A Comparative study on the productive and reproductive performances of crossbreed cattle on commercial dairy farms in Karnaphuli Upazila, Chattogram, Bangladesh

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Submitted by

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Faculty of Veterinary Medicine

Chattogram Veterinary and Animal Sciences University

Khulshi, Chattogram – 4225, Bangladesh

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Biography

I am Arpita Das, DAUGHTER of Swapan Kumar Das and Manju Das. I passed Secondary School Certificate examination from Bakolia Govt. Laboratory High School, Chattogram in 2013 (G.P.A-5.00) followed by Higher Secondary Certificate examination from Govt. City College, Chattogram in 2015 (G.P.A-5.00). Now I am an intern veterinarian under the Faculty of Veterinary Medicine at Chattogram Veterinary and Animal Sciences University, Bangladesh.

Bangladesh is a developing country in South Asia where livestock plays a crucial role in our economy and the food chain. I expect to be a future researcher in life science to address the present challenges we have in this field.

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List of abbreviations

HF	Holstein Friesian
F	Holstein Friesian
DMY	Daily Milk Yield
L	Local
SL	Sahiwal
JR	Jersey

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Abstract

The study was conducted to evaluate and compare some productive and reproductive performances of different crossbreed cattle reared in the different dairy farms of Karnaphuli upazila, Chattogram. A total of 107 cows belonging to different breeds such as Holstein Friesian cross (HF cross), Jersey cross, Sahiwal cross, Sindhi cross, Brahman cross, Haryana, and Gir were selected, and their information regarding productive parameters like body weight, birth weight and daily milk yield and other reproductive parameters like parity, days open, service per conception were collected from the farms. Results showed that the mean daily milk yield of HF cross, Jersey cross, and Sahiwal cross were 12.57±0.13, 12.37±0.88, 07.67±0.33, respectively, and in second to third parity, it was the highest. According to the farm, the overall mean body weight was 398.84±7.20. Based on breed, the mean birth weight of HF cross, Jersey cross, Sahiwal cross and Brahman cross were 28.28±0.31, 29.00±1.00, 28.66±0.67 and 30.00±0.00, respectively. Based on breed, the mean days open of HF cross, Jersey cross, Sahiwal cross and Haryana were 75.00±2.04, 82.50±14.36, 60.00±0.00 and 90.00±0.00, respectively and based on parity, the first parity showed the highest (82.50±5.12). Based on breed, the mean service per conception of HF cross, Jersey cross, Sahiwal cross and Brahman cross were 2.53±0.53, 2.75±0.25, 2.33±0.33 and 2.50±0.50, respectively, and in the case of parity in first, second, third and fourth parity were 2.50±0.13, 2.57±0.07, 2.46±0.09 and 2.33±0.67 respectively. Therefore, it could be concluded that Holstein Friesian crossbred cows are more suitable for profitable dairy farming in Bangladesh.

Key words: Crossbreed dairy cows, productive and reproductive performances.

CHAPTER-I

Introduction

Geographically, Bangladesh is an agro based country. So, livestock rearing an integrated part of the economy of Bangladesh. The magnitude of the contribution of the livestock sector to the GDP is 1.44%, and the growth rate of GDP is 3.80% (DLS, 2020). Although livestock was the most promising agricultural sub-sector in the last few decades, it was deprived of government improvement initiatives. Improvement of production in dairy cattle is frequently considered possible by either improving the genetic merit or animal husbandry practices but often reproduction is neglected (Plaizier 1998). The main cause of livestock development is the genetic potential of the animal. Optimum nutrition, disease control and management practices permit full expression of this genetic potential (Ansell 1985). At present, the total livestock population of Bangladesh is 4221.80 lakh, and among them, the total cattle population is 245.45 lakh (DLS, 2020). Despite this large cattle population in the country, milk production falls short of the requirement. For this reason, to fulfil the requirement of the people, the number of crossbreed cattle is increasing day by day with the spread of practices of artificial insemination throughout the country.

