IDENTIFICATION AND CHARACTERIZATION OF DWARF CATTLE AVAILABLE IN DINAJPUR DISTRICT

A THESIS

BY

SHARMIN BEGUMU
Registration No.: 1305094
Session: 2013-2014
Semester: July-December, 2014

MASTER OF SCIENCE (M S)

IN

GENETICS AND ANIMAL BREEDING

DEPARTMENT OF GENETICS AND ANIMAL BREEDING
HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY
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Submitted to the Department of Genetics and Animal Breeding, Faculty of Veterinary and Animal Science, Hajee Mohammad Danesh Science and Technology University, Dinajpur for partial fulfillment of the requirement of the degree

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Approved as to style and content by

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Department of Genetics and Animal Breeding
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Dinajpur-5200

December, 2014

Dedicated

To My

Beloved Parents

ACKNOWLEDGEMENT

At first all praises and deepest sense of gratitude be to Almighty ALLAH, the supreme creator of this universe, who enabled the author to complete this Thesis. The author always likes to bow her head to Almighty ALLAH for his never ending blessing for successful, completion of the work.

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The Author

Abstract

The present investigation was undertaken to study 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. Out of 200 cattle 54.5, 13.5, 12.0, 20.0 and 4.0% were red, black, white and brown coat color, respectively. The body is small, compact and less fleshy. The head length and width ranges from 20.9, 9.21 cm in male calves and 39.6, 15.9 cm in adult bulls. The ear length and width ranges from 11.5, 7.29 cm in male calves to 17.7, 10.6 cm in adult bulls. The horn length and diameter were 3.25, 8.67 cm in yearling bulls and 5.74, 8.21 cm in cows. The neck length and width were 19.4, 20.6 cm in male calves to 40.9, 37.6 cm in adult bulls. The body lengths were 49.8 cm in male calves and 89.7 cm in cows. The wither height were 63.1 cm in male calves and 92.2 cm in cows. The heart girth were 67.4 cm in male calves and 120.3 cm in cows. The fore leg and hind leg length were 37.8, 41.7 cm in female calves to 56.3, 60.5 cm in cows. The tail length and diameter were 35.8, 7.83 cm in female calves to 79.2, 12.7 cm in adult bulls. The average teat length and diameter was 3.25, 4.88 cm in heifers and 4.37, 5.20 cm in cows. The distance between fore teats and rear teats were 5.88, 4.0 cm in heifers and 5.71, 4.28 cm in cows. The length and width of testis was 15.7, 11.1 cm in yearling bulls and 16.6, 11.6 cm in adult bulls. The average weight of testis was 104.1 g in yearling bulls and 110.6 g in adult bulls. The live weight were 21.7 kg in male calves and 120.8 kg in cows. The daily milk yield of Dwarf cows was 1.70 liters per day. The lactation length, gestation length, calving interval, dry period and post partum heat period were 240.0, 275.8, 408.6, 190 and 110.6 days, respectively. The age at first heat was 19.1 month and service per conception was 1.62. The most important feature about Dwarf cattle was its adaptability to harsh environment of Dinajpur District. It could survive in high and cold temperature of North Bengal. The cattle were highly disease resistant. 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 sizeable variation. The data generated for Dwarf cattle in Dinajpur District would be useful to characterize them.

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

Abbreviation and Acronyms

cm	Centimeters
BQ	Black Quarter
DLS	Department of Livestock Services
GDP	Gross Domestic Product
FMD	Foot and Mouth Disease
g	Grams
HS	Haemorrhagic Septicemia
kg	Kilograms
SEM	Standard Error Mean
SPSS	Statistical Package for the Social Sciences
%	Percentage

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Chapter I

Introduction

Bangladesh is an agricultural least developing country. Livestock is one of the major components of its agricultural output 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 every day life and 25% peoples 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. The density of livestock population per acre of cultivable land is 7.37 (Banglapedia, 2012). The relative density of the cattle population is well above the averages found in many other countries of the world. It ranks twelve in cattle populations in the world and third among Asian countries (Alam *et al.,* 1994). 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 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 posses 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. Locally adapted breeds will continue to be valuable in our country because the people of this country cannot afford the inputs that are required to sustain breeds that have been developed in low stress, high input production systems (Al-Amin *et al.* 2007).

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). Further, it serves as the source of variation for selection and improvement of milk production (Yadav and Rathi, 1991). Efforts are being made to improve the production performance of non-descriptive

cattle through cross breeding with exotic dairy cattle, however it has not yielded desirable results as it possess problem in maintaining exotic inheritance level as field condition (Rehaman *et al.*, 1998).

In the developing world, the indiscriminate use of exotic animal genetic resources and poorly designed breeding schemes are the major reasons for the loss of animal genetic resources. The loss of locally adapted breeds will have long term negative implications, and in most instances, will reduce food security rather than ensure it. These so called 'varieties' of cattle have neither been identified (either by phenotypic and genetic characterization) nor has any study been made on their conformation of productive and reproductive performance with larger sample sizes.

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). The native varieties attribute good qualities like good adaptability to traditional husbandry practices, subsistence on poor quality feeds and fodders, regularity in breeding and better resistance capabilities to withstand environmental stress and tropical diseases (Bhuiyan *et al*., 2005). Another type of cattle is called Dwarf cattle found in Northern areas of Bangladesh. Dwarf cattle possess some distinguishable features in their appearance and body characteristics. 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:

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

Chapter II

Review of literature

This chapter includes the review of some relevant literatures, which consist of the identification and characterization of cattle around the world. This type of work is very common throughout the past and present time. Some of the research works are mentioned below.

Red Chittagong is a promising cattle of Bangladesh. Many scientific works were performed to characterize the productive and reproductive performance of this cattle (Hadiuzzaman *et al*., 2010; Hossain *et al*., 2005; Bag *et al*., 2010; Bhuiyan *et al.*, 2005; Khan *et al*., 2000 and Habib *et al*., 2003). Hadiuzzaman *et al.* (2010) studied to estimate different body measurements of Red Chittagong cattle at different age groups. A total of 12 different age groups at 6 months interval were considered for estimation. The age groups were 1-6, 7-12, 13-18, 19-24, 25-30, 31-36, 37-42, 43-48, 49-54, 55-60, 61-66 and 66+ months. Different body measurements were, wither height, hip height, body length, chest diameter, chest width, hip width and rump length. It was found that all measurements significantly increased ($P<0.01$) with the advancement of age. All the estimates reached in maximum level at the highest age class (66+ months) in this study except chest width and rump length (61-66 and 43-48 months class, respectively). It also observed that all the estimates were gradually increased with age, but the rate of increment varied for different measurements for different age groups.

Different works on other cattle of Bangladesh has been performed in different times. Koirala *et al.* (2011) conducted a study on morphometric, productive and reproductive traits of native cattle at Sylhet District in Bangladesh. The body was small, compact and less fleshy. Wither height and heart girth were 89.0 and 112.1 cm, respectively. The average body length and chest width were 119.9 and 32.5 cm, respectively. The approximate body weight and horn size of the cattle were 162.8 kg and 3.94 cm, respectively. The milk production per day was 1.33 liters, lactation length was 187.9 days and the dry period was 220.8 days. Gestation length and calving interval were found 299.2 and 453.5 days, respectively. The average age at first calving was found 44.0 months.

Al-Amin *et al*. (2007) studied that locally adapted breeds will continue to be valuable in our countries because the farmers of country cannot afford the inputs that are required to sustain breeds that have been developed in low stress, high input production systems. The physical and morphological characteristics and the productive and reproductive performances of North Bengal Grey cattle were studied. The coat color of these animals was deep grey to white. The body was small, compact and less fleshy. The average ear length, ear width, head length, head width, foreleg length, hind leg length, tail length, horn length, horn diameter, teat length, teat diameter, distance between the front teats, distance between the rear teats were 18.0, 11.0, 38.0, 16.0, 65.0, 71.0, 71.0, 9.0, 10.0, 5.0, 6.0, 7.0, 7.0 cm, respectively. The average body length, wither height and heart girth in adult cows were 105.0, 94.0 and 127.0 cm, respectively. The recorded highest peak milk production per day was 3.5 liters; lactation length and dry period were 219 and 180 days, respectively. The average mature live weight of cows was 241.0 kg. The age at first heat, gestation length, calving interval and postpartum heat period was 869.0, 281.0, 442.0, 110.0 days, respectively. The number of services per conception was 1.40.

Uzzaman *et al.* (2010) conducted a survey on phenotypic characterization and performances of Munshiganj cattle. They evaluated the physical and morphological characteristics, productive and reproductive performances of Munshiganj cattle. The color of body-coat was mostly creamy to dull pinkish and looked different from other indigenous varieties of Bangladesh. The recorded highest peak milk production per day was 6.68 kg; lactation length and dry period were 8.45 and 2.42 months, respectively. The average mature live weight of cows was 223.7 kg. The age at first heat, age at first calving, gestation length and calving interval were 33.8, 45.5, 10.3 and 13.3 months, respectively The post partum heat period was 70.3 days and service per conception was 1.30.

Deb *et al*. (2008) performed research about heritability and genetic evaluation of Bangladesh Livestock Research Institute Cattle Breed-1. The estimated heritabilities were higher for lactation milk yield (0.404) and age at first calving (0.404) followed by moderate estimates of daily milk yield (0.257), lactation length (0.333), peak milk yield (0.335), milk yield per day of calving interval (0.227), age at first service (0.316), calving interval (0.273), and post partum heat period (0.276).

Saleem *et al*. (2013) worked on morphological characterization of Achai cattle in sedentary and transhumant systems in Pakistan. They evaluated the physical characteristics (color of the coat, horns, eyelashes, muzzle, hoof, switch) and morphometric measurements – i.e. heart girth, body length, height at withers, height at hipbone, face length, horn length, horn circumference, ear (length and width), neck length, dewlap length, chine length, loin length, rump (length and width), length below knee, hoof circumference, tail and switch length. Results shown that farming systems significantly affect most of the morphological characteristics of both sexes, particularly the morphometric measurements with tall and leggy conformation for transhumant farming system cows and bulls.

Khirari *et al*. (2014) recently worked on physical characteristics, productive and reproductive performance of non-descriptive cattle in Ratnagiri District of Konkan Region, India. The animals were small in size, udder with different shape like bowl, round, trough and pendulous. The physical characteristics such as average body length, wither height, heart girth, head length, ear length, horn length and circumference of horn at base were 97.3, 84.6, 126.9, 40.5, 18.1, 18.1 and 11.4 cm, respectively. Reproductive performance of the animals studied was measured as average age at first calving was 47.8 months, average calving interval and number of calving were found as 381.2 days and 2.94, respectively. The animals in the study had an average lactation milk yield, daily milk yield, lactation length and dry period in non-descriptive cattle was found as 270.0 kg, 1.62 kg 200.5 days and 173.1 days, respectively.

Kayastha *et al*. (2011) worked on physical and morphometric characterization of indigenous cattle of Assam, India. They studied the physical characteristics included colour pattern of body coat, muzzle, tail switch, hoof and horn. Body length, wither height, heart girth, pouch girth, length of tail, switch, neck, ear and head were taken up for morphometric characterization. The main body coat color of indigenous cattle were 31.2, 28.5, 15.3, 13.5, 4.41 and 7.06% brown, white, fawn, grey, black and mixed respectively. The prominent color of tail switch was black (74.5%). The means for body length, height at wither, heart girth, pouch girth, length of tail, switch, neck, ear and head were 83.7, 91.9, 113.1, 121.2, 54.2, 26.1, 32.7, 18.1 and 35.0 cm, respectively.

Bhuiyan *et al.* (2007) evaluated the indigenous cattle genetic resources of Bangladesh and a way forward to their development. Bhuiyan *et al.* (1993) researched about yield and

variability of milk production in the local cattle of Bangladesh. Bhuiyan *et al*. (1992) also studied on performance of purebred and crossbred dairy cattle in Bangladesh. Islam *et al*. (2004) conducted a study on some productive parameters of Local × Friesian crossbred cows in Bangladesh. Roy (1999) conducted a comparative study on the productive and reproductive performances of different genetic groups of dairy cows in Military Farm, Savar, Dhaka and Pabna in Bangladesh. Khan *et al*. (1999) worked on reproductive performance of different genetic group of cows under farm condition of Bangladesh. Alam *et al*. (1994) studied the comparative performance of local and cross-bred cows in Bangladesh. Alam *et al.* (2008) also worked on productive and reproductive performance of dairy cattle in Char areas of Bangladesh. Husain *et al*. (1985) evaluated the reproductive potentialities of local and crossbred animals under farm and village conditions in Bangladesh. Ashraf (1988) conducted a study on some economic traits of indigenous and graded cattle in Khulna region. Jabbar *et al.* (1988) studied the limitation of crossbreeding for improvement of cattle in Bangladesh.

Ghose *et al*. (1977) worked on comparative study of age at first calving, gestation period and calving interval of different breeds of cattle in Bangladesh. Hossain *et al*. (1982) studied performance of crossbred and local cattle under village conditions in Pabna District of Bangladesh. Halim (1992) researched on comparative economic analysis of local and crossbred dairy cows in a selected area of Dhaka District, Bangladesh. Majid *et al*. (1992) evaluated the breeding for cattle improvement in Bangladesh. Majid *et al*. (1995) worked on factors affecting the reproductive efficiency of crossbred cows in Bangladesh. Rahman *et al*. (1987) worked on comparative study of some productive and reproductive performances of dairy cows at Savar dairy and cattle improvement farm, Bangladesh. Rahman *et al*. (2001) also worked on genetic differences in the performance of local, pure and crossbred cows in Bangladesh.

Chapter III

Methodology

3.1. Location and climate

Dinajpur District is located in Northern part of Bangladesh. It is located between 25°37′38″ North latitude and 88°38′16″ East longitude. The area is within the annual average highest temperatures of 33.5°C and average lowest temperature of 10.5°C with annual rainfall 2,536 mm. The average height of Dinajpur from the sea level is 42 m or 137 ft.

