

Chapter I

Introduction

Livestock plays an important role in the persistent agro-based economy of Bangladesh. Nearly, 85 percent of the populations are engaged in agriculture and livestock sector (Raha, 2000). The magnitude of contribution of the livestock sub-sector to the GDP is 1.60 percent. Share of Livestock in Agricultural GDP is 14.31%. It generates 20 percent full times and 50 percent partly in employment (BBS, 2018). It generates 13 percent of the total foreign exchange earnings and provides fulltime employment to about 20 percent of the rural population (BOS, 2014).

Dairy farming is a part and parcel of integrated farming system in Bangladesh (Saadullah et al., 1997). The number of milking cows in Bangladesh is 3.93 million, which represents 38% of the total cows (BBS, 2018). The daily per capita availability and requirement of milk are estimated at about 158.19 and 250 ml respectively in order to fulfill the normal requirement of people (BBS, 2018).

The most economic traits of the milk-producing animals are average body weight, milk yield, calving interval, conception rate, birth weight of calves, gestation length etc. Indigenous cows (*Bos indicus*) are our resource. Their milk quality is good but the productive and reproductive performance is not up to mark (Rahman et al., 1998). It varies between 300 to 400 liters per lactation period of 180 to 240 days of local cow. On contrary crossbred cows yield from 600 to 800 liters per lactation of 210 to 240 days (Islam, 1992). But we cannot ignore local cattle because they possess some unique characteristics, like they have more resistance capacity against diseases, sustain production in low quality nutrition, well-adjusted with hot and humid climatic conditions. On the other hand, HYV resistance capacity is low against prevalent diseases and thrive in adverse climate.

Whatever the number of crossbred cattle is increasing day by day with the availability of artificial insemination (AI) practices throughout the country. Reasonable number of landless and marginal farmers have found crossbred cows as a profitable enterprise under improved nutrition, better disease control and management.

Objectives:

- To evaluate the productive and reproductive performance of different crossbred dairy in Chattogram Metro area.
- To recommend farmers about the breed and type of animals which are to be suitable in existing ecological and socio-economical condition of Bangladesh.

Chapter II

Materials & Method

Study Area and Duration: The survey was conducted on 59 crossbred dairy cows for a period of one month from 03 March 2019 to 31 March 2019 at Chittagong Metropolitan areas. Farms under dairy placement rotation are selected.

Animal Selection: The dairy cows had been selected on the basis of milking period was on going. The cows were in 3rd lactation period. About 59 crossbred cows were selected from different dairy farms. They were categorized into 75 % HF × 25% L (10 cows) and 75 % HF × 25 % SL (5 cows) from Shahnewaz dairy farm, 75% HF × 25% JS (11 cows) and 75 % HF × 25 % L (4 cows) from Super dairy farm, 50% HF × 50% SL (9 cows) and 75% HF × 25 % SL (5 cows) from Diamond dairy farm and 75% HF × 25% SL (5 cows), 75% HF × 25% L (1 cows), 50% HF × 50% SL (5 cows), 75% HF × 25% JS (4 cows) from Jarip dairy farm.

Method of Data Collection: The data was collected from records books of respective farms and confusion was met discussing with owners, managers and employs.

Preparation of Questionnaire: The questionnaire was developed in accordance with objectives of the study. It was designed in a simple manner to get accurate information from the dairy cow owners. The questionnaire contained following information.

- A) General identification and information of the selected dairy cow owners.
 - a) Name of the owner
 - b) Location of the owner
 - c) Reared breed
 - d) General feeding system

B) Productive and reproductive parameters of crossbred cows such as

1. Milk yield (lit/day)
2. Length of lactation (days)
3. Post-partum heat period (days)
4. Service per conception (Number)
5. Age at 1st heat
6. Calf birth weight
7. Length of calving interval (days)
 - i) recent calving date
 - ii) previous calving date

Statistical Analysis: The collected data was compiled, tabulated and analyzed in accordance with the objectives of the study. The data were subjected to statistical analysis using MS Excel program to compute analysis of variance and means of each variance with standard error (SE) according to Steel and Torrie (1980).

Chapter III

Result & Discussion

Milk Yield:

The average daily milk production of Friesian × Local, Friesian × Jersey, Friesian × Shahiwal (25%) and Friesian × Shahiwal (50%) cows was 8.10 ± 0.32 , 16.27 ± 0.65 and 14.43 ± 0.33 and 13.13 ± 0.44 liter, respectively (Table 1). The Milk yield differ significantly ($P < 0.05$) among four different crossbred cattle. Highest milk production was recorded in Friesian × Jersey and the lowest in Friesian × Local. These results are partially agree with findings of Sultana *et al.* (2001). She found that Friesian cross, Jersey cross, Shahiwal cross were 7.20 ± 1.07 , 6.70 ± 0.86 , 4.86 ± 0.85 and 4.05 ± 0.54 liters, respectively.