Dairy farmers in a developing country like Bangladesh rear cows of indigenous, cross-breed and exotic breed types. The productive and reproductive performances vary from breed to breed since genotype has a significant effect on biological traits of dairy cows (Khaton 2015). For getting a better production, nutritional management is also important. Grazing animals on smallholdings fulfil their green roughage requirement from the roadside, fallow land, riverbank, where crop has harvested partially. In farm, a planned feeding and management practices are followed throughout the year. Smallholder farmers depend on crop residue and other agricultural by-products. In some milk pocket areas like Karnaphuli, green fodders are available from April to November, and for the rest of the year, animals are raised on rice straw and preserved fodders. Rice polish, Wheat bran, broken maize and soyabean meal are playing important roles in the feeding element as concentrate sources. In the context of Bangladesh, the pure exotic breeds are unsuitable in terms of environmental conditions as the disease prevention capacity is lower than the local breed. So, it is necessary to improve local breeds by selective breeding to increase the productive and reproductive performance of the cows. From these above observations, the present study was undertaken to evaluate and compare the productive and reproductive performances of different cross-breed cows based

on their body weight, birth weight, parity and service per conception at commercial farmers' level in rural areas.

CHAPTER-II

Materials and methods

2.1 Study population

A total of 107 cows were selected from five dairy farms for this study. Cows were grouped according to their breeds such as Holstein Friesian (HF=1, Jersey=2, Sahiwal=3, Brahman =4, Red Sindhi=5, Haryana=6, Gir=7). The dairy cow had been selected in their milking period. Some cows were in the same lactation period and also near to same age. Both Artificial Insemination (AI) and natural services were practiced.

2.2 Study area and duration

The study was conducted on 102 dairy cows for almost three months, from February 20 to April 28, 2022, at some selected areas in Karnaphuli Upazila of the Chattogram district. The areas were selected where dairy farms are available and cross-breeds are found.

2.3 Data Collection

The questionnaire was prepared according to the objectives of the study. Data were collected from the farmers of selected areas by using the prepared questionnaire. All questionnaire was supplied to each farmer and closely and frequently monitored by visits. The questionnaire contained the following information.

1. General identification and information of the selected dairy farms.

a) Name of the dairy farm

b) Location of the dairy farm

c) Name of the owner

d) Reared breed

e) Feeding system

2. Productive and reproductive parameters of the cross-breed cows such as-

    a) Number of parity

    b) Milk yield (lit/day)

    c) Length of gestation period (month)

    d) Length of days open (day)

e) Length of service per conception (month)

The collected data was organized, tabulated in Microsoft Excel worksheet and analyzed in accordance with the objectives of the study.

2.4 Statistical Analysis

The collected data were entered in to a Microsoft excel 2016 work sheet. Descriptive statistical parameters were analyzed using SPSS statistical software (SPSS Inc, Chicago, IL,USA).

Figure 1: Picture of different dairy farm of Karnaphuli upazila and data collection

Figure 2: Preserved fodders at the dairy farm premises

CHAPTER-III

Result

3.1 Population structure

Usually exotic breeds have been developed in the European countries like South-East Asia, namely India, Pakistan, Sri Lanka and Thailand. So, by importing these breeds, it is not possible to expect high performance from them. They need a good and costly management. Some breeds like Friesian, Sahiwal, Jersey, Sindhi, Brahman and their crosses with Local are found to suitable for the climatic condition of Bangladesh.

3.1.1 Breeds

Holstein Friesian

This is a popular breed in Bangladesh and also in the studied area. Their body color is white and black mixed. Their udder is large in size. Holland is the production source of this variety. Now a day, this variety is used as a milk breed around the whole world including Bangladesh.

Jersey

Australia is the production source of this variety. Their color is like that of deer and blackish circle is present around the eyes and muzzle. Top line is straight and the head possesses a double dish. Udder is well developed and well attached. Now, it is also a common breed in Bangladesh.

Sahiwal

The breeding tract of this breed is Montgomery District in Pakistan which is now named as Sahiwal. Their colored reddish brown or pale red, sometimes flashed with white patches. Muzzle and eyelashes are light in color. Long deep, fleshy cattle and comparatively lethargic. Head broad and horns are short and stumpy. Hump and dewlap are well–developed. Udder is capacious and pendulous in cow.

Red Sindhi

The home tract of this breed is Karachi and Hyderabad Districts of Pakistan. Generally dark red but variation from dun yellow to almost dark- brown is found. Head slightly bulged in the

forehead. The hump, dewlap and sheath are well developed. The udder is capacious and pendulous.