3.2. 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, reproductive performance, disease control and management.

3.3. Questionnaire development

Most easy, simple and direct questions were used to obtain information from the respondent farmers. The questionnaire was pre-tested in order to judge its suitability for the respondents then finalized and necessary modifications have been made. It was carefully designed keeping the purposes of the study in mind. It contained both open and closed form questions. Simple and direct questions were included in the questionnaire for the purposes of collecting information relating to the farmers such as age, education, occupation, farm size and for information relating to the cattle such as feeding management, 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. The livestock population referred to the total number of livestock, mainly cattle, reared by the farmer such as numbers of milch cows, pregnant cows, bulls, heifers, bullocks and calves of both sex. Most of the cattle were indigenous cattle and different crossbred cattle.

3.4. Measurement procedure

3.4.1. 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 are given below-

3.4.1.1. Coat color

The coat color detection is based on visual information of the researcher during the research. After observation, all the colors were expressed as percentage (%) for each.

3.4.1.2. Head length and width

The length of the head was detected by measuring the length from muzzle to back of forehead through measuring tape. Process of measuring the length of the head shown in Photo 4 (a). The width of the head was detected by measuring the length from side to side of head through measuring tape. Process of measuring the width of the head shown in Photo 4 (b).

3.4.1.3. Ear length and width

The length of the ear was determined by measuring the length from the base to tip of the ear through measuring tape. The procedure of measuring length of the ear shown in Photo 5 (a). The width of the ear was determined by measuring the length from side to side of ear at highest width point through measuring tape. The procedure of measuring width of the ear shown in Photo 5 (b).

3.4.1.4. Horn length and diameter

The length of the horn was determined by measuring the length from the top to bottom of the horn through measuring tape. Process of measuring the horn length shown in Photo 6 (a). The horn diameter was determined by measuring diameter of the base of the horn through measuring tape. Process of measuring the diameter of the base of the horn shown in Photo 6 (b).

Photo 1. Dwarf cattle (heifer)

Photo 2. Dwarf cow with her new born calf

Dwarf Yearling bull

Dwarf bull

Dwarf heifer

Dwarf cow and calf

Photo 3. Different Categories of Dwarf Cattle

3.4.1.5. Neck length and width

The length of the neck was measured from the front of the wither to back of forehead through measuring tape. Process of measuring the neck length shown in Photo 7 (a). The width of the neck was determined by measuring the length from upside to downside of neck through measuring tape. Process of measuring the width of the neck shown in Photo 7 (b).

3.4.1.6. Body length

The length of the body from shoulder point to buttock was measured by measuring tape. The procedure of measuring body length shown in Photo 8.

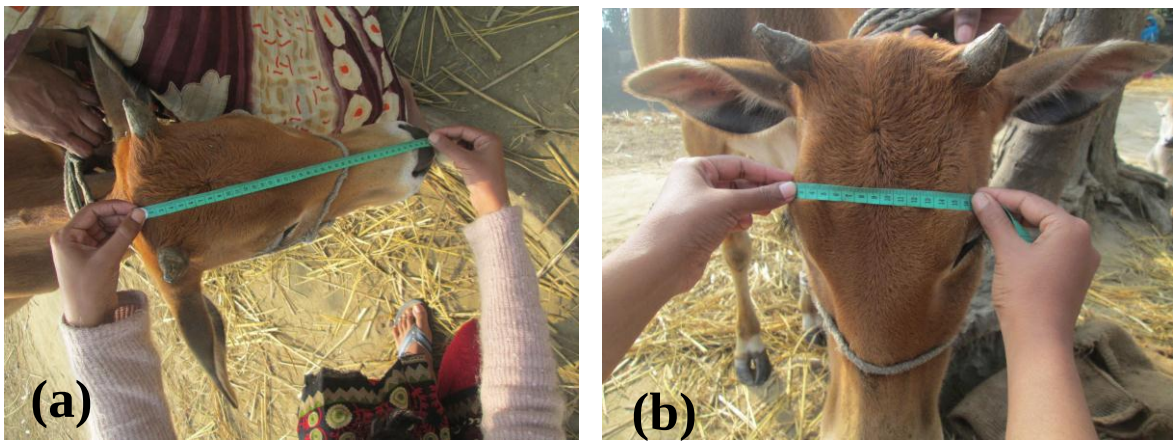

Photo 4 (a,b). Measuring of head length and width of a cow

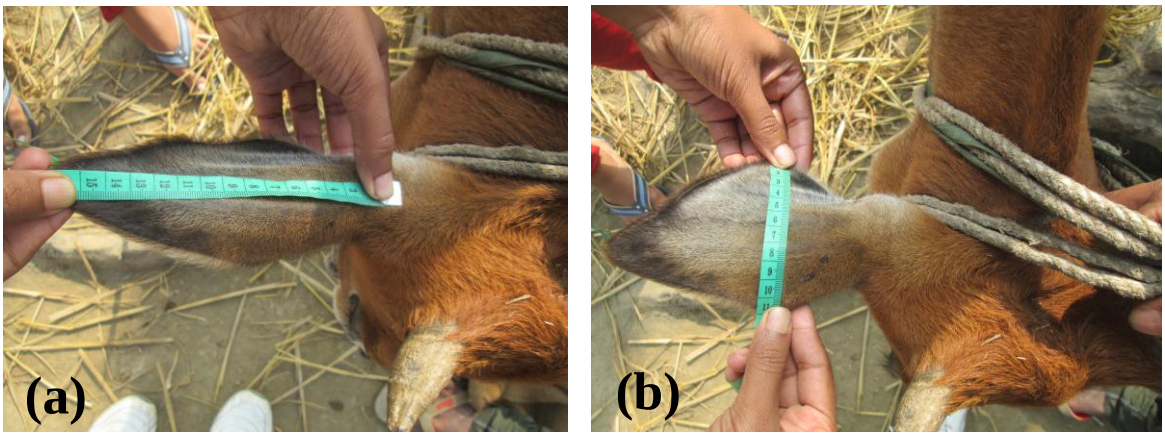

Photo 5 (a,b). Measuring of ear length and width of a cow

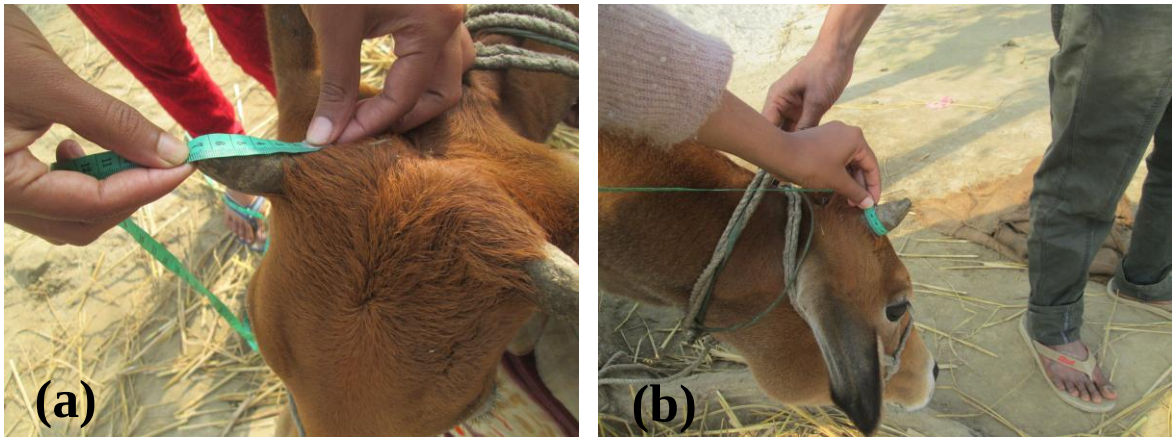

Photo 6 (a,b). Measuring of horn length and diameter of a cow

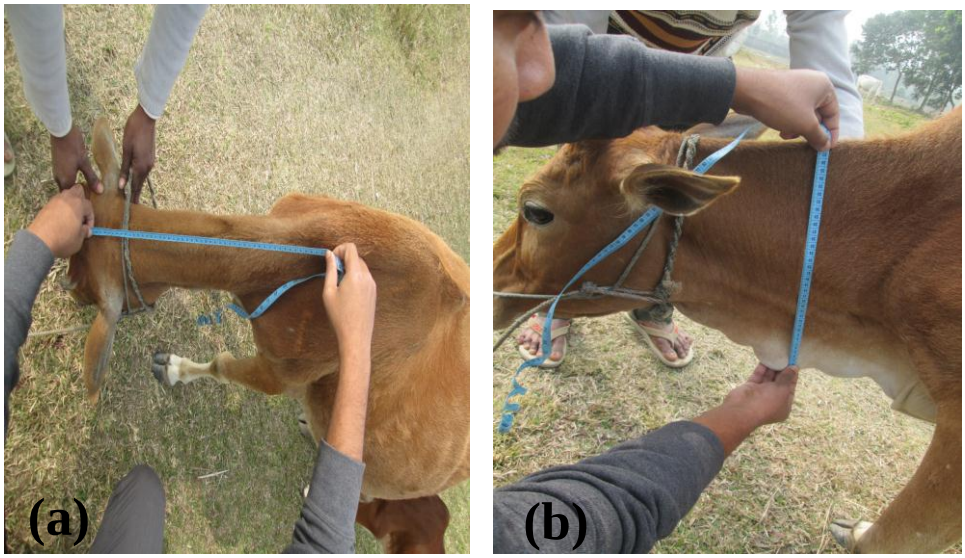

Photo 7 (a,b). Measuring of neck length and width of a cow

Photo 8. Measuring of body length of a heifer

3.4.1.7. Wither height

It was detected by measuring the height of the cattle from ground to wither with the help of measuring tape. Process of measuring the wither height shown in Photo 9.

3.4.1.8. Heart girth

The heart girth was determined by the peripheral measurement around the heart, just behind the fore legs through measuring tape. The procedure of measuring heart girth shown in Photo 10.

Photo 9. Measuring of wither height of a heifer

Photo 10. Measuring of heart girth of a cow

3.4.1.9. Fore leg and hind leg length

The length of the fore leg from base of scapula to the tip of hoof was determined by direct measurement through measuring tape. Process of measuring the fore leg length shown in Photo 11 (a). The length of the hind leg from base of hook joint to the tip of hoof was measured by measuring tape. Process of measuring the length of the hind leg shown in Photo 11 (b).

Photo 11 (a,b). Measuring of fore leg and hind leg length of a cow

Photo 12 (a,b). Measuring of tail length and diameter of a heifer

3.4.1.10. Tail length and diameter

The length of the tail was detected by measuring the length from base to the tip of the tail through measuring tape. Process of measuring the length of the tail shown in Photo 12 (a). The diameter of tail was determined by measuring diameter around the base of the tail through measuring tape. Process of measuring the diameter of the tail shown in Photo 12 (b).

3.4.1.11. Teat characteristics

The length of the teat was determined by measuring the length from base to the tip of a teat through measuring tape. The procedure of measuring the teat length shown in Photo 13 (a). The diameter of teat was detected by measuring diameter around the base of a teat through measuring tape. The procedure of measuring the diameter of teat shown in Photo 13 (b).

The distance between fore and rear teats were determined by measuring the distance of front and rear teats from one to another through measuring tape. Process of measuring the distance between fore and rear teats shown in Photo 14 (a,b).

3.4.1.12. Testis length, width and weight of testis

The length of the testis was detected by measuring the length from base to the tip of the scrotal sac through measuring tape. The procedure of measuring the length of the testis shown in Photo 15 (a). The width of the testis was determined by measuring the length from side to side of the scrotal sac through measuring tape. Process of measuring the width of the testis shown in Photo 15 (b). The weight of the testis was measured by weighing balance. It was expressed as grams. Process of measuring the width of the testis shown in Photo 16 (a).