Lactation length:

The average lactation length of different crossbred dairy cows at Chittagong Metropolitan Area is presented in Table 1. It was found that Friesian × Local, Friesian × Jersey, Friesian × Shahiwal (25%) and Friesian × Shahiwal (50%) cows, 244.60 ± 1.19 , 291.93 ± 1.90 , 283.53 ± 1.63 and 285.64 ± 1.14 days, respectively (Table 1). The lowest lactation length was found in Friesian × Local and the highest in Friesian × Jersey. There was significance ($P < 0.05$) difference among the lactation length. The result of present study nearly agrees finding of Mondal *et al.* (2005). He found that lactation length of Friesian × Local and Sahiwal × Local cows 250 ± 38.6 , 245 ± 10.6 days respectively. Hasan (1995) found that average lactation period of Jersey cross, Holstein cross, Sahiwal cross, Sindhi cross were 286 ± 40.2 , 272 ± 55.3 , 262 ± 51.5 and 255 ± 61.5 days, respectively. The result of present study nearly agrees finding of Hasan (1995).

Table1. Breed wise productive and reproductive performance of the dairy cows under study

Parameters	75%HF × 25% Local (FL) n=15	75%HF×25% JS (FJS) n=15	75%HFx 25% SL (HSL) n=15	50%HF×50% SL (HS) n=14
Lactation length (day)	244.60 b ±1.19	291.93 a ±1.90	283.53 a ±1.63	285.64 a ±1.14
Milk yield (lit/day)	8.10 c ±.32	16.27 a ±.64	14.43 b ±.33	13.13 b ±.44
Calving interval (month)	14.13 a ±.16	14.07 a ±.15	14.20 a ±.24	13.86 a ±.29
Post-partum heat period (days)	64.87 a ±.77	88.07 b ±.87	91.33 b ±1.51	89.86 b ±1.06
Service per conception(n)	1.93 a ±.18	1.80 a ±.17	1.93 a ±.18	1.71 a ±.22
Calf birth weight(Kg)	11.20 b ±.27	15.83 a ±.34	13.13 a ±.27	14.60 a ±.37
Age at 1 st heat(month)	14 a ±.27	13.13 a ±.32	17.67 b ±.21	21.71 c ±.32
Age at 1 st calving (month)	23.73 a ±.20	23.93 a ±.24	27.80 b ±.29	32.07 c ±.35

Service per conception:

The average lowest number of service per conception (1.71 ± 0.22) was in Friesian \times Sahiwal (50%) crossbred and the highest (1.93 ± 0.18) in Friesian \times Local and Friesian \times Shahiwal (25%) (Table 1) There was no significant ($P > 0.05$) difference among service per conception. This finding of service per conception the present study was partially in agree with the finding of Mondal *et al.* (2005). He found that service per conception of Sahiwal \times Local, Friesian \times Local cows was 1.63 ± 0.64 , 1.6 ± 0.59 , respectively.

Calving Interval:

The average calving interval of Friesian \times Local, Friesian \times Jersey, Friesian \times Shahiwal (25%) and Friesian \times Shahiwal (50%) cows was 14.13 ± 0.16 , 14.07 ± 0.15 , 14.20 ± 0.24 and 13.86 ± 0.29 month respectively (Table 1). There was no significant ($P > 0.05$) difference among the calving interval. These results coincides the findings of Mondal (1998) found that the means calving interval of Jersey cross, Sahiwal cross and Friesian cross cows was 16.71 ± 0.10 , 14.83 ± 0.19 and 13.81 ± 0.14 days, respectively.

Calves Birth Weight:

Average birth weight of calves of different crossbred cows was presented in Table 1. It was found that average birth weight of calves of Friesian \times Local, Friesian \times Jersey, Friesian \times Shahiwal (25%) and Friesian \times Shahiwal (50%) cows was 11.20 ± 0.27 , 15.83 ± 0.34 , 13.13 ± 0.27 and 14.60 ± 0.37 kg, respectively. Statistical analysis showed that there was significant difference ($P < 0.05$) within the birth weight of calves of different dairy cows. Among the different types of cows highest birth was recorded in case of Friesian \times Jersey and the lowest was recorded in case of Friesian \times Local. Khan (1990) found that average birth weight of calves for Jersey, Sahiwal and Sindhi crossbred calves were 17.1 ± 0.17 , 17.8 ± 0.18 , 17.9 ± 0.17 kg respectively. These results are similar with present study.