Brahman

The Brahman breed (also known as Brahma) originated from Bos indicus cattle from India. They contain large hump over the top of the shoulder and neck. Brahmans vary in color from very light grey or red to almost black. A majority of the breed are light to medium grey. Their horns curve upwards and sometimes tilt to the rear plus they have pendulous ears.

Haryana

The breeding tract of this breed is North India, especially in the state of Haryana. They vary in color from white to gray shades. Horns are short and the face is narrow and long. The cows are fairly good milk yielders.

Gir

The breeding tract of this breed is west India in the state of Gujarat and have since spread to neighbouring Maharashtra and Rajasthan. They contain a rounded and domed forehead, long pendulous ears and horns which spiral out and back. Gir are generally mottled with the color ranging from red through yellow to white, black being the only unacceptable color.

Evidently, the rapid growth of dairy development is necessary for our country. However, the pure exotic breed cannot survive in our country due to the hot and humid climate. However, some cross breeds like the Friesian cross, Jersey cross, and Sindhi cross are suitable for Bangladesh's climate condition. Table 1 shows that Holstein Friesian crosses are mostly reared on dairy farms for dairy purposes.

Table-1: Farm wise distribution of breeds in the studied dairy farms in Karnaphuli upazila

Breed	**Count**
Holstein-Friesian cross	88
Jersey cross	4
Sahiwal cross	3
Red Sindhi cross	2
Brahman cross	2
Haryana	2
Gir	1
Total	102

3.1.2 Age

Table-2 presented the mean age of five dairy farm as Raeid Dairy Farm showed the mean age of dairy cows was 36.00±0.00, Salam Dairy Farm showed the mean age of dairy cows was 35.00±0.67, Sufiya Dairy Farm showed the mean age of dairy cows was 39.15±1.96, Dobas Agro Farm showed the mean age of dairy cows was 31.20±2.94, Alim Agro Farm showed the mean age of dairy cows was 40.46±1.48. The overall approximate age of dairy cattle for every farm are shown statistically in the table-2. The maximum age of cattle is reared in Alim Agro Farm and the minimum age of animal are reared in Dobas Agro Farm.

Table-2: Distribution of age of animal in the studied dairy farms in Karnaphuli upazila

Name of the farm	Age of animal (Mean± SE)
Raeid Dairy Farm	36.00±0.00
Salam Dairy Farm	35.00±0.67
Sufiya Dairy Farm	39.15±1.96
Dobas Agro Farm	31.20±2.94
Alim Agro Farm	40.46±1.48
Overall	38.41±0.96

3.2 Feeding practice

Roughage and concentrate ratio should be 2:1. Table-3 presented that the ratio of roughage and concentrate in Raeid Dairy Farm is 1.5:1, in Salam Dairy Farm is 1.4:1, in Sufiya Dairy Farm is 1.4:1, in Dobas Agro Farm is 2:1 and in Alim Agro Farm is 1.45:1. The Dobas agro farm showed a good balance of roughage and concentrate.

Table-3: Feeding practice (Roughage: Concentrate) in the studied dairy farms in Karnaphuli upazila

Name of the farm	Roughage: Concentrate
Raeid Dairy Farm	1.5:1
Salam Dairy Farm	1.4:1
Sufiya Dairy Farm	1.4:1
Dobas Agro Farm	2:1
Alim Agro Farm	1.4:1
Overall	1.45:1

3.3 Productive performances

3.3.1 Body weight

According to farm, the overall mean body weight of dairy cattle is 398.84±1.68. Alim Agro Farm presented the highest body weight of dairy cows which is shown in Table-4. Their managemental practices may help to keep a good body weight of dairy cows.

According to breed, Sahiwal showed the highest body weight which is 450.00±11.54 (Table-5). As they are genetically large in size so it helps to build a good body weight. And a good managemental practice also helps them to maintain a balanced weight.