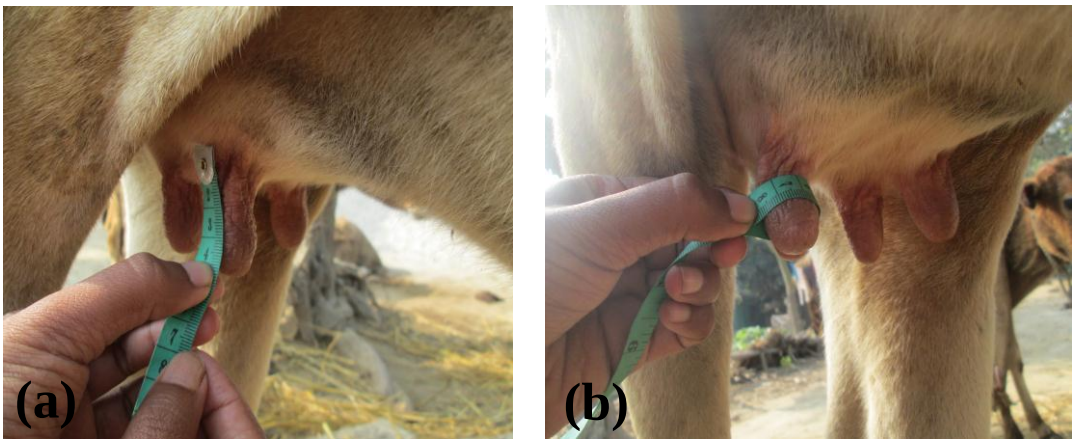

Photo 13 (a,b). Measuring of teat length and diameter of a cow

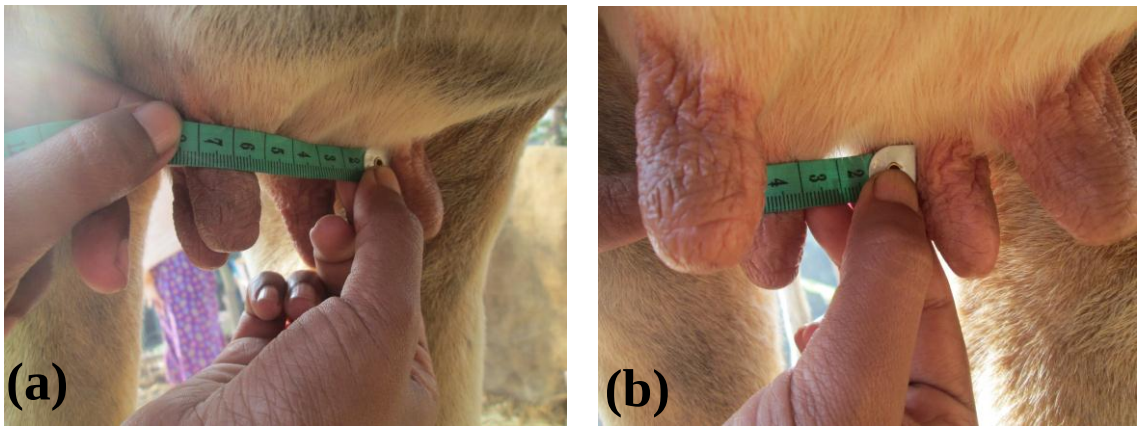

Photo 14 (a,b). Measuring of distance between fore and rear teats of a cow

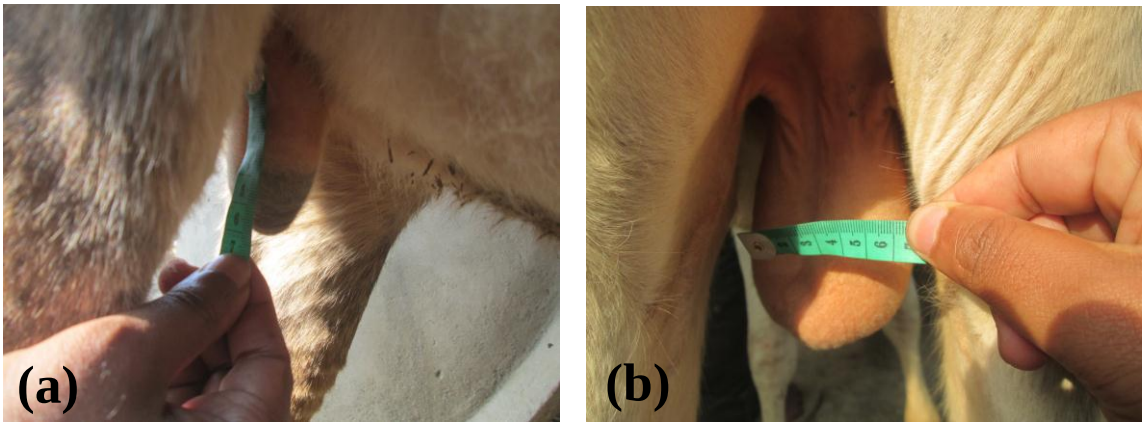

Photo 15 (a,b). Measuring of length and width of testis of a Dwarf bull

Photo 16 (a,b). Weighing and measuring of testicle of a bull

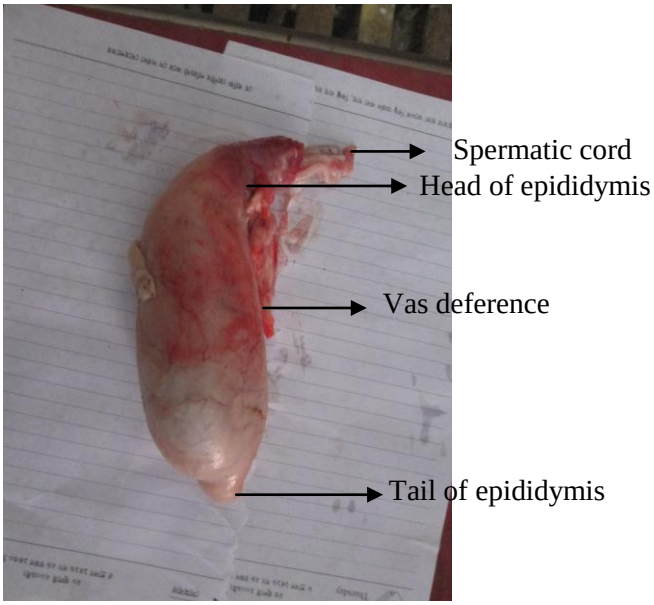

Photo 17. Different parts of testicle of a bull

3.4.2. Productive traits

3.4.2.1. Live weight

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

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

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

3.4.2.2. Average milk yield and peak milk yield

The average milk yield and peak milk yield was measured from the verbal answer of the farmer. They were expressed in liter unit of liquid.

3.4.3. Reproductive traits

3.4.3.1. Gestation period, lactation length, dry period, calving interval and post partum heat period

Gestation period: Duration between conception to calving.
Lactation length: Duration of milking days.
Dry period: Duration of absent from milking.
Calving interval: Duration between two calving.
Post partum heat period: Duration of first heat after calving.

The gestation period, lactation length, dry period, calving interval and post partum heat period were measured from the verbal answer of the farmer. They were expressed in number of days.

3.4.3.2. Age at first heat

The age at first heat was measured from the verbal answer of the farmer. It was expressed in number of months.

3.5. 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 ± SEM. Differences were considered significant at the level of $P<0.05$.

Chapter IV

Results and Discussion

4.1. Morphometric traits

The morphometric characteristics of the Dwarf cattle such as coat color, head length and width, horn length and diameter, ear length and width, neck length and width, body length, wither height, heart girth, length of fore leg and hind leg, tail length and diameter, teat characteristics and length, width and weight of testis are described below.

4.1.1. 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).

Table 1. Different coat color of Dwarf cattle available in Dinajpur District (200 cattle).

Coat Color						
Color (%)	Yearling bull	Bull	heifer	cow	Calf (m)	Calf (f)
Red (50.5)	15	20	21	26	8	11
Black (13.5)	4	16	6	1	-	-
White (12)	4	11	5	3	-	1
Gray (20)	8	6	9	12	3	2
Brown (4)	2	-	-	5	1	-

4.1.2. 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 (Figure 1). 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 and Krishna valley cattle were found 40.5 and 44.9 cm, respectively (Khirari *et al.,* 2014; Karthikeyan *et al*., 2006). Kayastha *et al.* (2011) observed almost similar head length (35.0 cm) in indigenous cattle of Assam, India.

4.1.3. 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 (Figure 2). 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. Singh *et al.* (2002) reported that the ear length in Indian Deoni cattle was 26.2 cm which is higher than that of the present study.

4.1.4. Horn length and diameter

The horn length and diameter of different categories of Dwarf cattle shown in Figure 3. 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; Koirala *et al.,* 2011) almost similar with that of Dwarf cattle. Singh *et al.* (2002) found that the horn length of Deoni cattle was 17.6 cm. The similar value of horn circumference at base (10.8 cm) about Khillar breed of cattle was reported by Dhal *et al*. (2007). Horn length and diameter of non-descriptive cattle in India were 18.1 and 11.4 cm, respectively (Khirari *et al.,* 2014). Karthikeyan *et al*. (2006) reported that the horn length (38.5 cm) of Krishna valley cattle was higher than that of the Dwarf cattle. The horn length and diameter of North Bengal Grey cattle were 9.0 and 10.0 cm, respectively (Al-Amin *et al.*, 2007).

4.1.5. Neck length and width

The neck length and width of different categories of Dwarf cattle shown in Figure 4. 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.

4.1.6. Body length

The body length of different categories of Dwarf cattle shown in Figure 5. 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). Habib *et al.* (2003) observed that the body length of Red Chittagong cow was 114.4 cm, where the value is higher than that of Dwarf cow (89.7 cm). Koirala *et al.* (2011) observed that the body length of native cattle of Sylhet was 119.9 cm. Al-Amin *et al.* (2007) found that the average body length of North Bengal Grey cattle was 99.0 cm which is also higher than that of the present result. Bhuiyan *et al.* (2007) found that the body length of Pabna cows was 164.4 cm. Body length of non-descriptive cattle in India was 97.3 cm (Khirari *et al.*, 2014). Karthickeyan *et al.* (2006) observed that the body length of Krishna valley cattle was 128.4 cm which is higher than that of present finding. Singh *et al.* (2002) reported that the body length of Indian Deoni cattle were 78.5, 93.3, 101.6, 103.5, 116.4 and 120.1 cm in the age groups of 4-6, 10-12, 13-18, 19-24, >24 months and adult cows, respectively, which are much higher values than the corresponding values.

4.1.7. Wither height

The wither height of different categories of Dwarf cattle shown in Figure 6. 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. Karthickeyan *et al*. (2006) found that the wither height of Krishna valley cattle of India was

116.4 cm in cow and 150.5 cm in bull. Habib *et al.* (2003) observed that the wither height of Red Chittagong cow was 107.7 cm, which is higher than that of Dwarf cow (92.2 cm) of Dinajpur. Bag *et al*. (2010) and Bhuiyan *et al.* (2005), found almost smiliar wither height 105.9 and in adult 107.7cm Red Chittagong cows. The results of the present study were lower than that of Pabna cows (118.2 cm) and Indian Ponwar cows (109.0 cm) reported by Bhuiyan *et al.* (2007) and Gaur *et al.* (2003). Namikawa *et al.* (1984) also reported higher wither height (100.3 cm) in native cattlengladesh. In another study Singh *et al*. (2002) reported that wither height were 86.5, 98.5, 107.9, 112.5, 122.1 and 122.2 cm, in the age groups of Deoni cattle 4-6, 10-12, 13-18, 19-24, >24 and adult cows respectively which are greater values than that of this study**.**

4.1.8. 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 (Figure 7). 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). Habib *et al*. (2003) and Karthickeyan *et al*. (2006) observed higher heart girth (139.9 and 144.7 cm, respectively) in Red Chittagong cows and Krishna valley cows of India than the present results (120.3 cm). Kayastha *et al*. (2011) found almost similar heart girth (113.1 cm) in indigenous cattle of Assam, India.

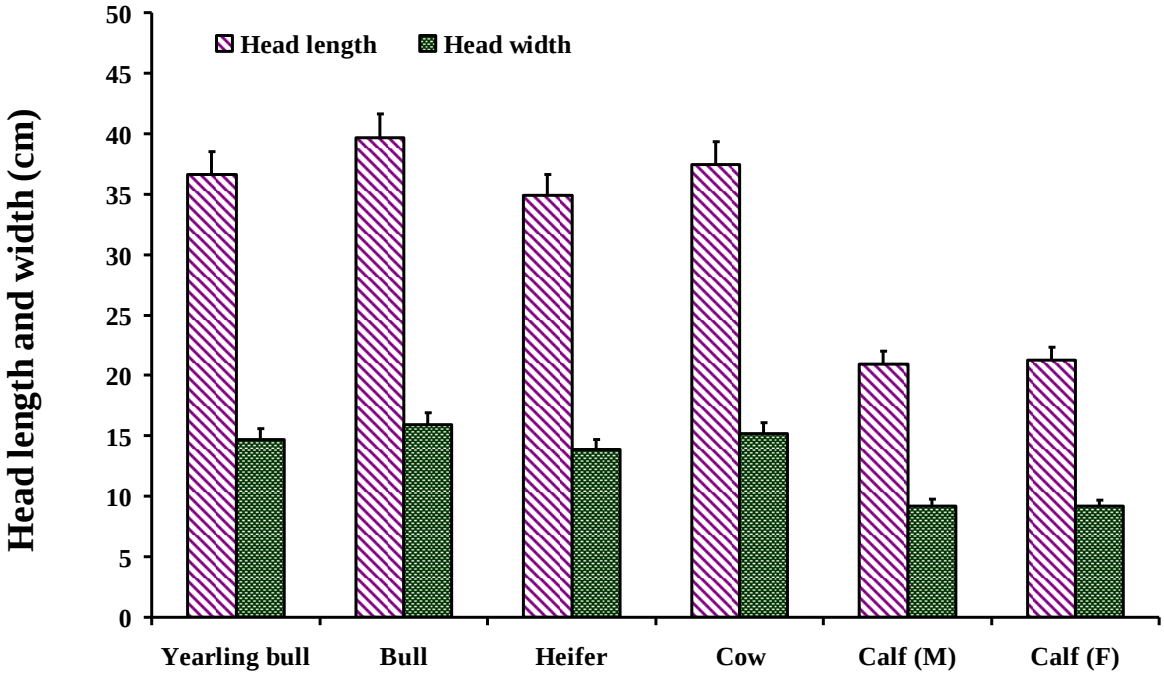

Figure 1. Head length and width of different categories of Dwarf cattle. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups.