Age at 1st Heat:

The pubertal age of the Friesian × Jersey was significantly lower than the other breeds namely Friesian × Local, Friesian × Shahiwal (25%), Friesian × Shahiwal (50%) and the result was 13.13 ± 0.32 , 14 ± 0.27 , 17.67 ± 0.21 and 21.71 ± 0.32 months. There was significant ($P < 0.05$) difference among the pubertal age. These findings are in agreement with Morrow (1986) who found the age at puberty ranging from 1.4 months to over 2 years. In contrast Rahman et al. (1993) found that the age at puberty of Friesian × Local cows was 19 ± 2.3 months.

Age at 1st Calving:

The average 1st calving age of Friesian × Local, Friesian × Jersey, Friesian × Shahiwal (25%) and Friesian × Shahiwal (50%) was 23.73 ± 0.20 , 23.93 ± 0.24 , 27.80 ± 0.29 and 32.07 ± 0.35 months respectively (Table1). There was significant ($P < 0.05$) difference among the 1st calving age at 1st calving. This result was supported by Hafez (1987) who found age at first calving ranging from 24 to 36 months. Islam (1999) found that age at first calving of Friesian crossbred, Sahiwal crossbred and local crosses were 36.3 ± 3.48 , 37.3 ± 3.01 , 40.1 ± 3.54 months, respectively which may differ from present study due to management and environmental factor.

Post-partum Heat Period:

The average post-partum heat period of Friesian × Local, Friesian × Jersey, Friesian × Shahiwal (25%) and Friesian × Shahiwal (50%) was 64.87 ± 0.775 , 88.07 ± 0.875 , 91.33 ± 1.51 and 89.86 ± 1.06 days respectively (Table1). There was significant ($P < 0.05$) difference among the post-partum heat period. These results are partially similar with Miazi *et al.* (2007). They found that local, Sahiwal × Local, Friesian × Local and Jersey × Local was 102 ± 8.7 , 95.0 ± 25.0 , 90.0 ± 13.42 and 92.92 ± 7.16 days respectively. Mazid *et al.* (1993) found that average post-partum heat period for local, Friesian × Local was 120.04 ± 7.84 and 117.24 ± 7.29 days, respectively.

Conclusion

The study was conducted to find out the comparative productive and reproductive performance of different cross breed dairy cows in Chattogram Metropolitan Area. It is known that genetic merit plays the role in productive and reproductive variation. This study exhibited that Friesian × Jersey cross-bred is a potential animal and its productive and reproductive performances was better for milk production, lactation length, calf birth wt. and age at 1st heat. Although the calving interval and service per conception was better in Friesian × Shahiwal (50%) and post-partum heat period & age at 1st calving in Friesian × Local but not significant difference. Considering other four traits performance of Friesian × Jersey is better than any other cross breeds of this study. This crossbred should be reared in commercial dairy farming condition for better return.

Limitation

Study period was short, just for 1 month of time. Animals were reared in different management condition. Short of precise data recording system in dairy farms.

Reference

- A.A. Khan, A. Ali, S.S. Hussain and A.K.F.H. Bhuiyan (1999). Reproductive performance of different genetic group of cow under farm condition. *Bangladesh J. Anim. Sci.* 28: 59-64
- A.A. Khan (1990). A comparative study on the Reproductive efficiency of native and crossbred cows. M.Sc. Thesis, Department of Dairy Science. Bangladesh Agricultural University, Mymensingh.
- A. Morrow (1986). *Current Therapy in Theriogenology*. 2nd edn. W.B. Saunders Company. The Curtis Center, Independence Square, West Philadelphia, PA 19106
- BBS (2018). *Bangladesh Census of Agriculture*, Bangladesh Bureau of Statistics, Dhaka, Bangladesh.
- BBS (2018). *Bangladesh Bureau of Statistics, Survey on Livestock and Poultry in Bangladesh: A Nation Survey Report*
- BOS (2014). *Bangladesh Orthonaitik Samikha*, Economic Advisory Section, Department of Finance. Ministry of Finance, Bangladesh.
- E.S.E. Hafez (1987). *Reproduction in Farm Animal*. 6th edn. Lea and febiger, USA. pp. 424-439
- M.A. Islam (1992). A comparative economic analysis of milch cows and buffaloes in two selected villages of Mymensingh district in Bangladesh. M.Sc. Thesis, Department of Agricultural Finance, Bangladesh Agricultural University, Mymensingh.
- M.M. Mazid, T.N Nahar, A.I. Talukder and M.A. Rahman (1993). Reproductive performance of pure breed, F₁, F₂ and F₃ cows related at Savar Dairy Farm. *Bangladesh J. Livestock Res.* 2: pp. 53-62

M. Faruk Miazi, H. Emran *et al.* (2007) Productive and reproductive performance of crossbred and indigenous Dairy cows under rural conditions in Cumilla, Bangladesh. Rajshahi University, Vol. 26. pp. 67-70

M.G. Rahman, N. Ahmed and A.R. Ahmed (1993). A comparative study on some productive and reproductive performance of dairy cows at savar dairy and cattle improvement farm. Bangladesh Vet., J., 21: pp. 55-61

M.M. Rahman, M.N. Islam and A. Dev (1998). A productive and reproductive performances of indigenous and crossbred under village management condition. J. Prog. Agric. 1&2: pp. 95-99

M. M. Hasan (1995). Distribution Pattern and Some Economic Dairy Characters of Local and Crossbred Cows in Mymensingh Sadar, M. S. Thesis, Department of Dairy Science, Bangladesh Agricultural University, Mymensingh.