Table-4: Farm wise body weight in the studied dairy farms in Karnaphuli upazila

Name of the farm	Body weight (Mean± SE)
Raeid Dairy Farm	315.38±1.68
Salam Dairy Farm	331.83±2.42
Sufiya Dairy Farm	346.35±2.05
Dobas Agro Farm	347.00±2.00
Alim Agro Farm	476.28±8.21
Overall	398.84±7.20

Table-5: Breed wise body weight in the studied dairy farms in Karnaphuli upazila

Breed	Body weight (Mean±SE)
Holstein-Friesian cross	388.85±8.20
Jersey cross	343.75±8.50
Sahiwal cross	450.00±11.54
Red Sindhi cross	440.00±10.00
Brahman cross	390.00±10.00
Haryana	405.00±5.00
Gir	350.00±0.00

Table-5 showed the result of mean body weight of different cross-breed cows of five farms statistically such as Holstein Friesian cross (388.85±8.20), Jersey cross (343.75±8.50), Sahiwal (450.00±11.54), Red Sindhi cross (440.00±10.00), Brahman cross (390.00±10.00), Haryana (405.00±5.00) and Gir (350.00±0.00).

3.3.2 Birth weight:

Birth weight of a cow indicates their future performances. Sometimes the weight varies from breed to breed and depends on their genotype. Birth weight not only depends on genotype but also on parity. The reproductive performance of an early parity is better than a late parity. So, the birth weight of a calf in second or third parity is quite good than fifth or sixth parity.

Table-6: Breed wise birth weight of cattle in the studied dairy farms in Karnaphuli upazila

Breed	Birth weight (Mean± SE)
HF cross	28.28±0.31
Jersey cross	29.00±1.00
Sahiwal cross	28.66±0.67
Brahman cross	30.00±0.00
Red Shindhi cross	27.00±1.00
Haryana	25.50±0.50
Gir	22.00±0.00

Table-6 presented the mean birth weight of different cross-breed cows where the Brahman cross breed showed the highest weight (30.00±0.00). The birth weight of other cross-breed such as Holstein Friesian was 28.28±0.31, Jersey was 29.00±1.00, Sahiwal was 28.66±0.67, Red Sindhi was 27.00±1.00, Haryana was 25.50±0.50 and Gir was 22.00±0.00.

Table-7: Parity wise birth weight in the studied dairy farms in Karnaphuli upazila

Parity	Birth weight (Mean± SE)
Parity1	27.93±0.87
Parity2	27.57±0.39
Parity3	28.92±0.51
Parity4	30.38±0.75
Parity5	25.00±0.00
Parity6	30.00±0.00

Table-7 presented the mean birth weight of dairy cows of their different parities. The birth weight of first parity, second parity, third parity, fourth parity, fifth parity and sixth parity was 27.93±0.87, 27.57±0.39, 28.92±0.51, 30.38±0.75, 25.00±0.00 and 30.00±0.00.

3.3.3 Daily Milk yield (DMY)

Daily milk yield vary from breed to breed as it depends on genotype. But feeding practices and the length of the parity also plays an important role on milk yield.

As the number of parity increases, the productive performance like milk yield can be decreased.

Table-8: Breed wise daily milk yield in the studied dairy farms in Karnaphuli upazila

Breed	Daily Milk yield (Mean± SE)
HF cross	12.57±0.13
Jersey cross	12.37±0.88
Sahiwal cross	07.67±0.33
Brahman cross	06.00±0.00
Red Shindhi cross	07.00±0.00
Haryana	06.00±0.00
Gir	05.00±0.00

Table-8 presented the DMY of different cross-breeds such as HF cross (12.57±0.88), Jersey cross (12.37±0.88), Sahiwal cross (7.67±0.33), Brahman cross (6.00±0.00), Red Sindhi cross (7.00±0.00), Haryana (6.00±0.00), Gir (5.00±0.00).

Table-9: Parity wise daily milk yield in the studied dairy farms in Karnaphuli upazila

Parity	Daily Milk yield (Mean± SE)
Parity1	11.07±0.83
Parity2	12.04±0.27
Parity3	12.92±0.25
Parity4	12.00±0.19
Parity5	11.50±0.00
Parity6	11.50±0.00

3.4 Reproductive performances

3.4.1 Days open

Days open is referred to as interval from parturition to the next conception of a cow. In this study it is measured in days. Total performances of cows are affected by days open. It is also a very important trait in a dairy herd.