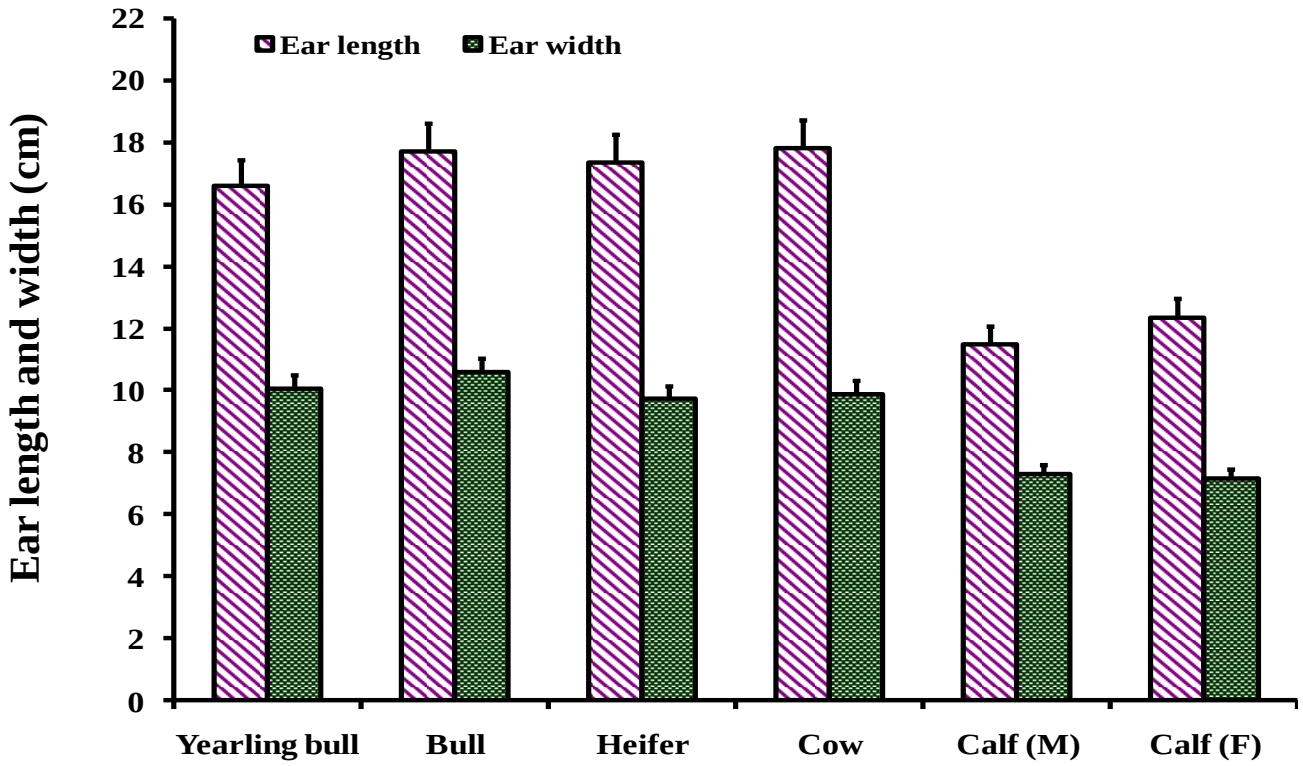

Figure 2. Ear length and width of different categories of Dwarf cattle. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups.

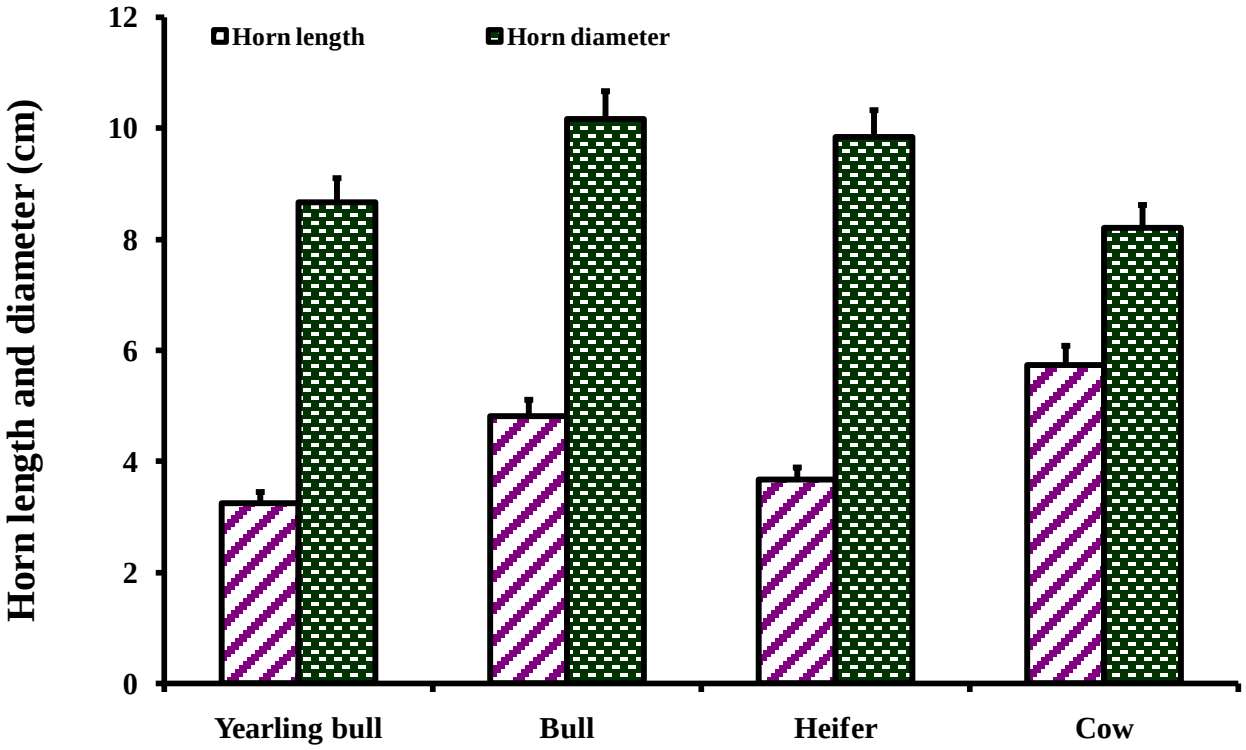

Figure 3. Horn length and diameter of different categories of Dwarf cattle. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups.

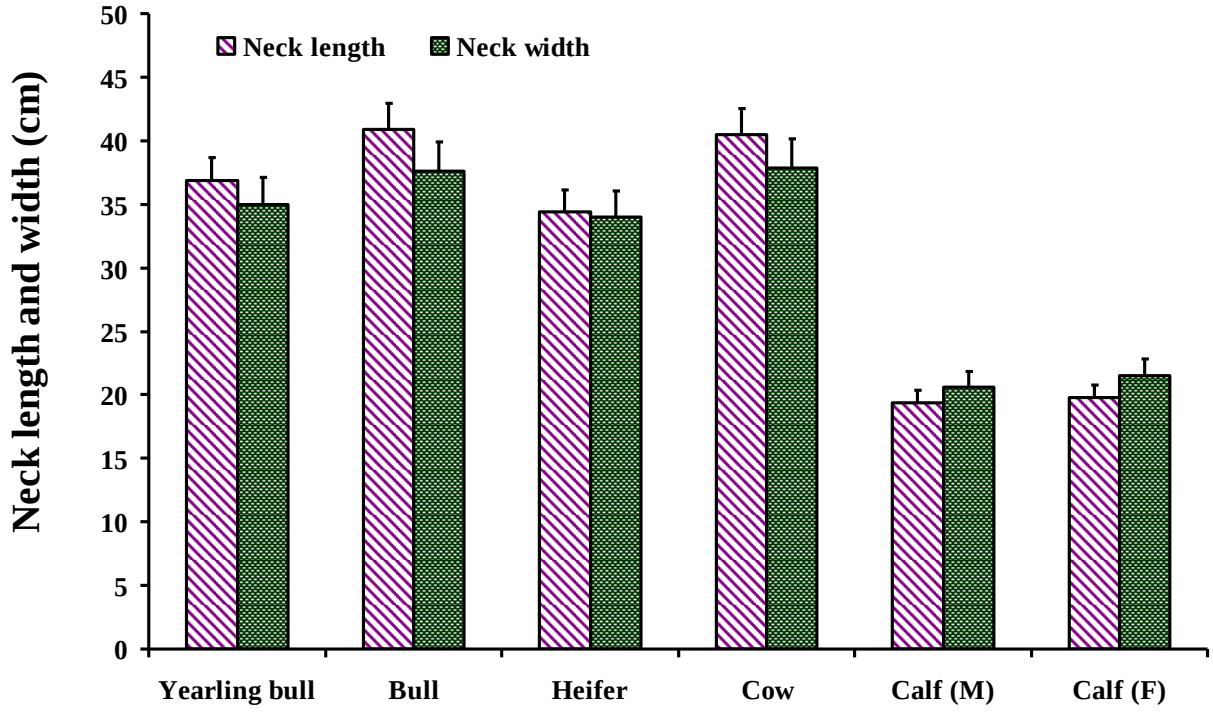

Figure 4. Neck length and width of different categories of Dwarf cattle. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups.

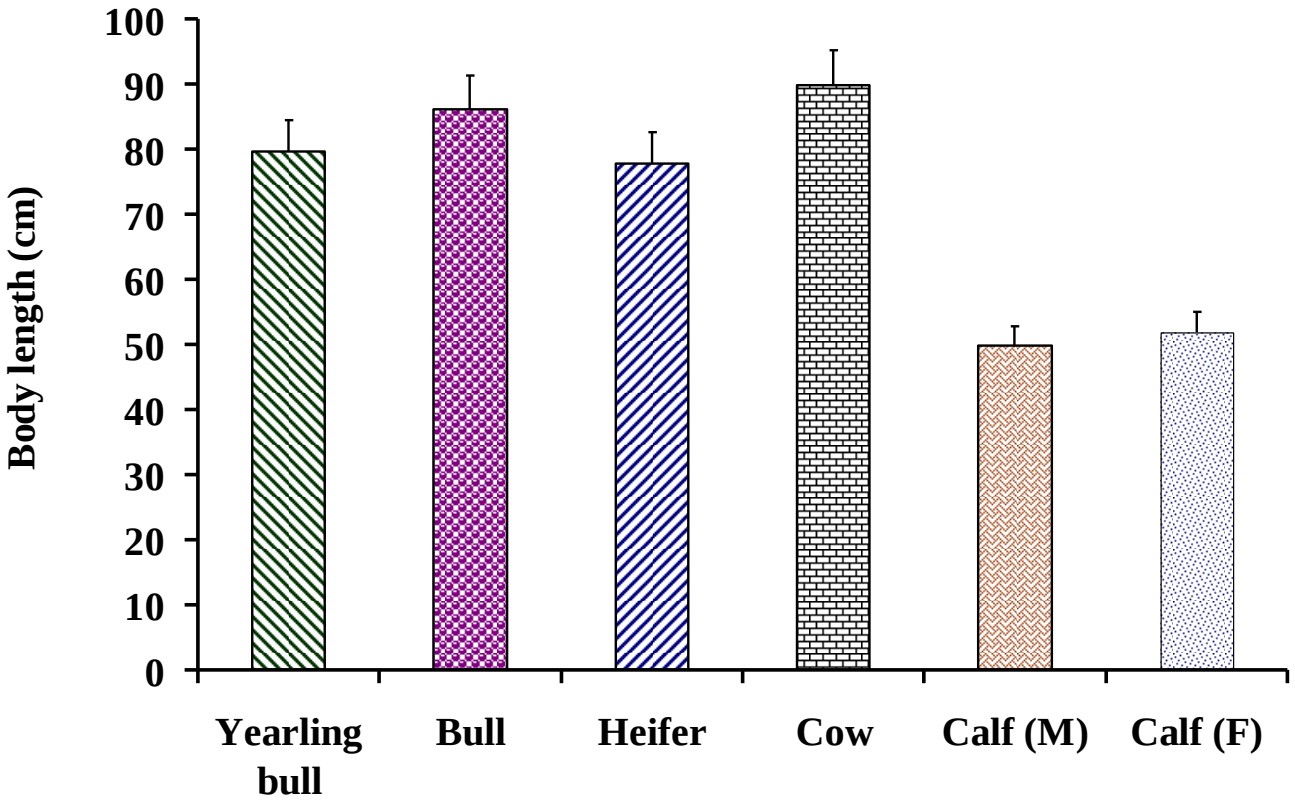

Figure 5. Body length of different categories of Dwarf cattle. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups.

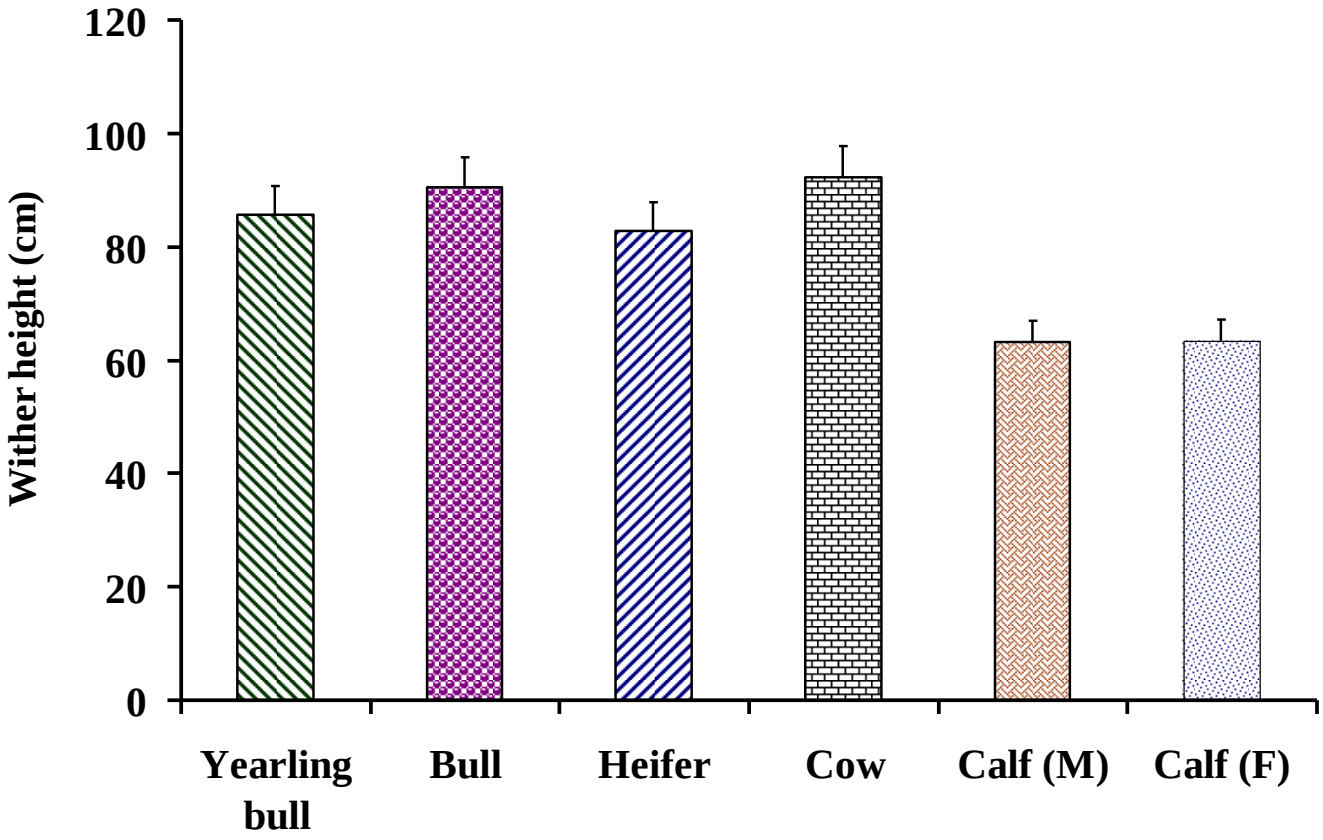

Figure 6. Wither height of different categories of Dwarf cattle. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups.