M.N. Islam (1999). A study on the socio-economic status and some productive and reproductive performance of crossbred and indigenous dairy cows under small holder dairy farming condition in Faridpur municipal area. M.sc. Thesis, Department of Dairy Science, BAU, Mymensingh.

M. Saadullah, M. Hoque; M. Rahman (1977). A Comparative Study of Age of First Calving, Gestation Period and Calving Interval of Different breeds of Cattle. Bangladesh Veterinary Journal. II; pp. 9-14

N. Mondal (1998). A comparative study on the productive performance of different dairy breeds on BAU dairy farm. M.Sc. Thesis, Department of Dairy Science, BAU, Mymensingh.

N. Sultana, M.M. Rashid, S.M.J. Hossain (2001). A Comparative Study on the Productive and Reproductive Performance of Different Crossbred and Indigenous Dairy Cows under Small Scale Dairy Farm Conditions. Pakistan Journal of Biological Sciences 4 (8); pp. 1036-1037

R.G.D. Steel and J.H. Torrie (1980). Principles and Procedure of Statistics. 2nd edn. Mc Graw Hill Book Co., New York.

S.C. Mondal, M.M. Alam, M.M. Rashid, M.Y. Al and M.M. Hossain (2005). Comparative Study on the Productive and Reproductive Performance of Different Dairy Genotypes Reared in Bangladesh Agricultural University Dairy Farm. Pakistan Journal of Nutrition 4 (4); pp. 222-225

S.K. Raha (2000). “Development of Livestock Sector: Issues and Evidences” In Mondal. M.S. (Ed.) Changing Rural Economy of Bangladesh. Bangladesh Economic Association, Eskaton Garden Road, Dhaka-1000.

Acknowledgement

All praises are due to Almighty who has created everything of the nature and who enable to author to complete this report. The author does not have adequate words to express his heartfelt sense of gratification, sincere appreciation to his benevolent teacher and report supervisor. The author express his sincere gratitude, heartfelt respect and immense ineptness to his supervisor, **Dr. Gous Miah**, Professor, Department of Genetics and Animal Breeding, Chattogram Veterinary and Animal Sciences University for his valuable advice, guidance, suggestions, inspiration and who was involved with this study through its inception.

The author highly express his sincere gratitude and gratefulness to the internship Coordinator, **Dr. A.K.M. Saifuddin**, Professor, Department of Physiology, Biochemistry and Pharmacology, Chattogram Veterinary And Animal Sciences University, for his constant inspiration, cordial co-operation, valuable suggestion for completion of the report work.

I would like to express my deep sense of gratitude and thanks to Professor **Dr. Abdul Ahad**, Dean, Faculty of Veterinary Medicine, Chattogram Veterinary and Animal Sciences University.

The author is ever indebted to his father, mother, sisters and friends for their sacrifices, blessing and encouragement to get him in this position.

Biography

This is Dipto Saha son of Dilip Kumar Saha and Suchitra Saha. He is from Narayanganj. He has passed the Secondary School Certificate Examinations in 2011 followed by Higher Secondary Certificate Examination in 2013. He enrolled for Doctor of Veterinary Medicine (DVM) degree in Chattogram Veterinary and Animal Sciences University (CVASU) Chattogram, Bangladesh in 2013-14 sessions. At present he is doing his internship program which is compulsory for awarding his DVM degree from CVASU. He would like to work and have massive interest in pet animal medicine and surgery.

ANNEXES
QUESTIONNAIRE

Date of Recording:

1. Farm name:
2. Location:.....
3. Cow ID:.....
4. Breed:.....
5. Parity: 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 6. BCS: 1 / 2 / 3 / 4 / 5
7. Age: 8. Age at first heat:
9. Age at first calving:
10. Lactation:
(a) Lactation length: days (b) Daily milk yield:.....kg
11. Post-partum heat: days after calving
12. First service after delivery:
13. Service per conception: 1 / 2 / 3 / 4 / 5
14. Gestation length:
15. Calving interval:.....
16. Calf Birth Weight.....
16. Disease occurred from last delivery to till now
Abortion / retained fetal membrane / vaginal prolapse / uterine prolapse /
uterine infection.
17. Method of service: Natural service / AI