Table-10: Breed wise days open in the studied dairy farms in Kamaphuli upazila

Breed	Days open (Mean± SE)
HF cross	75.00±2.04
Jersey cross	82.50±14.36
Sahiwal cross	60.00±0.00
Brahman cross	60.00±0.00
Red Sindhi cross	60.00±0.00
Haryana	90.00±0.00
Gir	60.00±0.00

Table-10 presented the days open of different cross-breed cattle statistically. The days open of HF, Jersey, Sahiwal, Brahman, Red Sindhi, Haryana and Gir was 75.00±2.04, 82.50±14.36, 60.00±0.00, 60.00±0.00, 60.00±0.00, 90.00±0.00 and 60.00 where jersey cross showed the highest days open.

Table-11: Parity wise days open in the studied dairy farms in Karnaphuli upazila

Parity	Days open (Mean± SE)
Parity1	82.50±5.12
Parity2	71.02±2.54
Parity3	76.15±4.15
Parity4	75.00±5.67
Parity5	60.00±0.00
Parity6	75.00±15.00

Table-11 presented the days open in different parities. The days open in first parity, second parity, third parity, fourth parity, fifth parity and sixth parity was 82.50±5.12, 71.02±2.54, 76.15±4.15, 75.00±5.67, 60.00±0.00 and 75.00±15.00 where first parity showed the highest days open.

3.4.2 Service per conception

It refers to the average number of services or inseminations required for each successful conception of cows. It is used as reproductive efficiency of heifer or cows.

Table-12: Breed wise service per conception in the studied dairy farms in Karnaphuli upazila

Breed	Service per conception (Mean± SE)
HF cross	2.53±0.53
Jersey cross	2.75±0.25
Sahiwal cross	2.33±0.33
Brahman cross	2.50±0.50
Red Sindhi cross	2.00±0.00
Haryana	2.50±0.50
Gir	2.00±0.00

Table-12 presented the service per conception of different cross-breed cows statistically. The service per conception of HF, Jersey, Sahiwal, Brahman, Red Sindhi, Haryana and Gir was 2.53±0.53, 2.75±0.25, 2.33±0.33, 2.50±0.50, 2.00±0.00, 2.50±0.50 and 2.00±0.00.

Table-13: Parity wise service per conception in the studied dairy farms in Karnaphuli upazila

Parity	Service per conception (Mean± SE)
Parity1	2.50±0.13
Parity2	2.57±0.07
Parity3	2.46±0.09
Parity4	2.33±0.67
Parity5	3.00±0.00
Parity6	3.00±0.00

Table-13 presented the service per conception in different parities. The service per conception in first, second, third, fourth, fifth and sixth parity was 2.50±0.13, 2.57±0.07, 2.46±0.09, 2.33±0.67, 3.00±0.00 and 3.00±0.00.

CHAPTER-IV

Discussion

4.1 Breed composition in the farms

The study was based on a field survey to investigate the reproductive and productive performances of indigenous and crossbred dairy cows at Karnaphuli upazila, Chattogram. A total of 107 dairy cows of five farms, of which 9 HF cross and 1 jersey cross in Raeid Dairy Farm, 12 HF cross in Salam Dairy Farm, 37 HF cross and 3 jersey cross in Sufiya Dairy Farm, 5 HF in Dobas Agro Farm and 30 HF cross, 3 Sahiwal, 2 Brahman cross, 2 Red Sindhi cross, 2 Haryana and 1 Gir were selected for the study. Up to seven parities of the cows were considered where the performances on reproductive and productive attributes were studied.

4.2 Age of the crossbreed cows

The overall age of these dairy cows is 38.41±0.96 month which is presented in the Table-2. The maximum and minimum age at first calving of cross breed in these dairy farms 2 and 5 years. The milk production depends on age. Farmers can achieve high milk production through good management. Kruif (1978) showed that many factors may influence the fertility of cattle population. In female animals, over seven years of age, pregnancy rate following the first insemination was lower. He monitored calving rate of two years, four years, nine years and greater than thirteen years were 55.9, 60.0, 53.1 and 42.1 respectively. The age of cows did not influence any of the fertility parameters significantly.