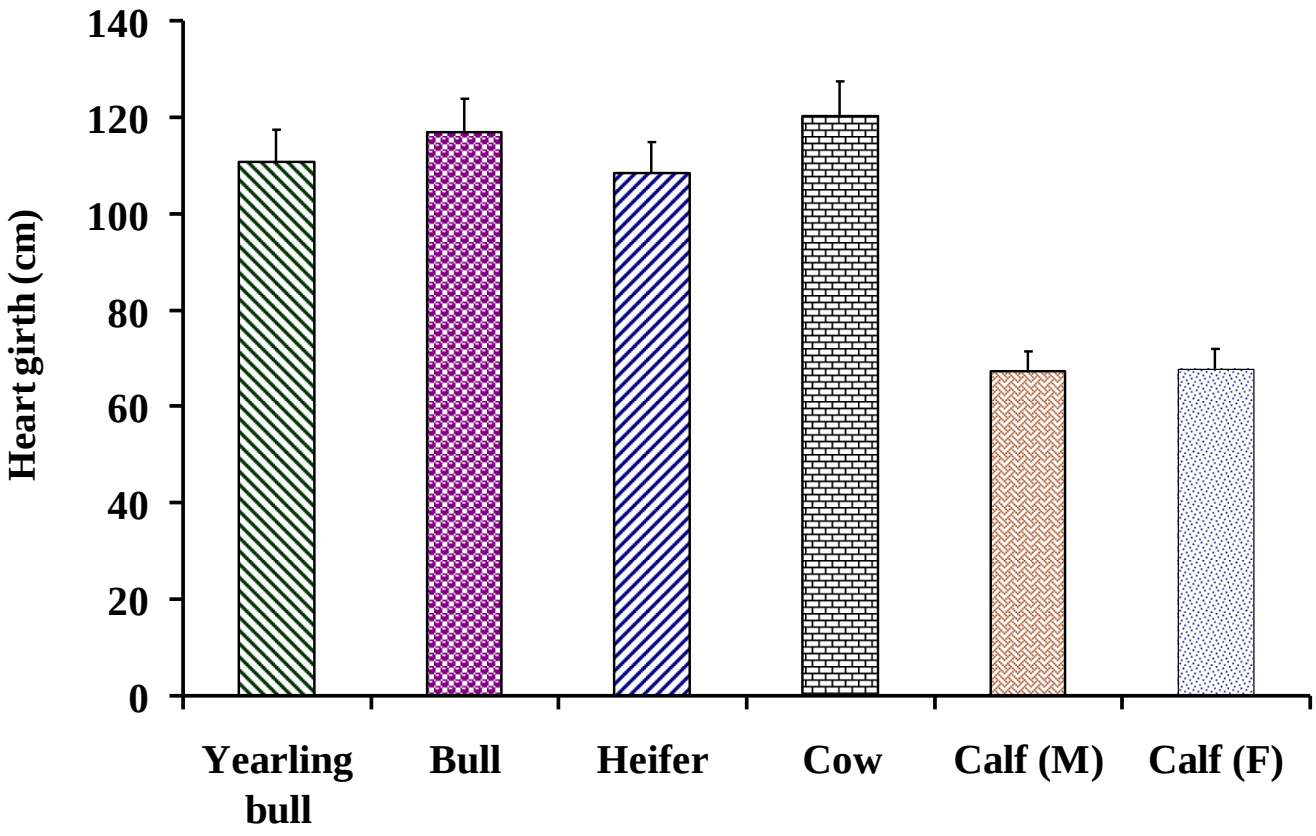

Figure 7. Heart girth of different categories of Dwarf cattle. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups.

4.1.9. 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 (Figure 8). 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). The length of fore leg and hind leg of North Bengal Gray cattle were higher than that of Dwarf cattle.

4.1.10. Tail length and diameter

The tail length and diameter of different categories of Dwarf cattle are shown in Figure 9. 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.

4.1.11. Teat characteristics

The teat length and diameter of Dwarf cattle (heifers and cows) are shown in Figure 10 (A). 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 (Figure 10 [B]). 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.

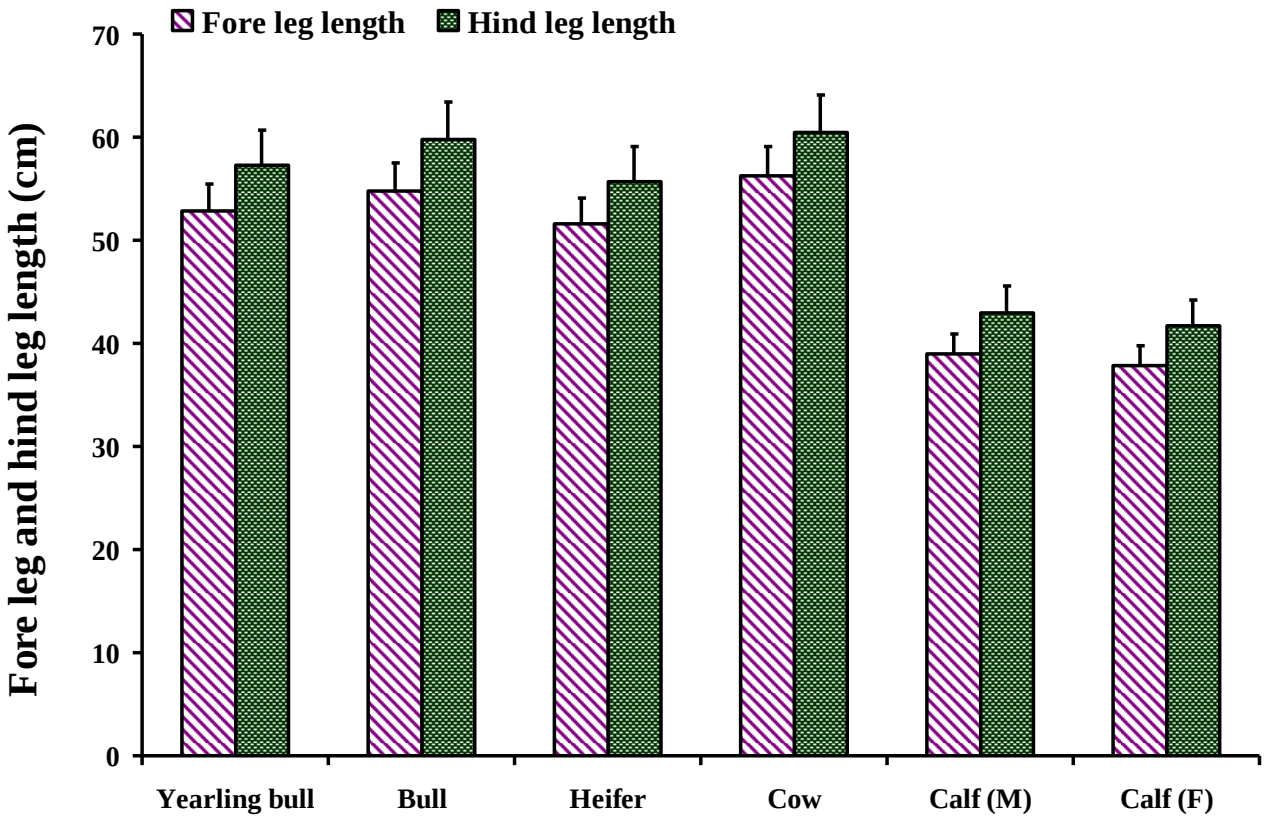

Figure 8. Foreleg and hind leg length of different categories of Dwarf cattle. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups.

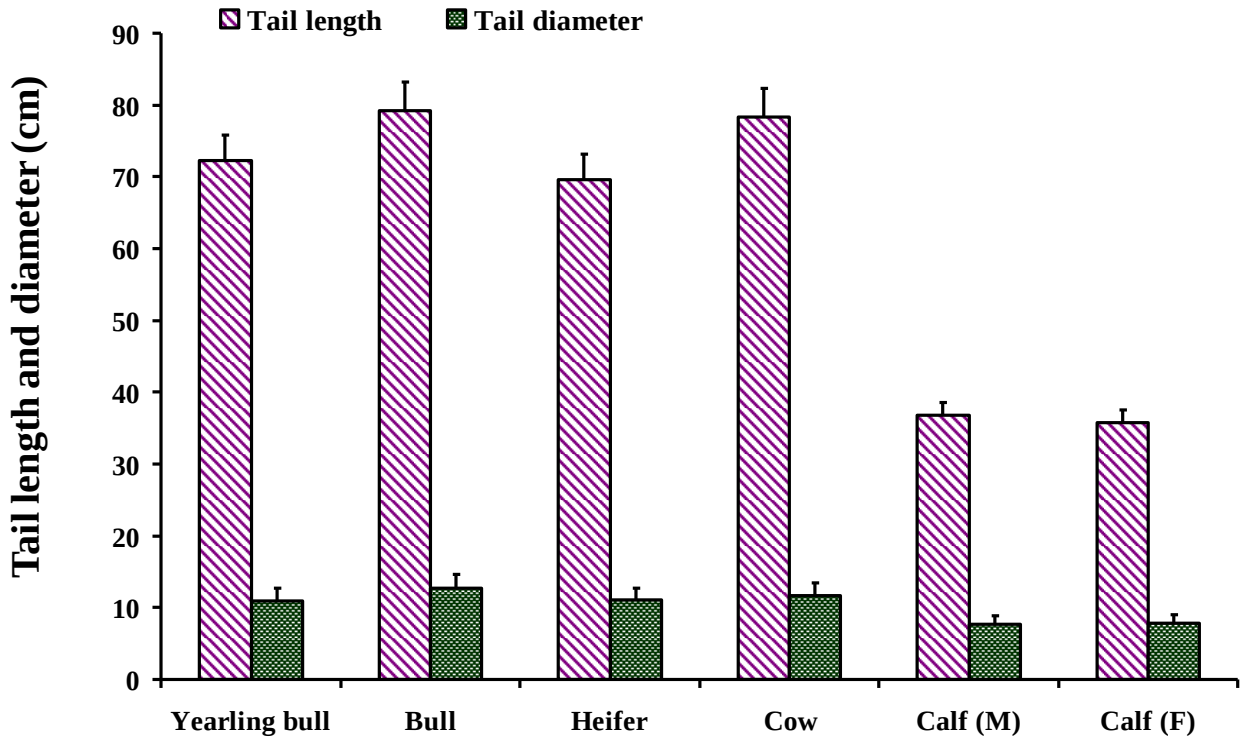

Figure 9. Tail length and diameter of different categories of Dwarf cattle. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups.

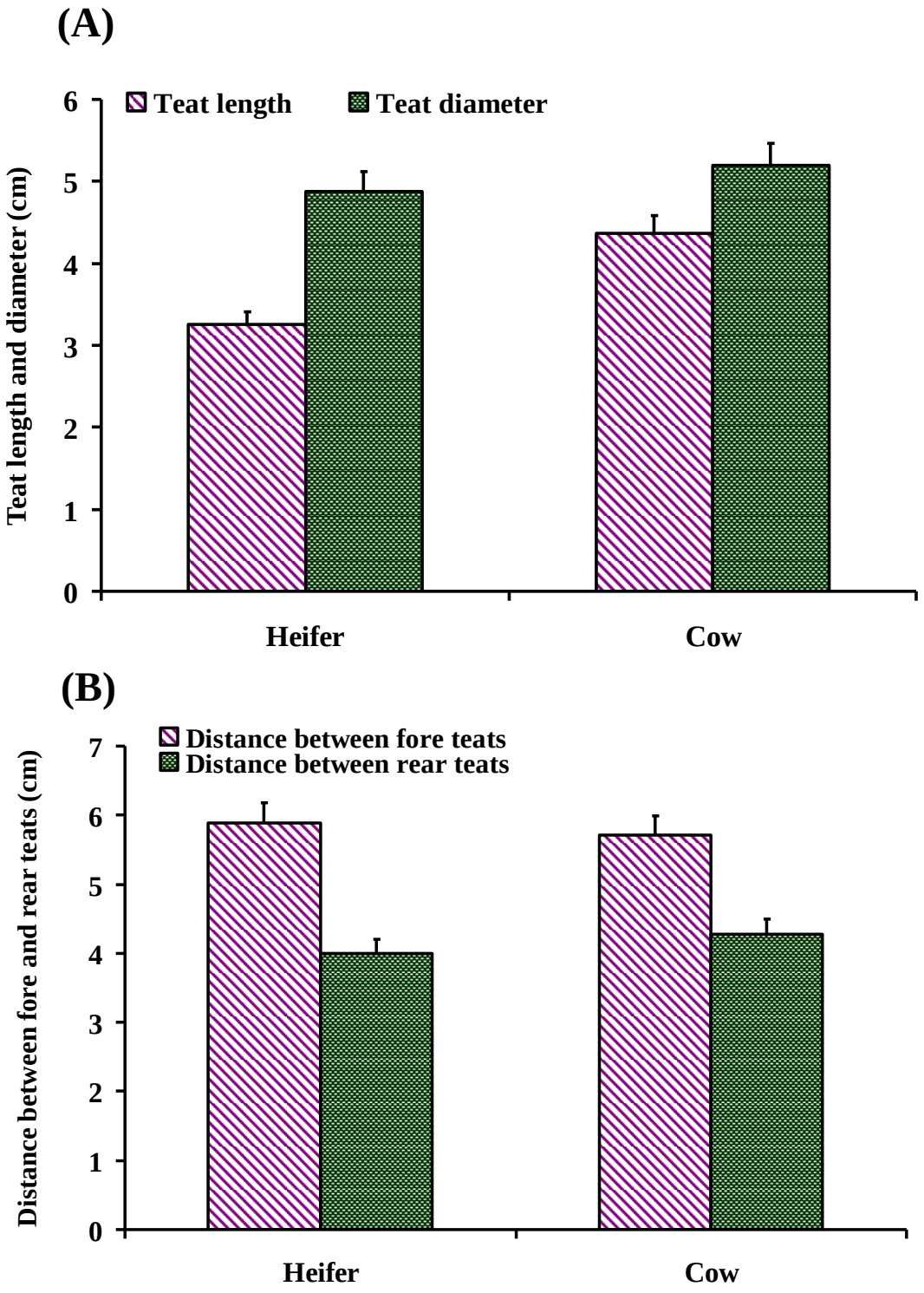

Figure 10 (A,B). Teat length and diameter (A); distance between fore and rear teats (B) of different categories of Dwarf cattle. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups.

