.25 and 1.29, respectively). Al-Amin *et al.*, (2007) and Uzzaman *et al.* (2011) observed lower services per conception in North Bengal Grey cow (1.40) and Munshiganj cattle (1.30) than that of Dwarf cows.

3.3.4. Calving interval

The average calving interval of Dwarf cows was 408.6 days. Bhuiyan *et al.* (2007) observed different calving interval in Red Chittagong and Pabna cows (430.9 and 485.0 days, respectively). The calving interval of native cows in Sylhet region (Koirala *et al.*, 2011) was slightly higher (453.5 days) than that of present result. Uzzaman *et al.* (2011) found that the calving interval of Munshiganj cows (399.0 days) were similar with that of the Dwarf cows (408.6 days). Calving interval of non-descriptive cattle in Ratnagiri District of Konkan Region, India, was 381.2 days (Khirari *et al.*, 2014).

3.3.5. Dry period

The average dry period of Dwarf cows was 190 days. The dry period of native cows in Sylhet region (Koirala *et al.*, 2011) was higher (221 days) than that of the Dwarf cattle. Al-Amin *et al.* (2007) observed lower dry period (180 days) in case of North Bengal Grey cows than that of the present result. The dry period of non-descriptive cattle (Khirari *et al.*, 2014) was almost similar (173 days) with that of Dwarf cattle. Bhuiyan *et al.* (2007) observed slightly higher dry period in Red Chittagong cows (222 days) than that of Dwarf cows. Uzzaman *et al.* (2011) found lower dry period (73 days) in Munshiganj cows.

3.3.6. Post partum heat period

The average post partum heat period of Dwarf cows was 110.6 days. Bhuiyan *et al.* (2007) observed different post partum heat period for Red Chittagong and Pabna cattle (57 and 160.7 days, respectively). The postpartum heat period in North Bengal Grey cows (Al-Amin *et al.*, 2007) was almost similar (110 days) with that of Dwarf cows. Uzzaman *et al.* (2011) found lower post partum heat period (70.2 days) in Munshiganj cattle than that of present result.

4. Conclusions

Dwarf cattle can be a promising cattle type with low feed intake and high milk yield in harsh climatic condition in Northern part of Bangladesh. Morphometric traits were smaller than almost all the cattle available in Bangladesh. Productive and reproductive traits were more or less similar with the other cattle. Major constraints of Dwarf cattle production are lack of quality breeding, lack of feeds and their cost, disease outbreaks, lack of effective vaccines and medicines and fluctuating market prices.

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Conflict of interest

None to declare.

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