4.3 Feeding practices

Table-3 presented that the comparison of roughage and concentrate ratio in different dairy farms. The ratio of roughage and concentrate should be 2:1. So all the dairy farms in this study approximately followed a good balance of roughage and concentrate. Huq *et al.* (1993) observed that health condition of cattle depends upon feeding practices. Productive and reproductive performances respond sharply to an increase in the forage offered. Feeds are given to animals more selectively, which improves their diet. But at one point, further increases in forage supply do not increase production and may even reduce it. As nutrition is

a major determinant of when puberty occurs. For example, with good nutritional management crossbred heifers can be bred at 15-18 months. Feed resources available in the country for dairy animals are dry roughage (straw, stover from legume crops), green grass (non-cultivated indigenous grass, cultivated fodder like Napier, Para and German grass), vegetables and fruit by products (Jackfruit, Pineapple, Banana, Mango, cabbage and other kitchen waste). Among concentrate supplements, agro-industrial by products (Rice polish, Wheat bran, Broken maize, Soyabean meal, Oil cakes, molasses) and animal by products (Fishmeal, blood meal) are the commonly feed ingredients. So, a balanced diet is more important for the maintenance, growth and production of animals.

4.4 Productive Performances

4.4.1 Body weight

The approximate mean body weight based on farm and breed are shown in the Table-4 and Table-5. In Table-4, the overall mean body weight was 398.84±7.20 where Alim Agro Farm showed the highest body weight. In Table-5 presented that the mean body weight of Holstein Friesian cross, Jersey cross, Sahiwal cross, Red Sindhi cross, Brahman cross, Haryana and Gir were 388.85±8.20, 343.75±8.50,450.00±11.54,440.00±10.00, 390.00±10.00, 405.00±5.00 and 350.00±0.00 where Sahiwal cross showed the highest.

Though the fertility parameters like service per conception, days open were not markedly influenced by the body weight, except a long calving to first service interval. Sarder *et al.* (1997) reported that the cross-breed animals weighted more (264 to 271 kg) than the local nondescript cows (178kg); the difference between breeds was not significant. Islam *et al.* (2021) observed that the mean difference in dairy milk yield was 3.2 kg between the body weight groups 130 to 150 kg and 301 to 401kg (4.8 vs 8.0).

4.4.2 Birth weight

In the present study, the mean birth weight was shown based on the breed and parity in the Table-6 and Table-7. The calves of Brahman cross showed the highest value (30.00±0.00) and in third to fourth parity, the weight was the highest (30.38±0.75).

Islam *et al.* (2021) reported that the birth weight of Local, Sahiwal, Sindhi, Jersey and Holstein under farm and urban conditions were 24.3±1.51, 37.9±1.60, 35.8±2.21, 35.4±2.36 and 46.6±2.34 lbs, respectively. Nahar (1987) collected data to find out the birth weight of 80

Sindhi, 68 Sahiwal, 54 Jersey and 60 Holstein Friesian cross-breed progenies under farm conditions. She observed that the mean birth weights of the above 4 cross-breed type progenies were 36.46, 39.87, 37.38, 48.42 lbs, respectively.

4.4.3 Daily Milk Yield (DMY)

The mean daily milk yield is presented in the Table-8 and Table-9 based on the breed and parity where Holstein Friesian showed the highest milk yield (12.57±0.13). In the Table-9, the second parity (12.04±0.27) and third parity (12.92±0.25) of dairy cows showed the highest milk yield.

Nahar *et al.* (1992) studied the productive and reproductive performance of Sindhi cross, Sahiwal cross, Jersey cross and Holstein Friesian cross grades under rural condition of Bangladesh and reported an average milk yield per day were 3.0±0.1, 2.9±0.1, 3.8±0.1 and 5.5±0.1 kg respectively. They concluded that Holstein Friesian crosses performed better in rural condition of Bangladesh. Hussain and Mostafa (1985) observed that in rural condition milk yield of Local, Sahiwal cross and Sindhi cross were 2.6±0.23, 7.9±0.52 and 8.7±0.45 kg per day respectively. In farm condition, average daily milk yield of Local, Sahiwal cross, Sindhi cross, Jersey cross and Holstein Friesian cross were 3.3±0.50, 8.8±0.61, 10.1±0.42, 10.2±0.48 and 12.7±0.53 kg respectively. Khan (2000) observed an average daily milk yield under farm and rural conditions to be 2±0.65 and 1.80±0.87 kg respectively.