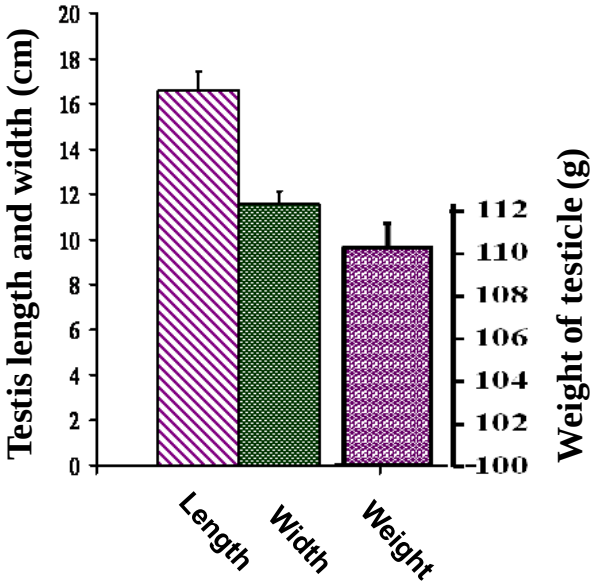

Figure 11. Testis length, width and weight of Dwarf bull. Mean ± SEM (P>0.05).

4.1.12. Testis length, width and weight

The length and width of testis of different categories of Dwarf cattle are shown in Figure 11. 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 (Figure 11).

4.2. Productive traits

The productive traits of Dwarf cattle such as live weight, daily milk yield and lactation length are described below-

4.2.1. 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 (Figure 12). 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. Khan *et al.* (2000) found that the mature body weight of Red Chittagong cows were 234.3 and 206.5 kg under farm and rural conditions, respectively which is higher than the results obtained in the present study. Habib *et al.* (2003) reported that the birth weight of Red Chittagong calves were 17.2 kg in male and 16.0 kg in female with an average of 16.7 kg, which are similar with the results from Dwarf calves in the present study (21.7 and 22.4 kg, for male and female calves respectively). Khan *et al*. (2000) observed that the birth weight of Red Chittagong calves in farm and rural condition were 17.3 and 16.0 kg, respectively which were very similar to the Dwarf cattle.

4.2.2. Daily milk yield

The average daily milk yield of Dwarf cows was 1.70 liter per day (Figure 13). The milk yield per day was lower (1.33 liter) in native cattle of Sylhet (Koirala *et al.,* 2011) than that of Dwarf cows. Habib *et al*. (2003) found higher milk yield per day (2.55 liters) in Red Chittagong cows than Dwarf cows the present result. Bhuiyan *et al.* (2007) also observed higher milk yield in Pabna cattle (2.81 liters). Khan *et al.* (2000) observed that daily milk yield of Red Chittagong cows under farm and rural conditions were 2.0 and 1.80 liters, respectively which are slightly higher than the result of present study. Khirari *et al*. (2014)

found that the daily milk yield was 1.62 liters in non-descriptive cattle, which is almost similar with the findings of Bhuiyan and Faruque (1993). Al-Amin *et al.* (2007) and Bhuiyan *et al.* (1992) found similar daily milk yield in North Bengal Gray cattle and local cow (3.0 liters). Jabbar and Ali (1988) found higher milk production of local cows (2.42 liters). A wide variation in milk yields in indigenous cows was noticed in different region and time.

4.2.3. Lactation length

The lactation length of different available cattle in Bangladesh is shown in Figure 14. The average lactation length of Dwarf cows was 240.0 days per lactation. Uzzaman *et al.* (2010) 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. Zafar *et al.* (2008) observed that the lactation length was 267.0 days in case of Pakistani Sahiwal cows, which is higher than that of the present findings. 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.

Gaur *et al*. (2003) reported almost similar lactation length (326.0 days) in Gir cattle breed of India. Habib *et al*. (2003) reported higher lactation length (261.1 days) in Red Chittagong cows. Khan *et al.* (2002) studied the lactation length of Red Chittagong cows and found that it was 222.9 days under farm conditions and 214.7 days under rural conditions. These results are slightly lower than that of the present study. Ahmed and Islam (1987) summarized the performance of local cattle for lactation length and found an average of 270.0 days, which is a little higher than the results of present study. Dhal (2007) reported higher lactation length (281.2 days) in Khillar cattle. The lactation length days in non-descriptive cattle were 200.5 days (Khirari *et al.*, 2014). Hoque *et al.* (1999) and Khan and Khatun (1998) studied the performance of crossbred cows and found that the lactation length ranged from 198.9 to 208.8 days.

4.3. Reproductive traits

The reproductive characteristics (gestation length, age at first calving, calving interval, dry period and post partum heat period) are described below-

4.3.1. Gestation length

The average gestation length of Dwarf cows was 275.8 days (Figure 15). 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. Khan *et al.* (1999) and Majid *et al.* (1992) found that the gestation length of Red Chittagong cows was 281.3 and 281.0 days, respectively where, Ahmed and Islam (1987) and Majid *et al*. (1999) found almost similar gestation length in Red Chittagong cows (281.3 and 281.0 days, respectively). The gestation lengths of crossbred cow were 281.0, 283.6 and 279.1 days, respectively (Hossain and Routledge, 1982; Khan and Khatun, 1998 and Khan *et al*., 1999). 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*. (2010) found significantly higher gestation length (309 days) in Munshiganj cattle than that of the Dwarf cows.

4.3.2. Age at first heat

The age at first heat of different available cattle in Bangladesh is shown in Figure 16. 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. Rahman *et al*. (1987) investigated the age at first heat of local cows and found it was 42.8 months. Ashraf (1998) concluded that age at first heat of indigenous cows was 31.0 months. Uzzaman *et al.* (2010) found higher age at first heat (33.8 months) in Munshiganj cattle than that of Dwarf cattle. Ali (1994) shown that the age at first heat of local cattle was 42.4 months. Bhuiyan *et al*. (2007) observed different age at first heat for Red Chittagong and Pabna cattle (40.5 and 15.6 months, respectively).

4.3.3. Service per conception

The service per conception of different available cattle in Bangladesh is shown in Figure 17. The average service per conception of Dwarf cows was 1.62. Khan *et al.* (1999) studied the performance of Red Chittagong cattle and reported similar service per conception (1.61). Bhuiyan *et al.* (2007) observed lower service per conception in Red Chittagong and Pabna cattle (1.25 and 1.29, respectively). Habib *et al.* (2003); Al-Amin *et al*., (2007) and Uzzaman *et al.* (2010) observed lower services per conception in Red Chittagong cattle (1.25); North Bengal Grey cow (1.40) and Munshiganj cattle (1.30) than that of Dwarf cows.

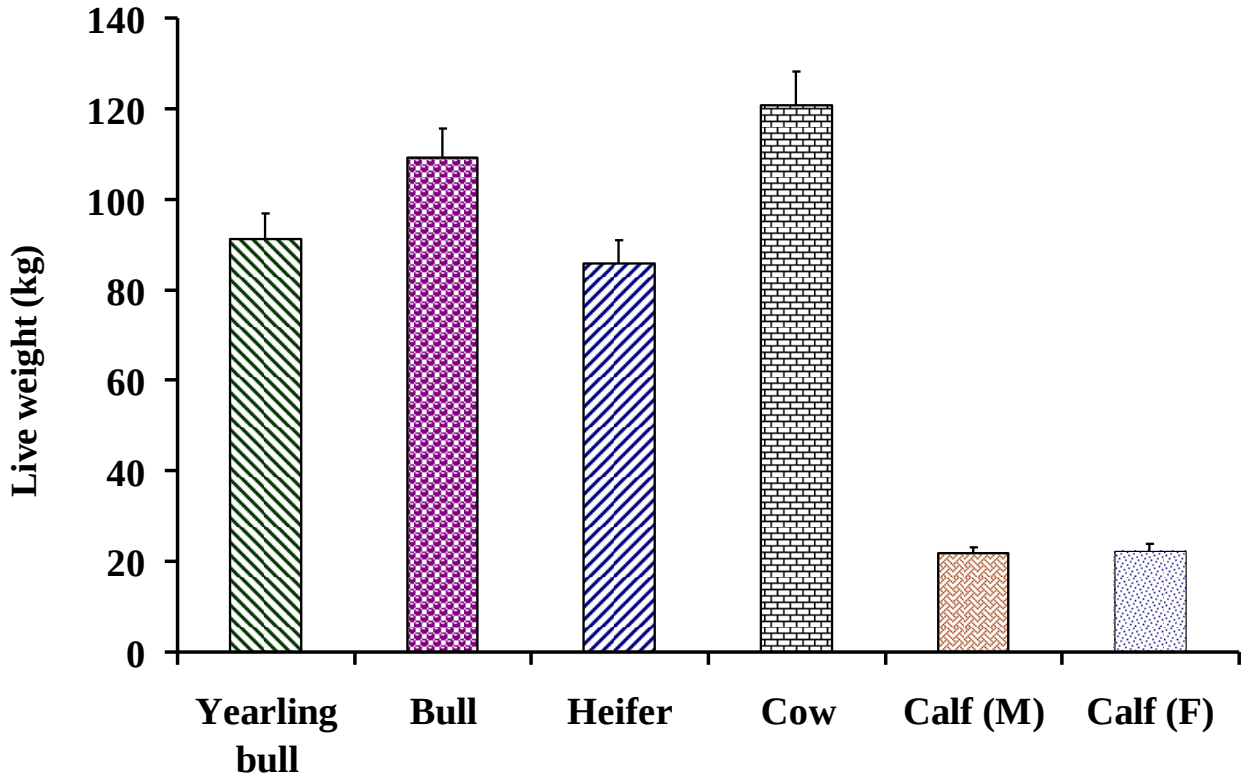

Figure 12. Live weight of different categories of Dwarf cattle. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups.

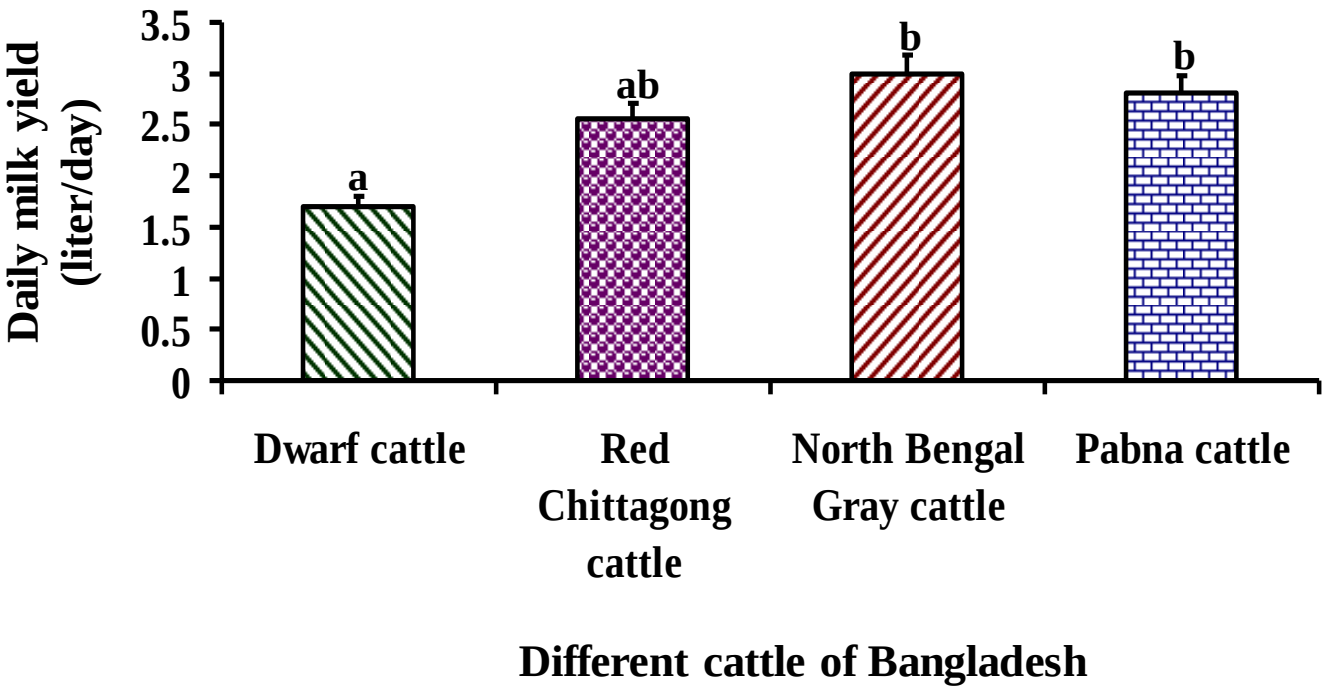

Figure 13. Daily milk yield of different cattle available in Bangladesh. Each bar with error bar represents Mean ± SEM value. Without a common lower case letter on error bars indicate significant differences ($P<0.05$) among the groups. The data regarding other different cattle collected from the studies of Al-Amin *et al.*, 2007 (North Bengal Gray cattle); Bhuiyan *et al.*, 2007 (Red Chittagong cattle and Pabna cattle).

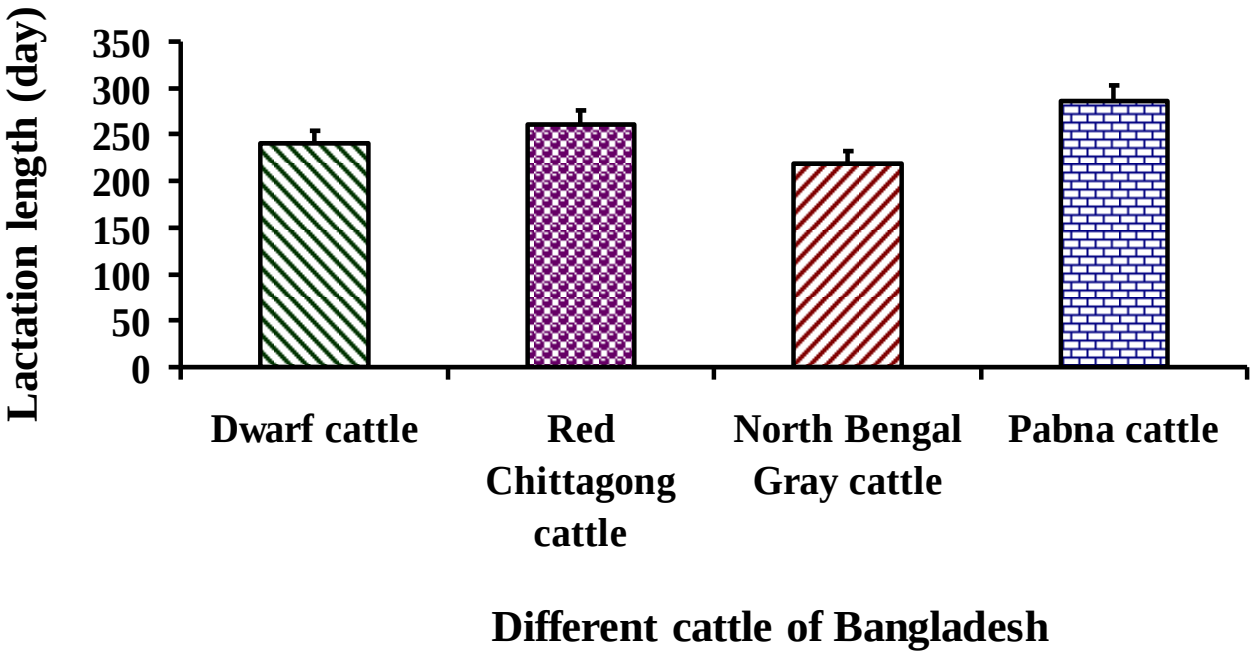

Figure 14. Lactation length of different cattle available in Bangladesh. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups. The data regarding other different cattle collected from the studies of Al-Amin *et al.*, 2007 (North Bengal Gray cattle); Bhuiyan *et al.*, 2007 (Red Chittagong cattle and Pabna cattle).

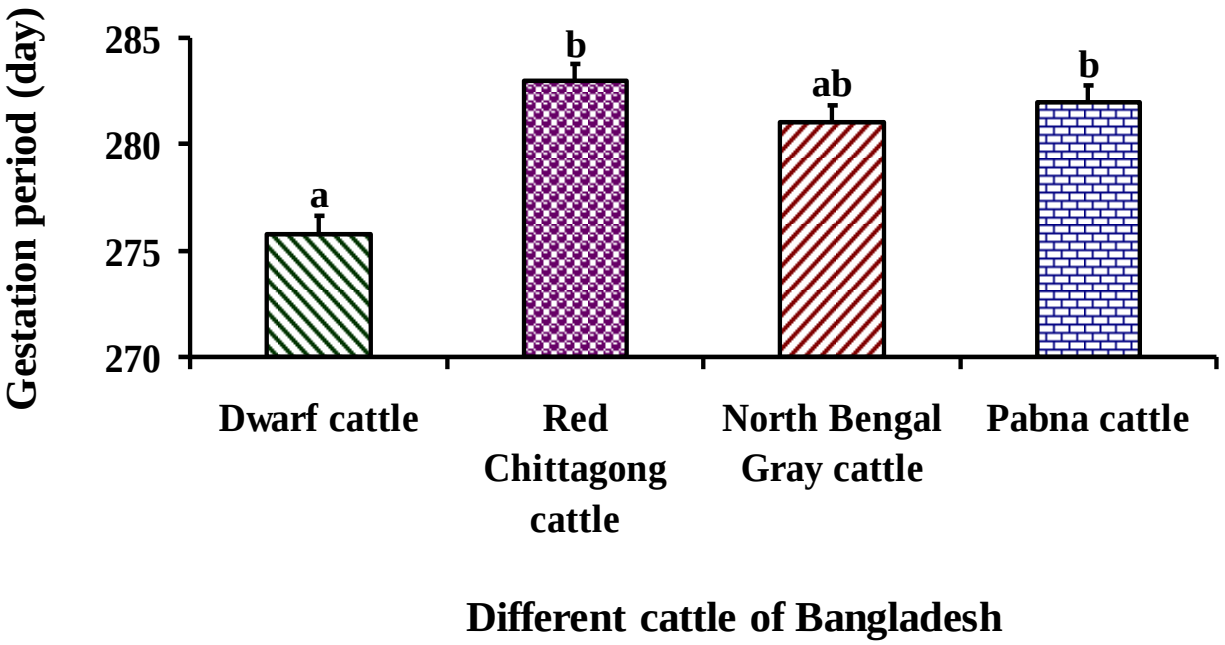

Figure 15. Gestation period of different cattle available in Bangladesh. Each bar with error bar represents Mean ± SEM value. Without a common lower case letter on error bars indicate significant differences ($P<0.05$) among the groups. The data regarding other different cattle collected from the studies of Al-Amin et al., 2007 (North Bengal Gray cattle); Bhuiyan et al. 2007 (Red Chittagong cattle and Pabna cattle).

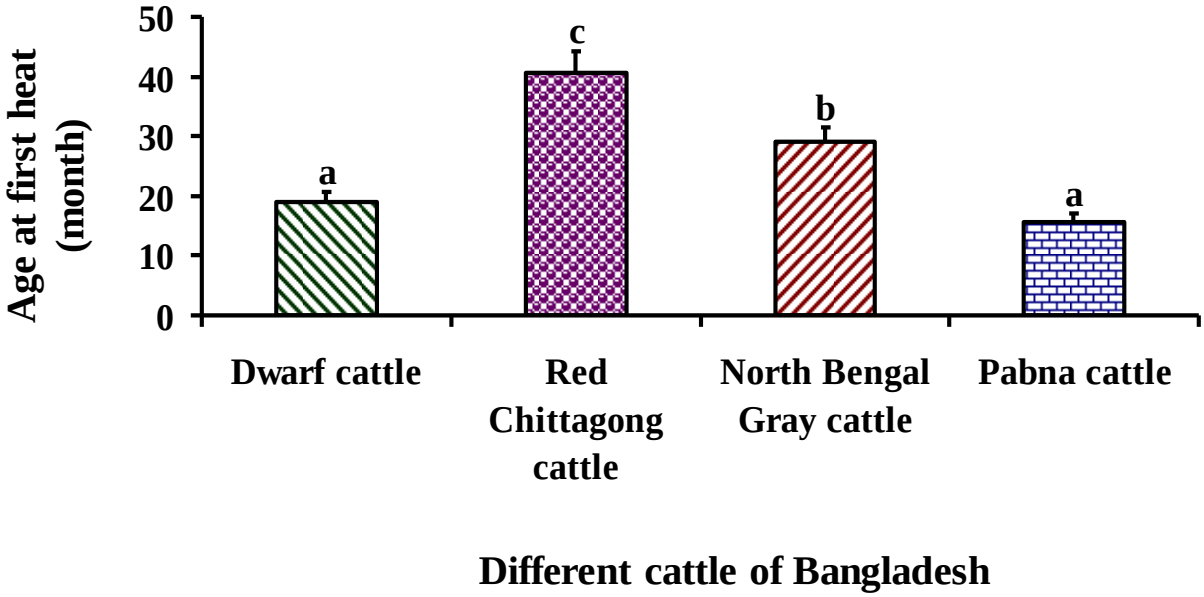

Figure 16. Age at first heat of different cattle available in Bangladesh. Each bar with error bar represents Mean ± SEM value. Without a common lower case letter on error bars indicate significant differences ($P<0.05$) among the groups. The data regarding other different cattle collected from the studies of Al-Amin *et al.*, 2007 (North Bengal Gray cattle); Bhuiyan *et al.*, 2007 (Red Chittagong cattle and Pabna cattle).

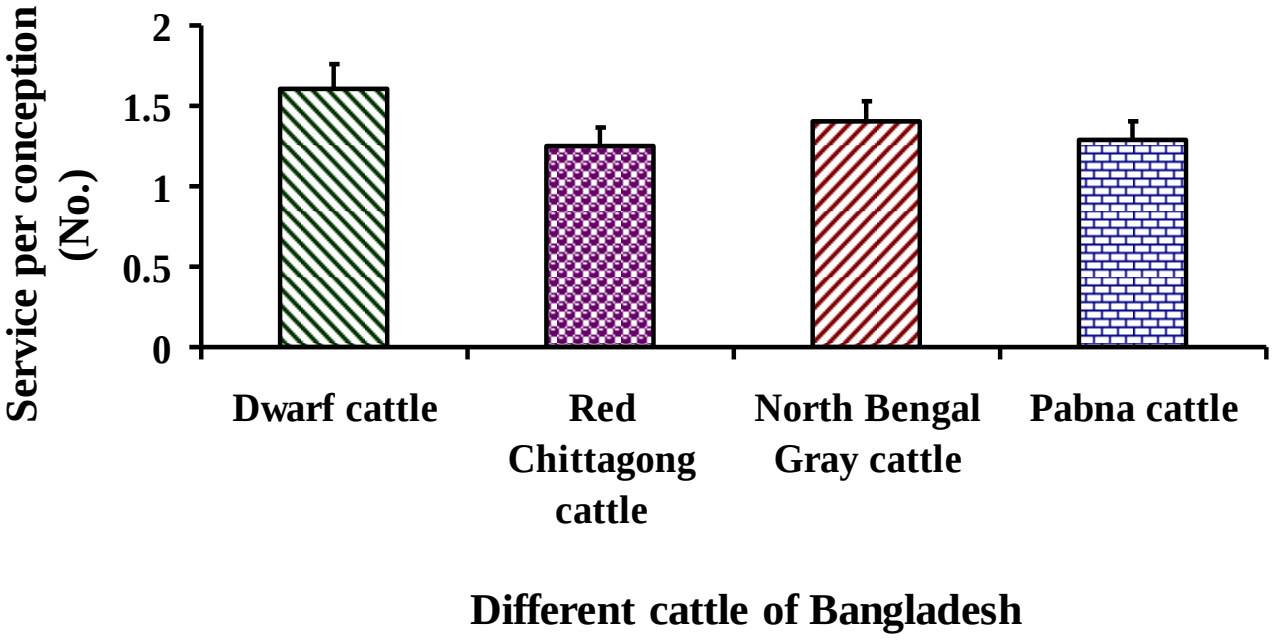

Figure 17. Service per conception of different cattle available in Bangladesh. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups. The data regarding other different cattle collected from the studies of Al-Amin *et al.,* 2007 (North Bengal Gray cattle); Bhuiyan *et al.,* 2007 (Red Chittagong cattle and Pabna cattle).