From available studies a wide variation in milk yield has been noticed and giving hints for an opportunity of selection among the cross-breed cows to increase the milk yield. Genetic architecture, feeding system, quality and quantity of ration may be affecting the daily milk yield.

4.5 Reproductive Performances

4.5.1 Days Open

The approximate mean days open of different breeds and in the different parities were presented in the Table-10 andTable-11. In this study, Haryana showed the longest days open (90.00±0.00) and in first parity, it was the longest (82.50±5.12).

Alam and Ghose (1988) found a prolonged postpartum anestrus in cows maintained with low level of nutrition before calving. Balanced diet and body weight were important determinant of the interval between calving and first ovulation in cows (Senatora, 1996). Sarder (1997)

found Holstein-Friesian crossbreed cows requiring the longest time (149 days) to onset of postpartum estrus compared with the Local ones (119 days); consequently, the Holstein-Friesian crossbreed cows remained open for the longest period (158 days). Khan and Rahman (2000) observed that the fewest days open in crossbreed Friesian and Local cows (148.6±89.2 and 188±106.7 days respectively). Parity influenced the onset of postpartum ovarian cyclicity and calving to conception interval in dairy cattle (Alam and Ghose, 1988). Sarder (2003) reported that the lowest days open was in Friesian cross (156±51 days) and the highest in cross of Local, Sahiwal and Sindhi (175±64 days). He also monitored that there were significant difference among genotypes, parities and feed quality.

4.5.2 Service per Conception

Table-12 and Table-13 presented the mean service per conception in study population based on the breed and parity where Jersey cross showed the highest (2.75±0.25) and in the fifth parity (3.00±0.00) and sixth parity (3.00±0.00), it was the highest.

Hodel (1996) stated that fertility decreased with increasing age of cow. Sultana (1995) analyzed data on service per conception of 540 animals of different genetic groups and observed service per conception of Local, Sahiwal, Sahiwal-Friesian cross, Jersey, Jersey cross and Friesian cross were 1.78±0.22, 1.12±0.70, 2.05±0.20, 2.01±0.34, 1.96±0.21 and 1.68±0.15 respectively. She found that no significant difference in service per conception among different genetic groups. The effects of many nutrient deficits on conception are largely mediated through changes in energy balance (Ferguson, 1991). Sarder (2001) found in indigenous cows in fifty parity significantly ($p<0.05$) highest service (1.7±0.8) for conception. The lowest numbers of service (1.3±0.5) were required in second parity cows. No significant differences were observed among the first, third and fourth parity (1.4±0.5), (1.4±0.6), (1.4±0.5). Shamsuddin (2001) reported an average service per conception of 2.2 in selected areas of Bangladesh. In a good quality farm, the number of services per conception should be a maximum of 1.3. Raheed (2002) reported that the average service per conception of different dairy breeds. The lowest services per conception observed in the L x L (1.3±0.5) and the highest observed in the L x F x F (2.0±1.1) followed by L x F (1.7±0.7), L x SL x F (1.6±0.8), L x JR (1.5±0.6) and L x SL (1.4±0.5) breeds respectively. Alam (2008) reported that service per conception of local, Friesian cross and Sahiwal cross were 1.3±0.5, 1.60±0.6 and 1.6±0.5.

CHAPTER-V

Conclusion

In conclusion, the cross-breed cattle performed better than that pure exotic and indigenous breed in terms of adaptability and production in Bangladesh. So, it is necessary to improve local cattle by selective breeding to increase their productive and reproductive performance. Results of this study showed some reproductive traits such as days open, service per conception, and the amount of milk yield in Karnaphuli upazila of Chattogram district. Taken together the above findings, it is concluded that cross-breed cows seemed more suitable for sustainable and profitable dairy farming in rural Bangladesh. Therefore, the study could help to make up a breeding strategy for a profitable farming system in Bangladesh. However, the production traits are not only attributed to a cow's genetic makeup but also interact with the environment and management system.

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6. GDP calculated at constant price (Source: BBS); *P denotes Provisional; Prepared by Dr. Hossan Md. Salim, LE Section, DLS.

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