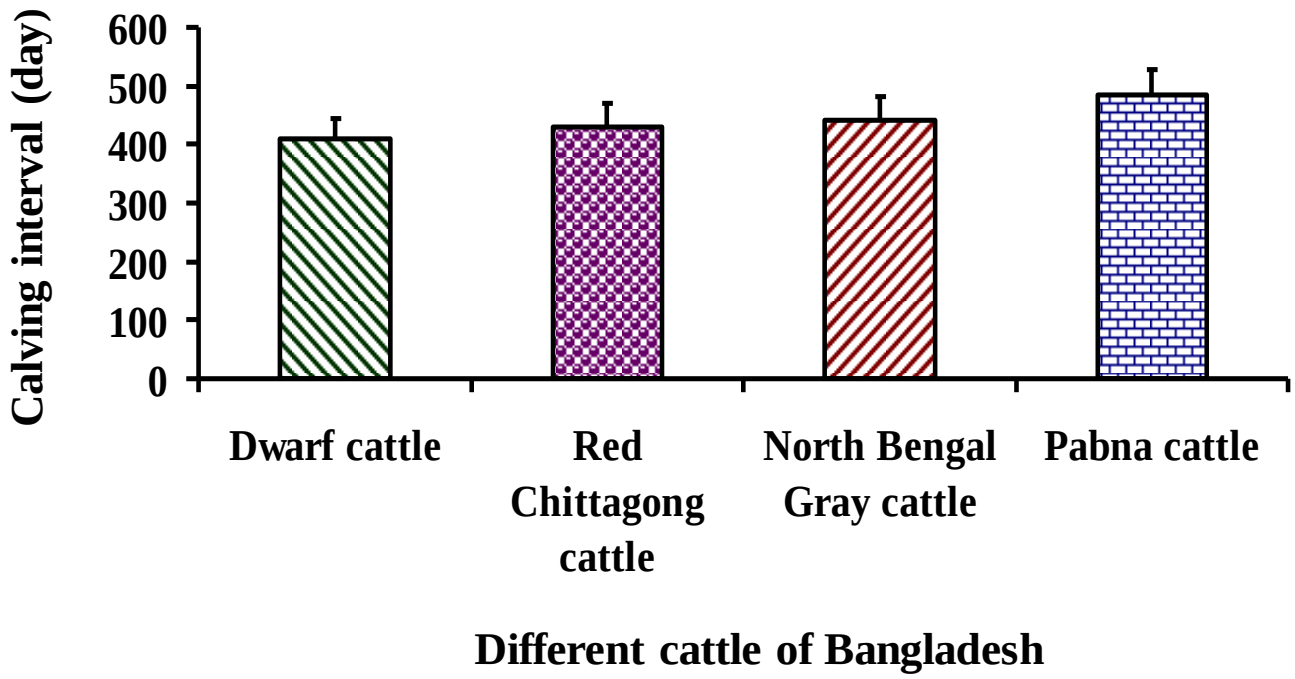

Figure 18. Calving interval of different cattle available in Bangladesh. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups. The data regarding other different cattle collected from the studies of Al-Amin *et al.*, 2007 (North Bengal Gray cattle); Bhuiyan *et al.*, 2007 (Red Chittagong cattle and Pabna cattle).

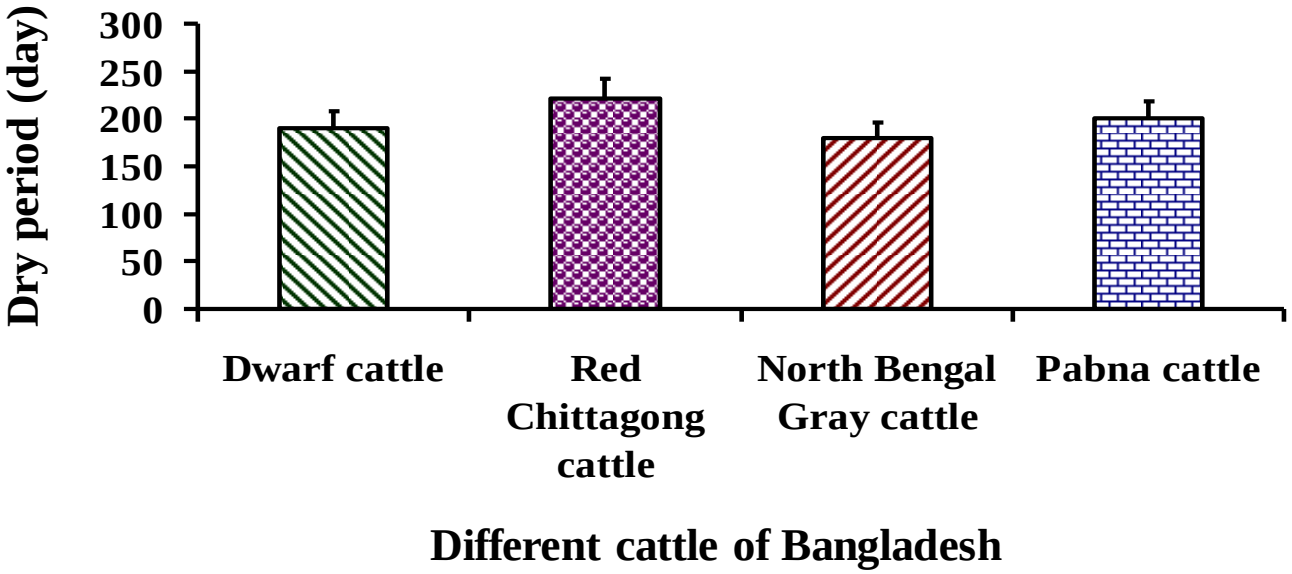

Figure 19. Dry period of different cattle available in Bangladesh. Each bar with error bar represents Mean ± SEM value. Differences were not significant (P>0.05) among the groups. The data regarding other different cattle collected from the studies of Al-Amin *et al.*, 2007 (North Bengal Gray cattle); Bhuiyan *et al.*, 2007 (Red Chittagong cattle and Pabna cattle).

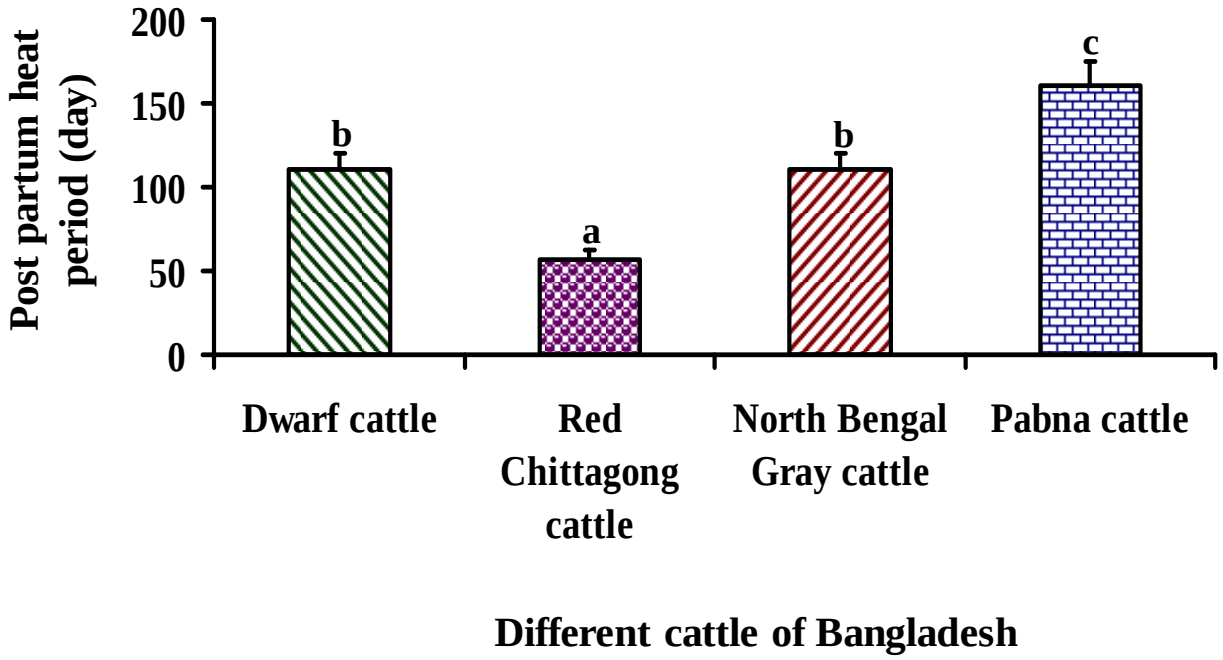

Figure 20. Post partum heat period of different cattle available in Bangladesh. Each bar with error bar represents Mean ± SEM value. Without a common lower case letter on error bars indicate significant differences ($P<0.05$) among the groups. The data regarding other different cattle collected from the studies of Al-Amin *et al.,* 2007 (North Bengal Gray cattle); Bhuiyan *et al.*, 2007 (Red Chittagong cattle and Pabna cattle).

4.3.4. Calving interval

The average calving interval of Dwarf cows was 408.6 days (Figure 18). 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. Khan *et al.* (1999), Ahmed and Islam (1987) and Hasnath (1974) studied calving interval of Red Chittagong cattle and their findings were 479.5, 458.4 and 485.0 days, respectively. Habib *et a*l. (2003) and Uzzaman *et al*. (2010) found that the calving interval of Red Chittagong cows (410.0 days) and Munshiganj cows (399.0 days) were similar with that of the Dwarf cows (408.6 days). Zafar *et al*. (2008) found that the calving interval of Sahiwal cows in Pakistan was 429.0 days which is higher than that of the present study. Calving interval of non-descriptive cattle in Ratnagiri District of Konkan Region, India, was 381.2 days (Khirari *et al.,* 2014). Calving interval of North Bengal Grey cows (Al-Amin *et al*., 2007) was almost similar (442.0 days) with that of the Dwarf cattle.

4.3.5. Dry period

The dry period of different cattle available in Bangladesh is shown in Figure 19. 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. Zafar *et al*. (2008) found that the dry period was 152 days in case of Pakistani Sahiwal cows, which is smaller than that of Dwarf cattle. 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*. (2010) found lower dry period (73 days) in Munshiganj cows.

4.3.6. Post partum heat period

The post partum heat period of different cattle available in Bangladesh is shown in Figure 20. 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). Nahar *et al*. (1989) reported that in different breed groups, post partum heat period ranged from 150.7 to 113.3 days. 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.* (2010) found lower post partum heat period (70.2 days) in Munshiganj cattle than that of present result.

4.4. Disease

Animal diseases causing morbidity and mortality significantly decrease profitability of animal production. But, the most important feature about Dwarf cattle is its adaptability to harsh environment of Dinajpur District. It can survive in high and cold temperature of North Bengal. The cattle were highly disease resistant. But, due to lack of knowledge about management of animal, some diseases like Bovine ephemeral fever, bacterial dermatitis, Foot and Mouth disease are often seen. In the rainy season, parasitic infestations are observed frequently. These diseases caused production loss of the farmers. Vaccine of high infectious diseases like Anthrax, Black Quarter and Haemorrhagic Septicemia were given sometimes by the veterinarian and quacks.

Chapter V

Summery and Conclusion

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. The coat color was variable among red, black, white, gray and brown. 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. But its adaptability to harsh climatic condition of Dinajpur District and disease resistance capability was very unique.

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. There is a big enthusiasm in applying breeds and breeding interventions to enhance livestock productivity, but lack of national breeding policy, use of unsustainable breed / type, weak infra-structure including human capacity, national service delivery, breeding farms etc, limited technical know-how and unclear marketing possibilities are major constraints to their sustainability .A serious lack of trained up personnel everywhere (extension, research and education etc). A few organizations have few trained up personnel but due to lack of physical infrastructure they could not play major role in livestock improvement. With rapid expansion of crossbreeding and urbanization, the said cattle genetic resources of Bangladesh are under threat of extinction. Because of the diversity of the Dwarf cattle production system, it has developed diverse morphological characteristics as well as better reproductive and productive performance under scarce fodder availability. These characteristics make it an ideal type that can insure food security, particularly in relation to the changing climate in the Nonthern part of Bangladesh.

Therefore the present study that this type of cattle might be developed by applying concluded continuous selection and breeding program with better feeding and management.

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Appendix: Pre – tested questionnaire for interviewing the farmer along with other necessary records

For M.Sc. Student, Department of Genetics and Animal Breeding, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh.

1	Date:……		
2	Serial No…….		
3	Village……	Union:……	Upazilla:……
4	Farmer		
	a) Name:…….....		
	b) Address……		
5	Breed/Variety/Type Name:…….		
6	Common Name/ Synonym:……		
7	Breed group Name:…….		
8	Breed Origin:……		
9	Location:…….		
10	Habit:……..		
11	Special characteristics:…….		
12	Cattle production:		

Sl. No.	Types	No.	Dwarf	Indigenous	other	Heifer	Cross breed
1	Milking cows						
2	Pregnant cows						
3	Bulls (Breeding)						
4	Bulls (not used in Breeding)						
5	Yearling bull						
6	Heifers						
7	Bullocks						
8	Calves (male)						
9	Calves (female)						
10	Overall						

A. Physical character:							
Sl. No.	Character	Male		Female		Calf (Male)	Calf (Female)
		Y.Bull	Adult	Heifer	Cow		
1	Coat colour/ Pattern						
2	Body length						
3	Dewelap status						
4	Ear length (cm)						
5	Ear width (cm)						
6	Horn pattern						
7	Horn diameter (cm)						
8	Horn length (cm)						
9	Hump status						
10	Head length (cm)						
11	Head width (cm)						
12	Muzzle colour						
13	Eye colour						
14	Fore leg length (cm)						
15	Hind leg length (cm)						
16	Tail length (cm)						
17	Tail width (cm)						
18	Teat length (cm)						
19	Teat diameter (cm)						
20	Dist. bet. fore teats (cm)						
21	Dist. bet. rear teats (cm)						
22	Heart Girth (cm)						
23	Live weight (kg)						
24	Wither height (cm)						
25	Neck length (cm)						
26	Neck width (cm)						

B. Production performance incase of Adult:			
Sl.No.	Character	Male	Female
1	Average milk yield (lit/ day)		
2	Lactation length (days)		
3	Mature body weight (kg)		

C. Reproduction Performance incase of female:				
Sl.No.	Character	Day	Month	Year
1	Age at puberty			
2	Age at 1st heat			
3	Age at 1st service			
4	Age at 1st conception			
5	Gestation period			
6	Dry period			
7	Calving interval			
8	Post partum heat period			
9	1st heat after calving			
10	1st service after calving			
11	Service per conception			
12	Conception rate(%)			

D. Reproduction Performance incase of male:		
Sl.No.	Character	
1	Width of each testis	
2	Length of each testis	
3	Weight of each testicle	
13	Disease incidence (%):	
		Male……
		Female……..
		Calf (male)…….
		Calf (female)……
		Yearling bull…….
		Heifer……
14	Purpose of Dwarf Cattle rearing:……	
15	Information about prevention and treatment:	
	Vaccination:……...	
	Source of treatment:…….	
16	Problems of owner:……	
17	Opinion of the owner about the cattle:……	

Signature