#  Chapter 1: Introduction

Bangladesh is a populous and agro-based developing country in south Asia where majority portion of people earn their livelihood doing cultivation and livestock farming Livestock sector is playing an inordinate role in subsistence farming contributing about 1.5 % of GDP, 20% of foreign currency and creating employment of 20% of population.

Dairy farming is a part and parcel of integrated farming system in Bangladesh (Saadullah, 2001).There is many commercial dairy farms in Bangladesh. The major part of milk is produced in the farms located in rural area. Local cows are our resource. There milk quality is good but the productive and reproductive status is not satisfactory. Consequently, the concept of crossbred and commercial dairy farming has been come under consideration forward. It was reported that, the number of dairy cow in Bangladesh is 3.98millions which is 16% of total cattle population and 35 % of our cows. Only 10% of cattle are reported to be crossbred (BBS, 2012).The total cattle population of Bangladesh is 25.5 millions of which 3.79 million are dairy cow yielding 2.28 million metric ton milk per year and this indicates the necessity of promotion of milk production in Bangladesh (Banglapedia 2012). Bangladesh is importing powder milk with a view to meeting depicts. The volume of imported powder milk has been increased over the year due to increased domestic demand. The cost of importation has exerted pressure on the country’s balance of payment and depressed domestic initiative for milk production. Moreover, about two third of total population are suffering from malnutrition. The magnitude of malnutrition can substantially be reduced by consumption of milk and dairy product (FAO, 2007).

The average production of local dairy cow is low which varies between 300 to 400 liters in a lactation period of 180 to 240 days. But there is a great variation of production among cows. Generally crossbreed cows under village condition yield 600 to 800 liters milk per lactation period of 210 to 240 days (Uddin, 2008). The low productivity of milking cow in this country is due to scarcity of feed and fodder land, poor genetic potentiality and wide extend of diseases. Sustainable dairy farming is not possible with indigenous cow because of their low productivity. For this reason, the concept of intensive farming with high yielding cows has established. The daily per capita availability and requirement of milk are estimated in adult 34.86 ml and 250 ml (DLS, 2009). To increase the number of crossbred animal, central cattle breeding and dairy farm (CCBDF) was established. The number of crossbred animal is being increased day by day with the spread of artificial insemination (AI). A good number of small, medium and large size farm has been developed mostly in urban and semi urban milk pocket areas like Pabna, Sirajgonj, Munsigonj, Manikgonj, Faridpur, Madaripur, kishorgonj, Rangpur, Kustia and Chittagong district (Rokonuzzaman et al., 2009).

The economic condition of a dairy farm depends to a greater extend on productive and reproductive performance of animal. The productive performance is considered as milk yield per lactation per cow, average lactation length of different genotype. The reproductive performance is considered as age at first heat, age at first calving, service per conception, gestation length, calving interval, days open. Prolong days open and low conception rate are the major constraints limiting the dairy farming in Bangladesh (Rokonuzzaman et al., 2009, Alam and Ghosh, 1999 and Shamsuddin et al., 2001).

We know that, productive and reproductive performance of a cow depends on genetic merits. Researcher stated that the productive and reproductive performance of a cow changed along with their genotypic variation. But the productive and reproductive performance are also be controlled by feeding, hygienic condition, bio-security and other management in different farms. Much research work has not been done in Bangladesh but if we get sufficient information about the relationship between genetic merit and management in different farm condition, then it would be possible to solve the problems related to dairy farming. Then farmers can be informed which parameter are to be followed in better management of dairy farming.

Hence, the present study has been undertaken to illustrate the productive and reproductive performance of same genotypic crossbred cows at different farming condition.

Objectives:

1. To explore the productive and reproductive performance of same genotypic crossbred cows at different dairy farm condition.

2. To observe the management factors affecting the productive and reproductive performance of same genotypic crossbred cows at different farming condition.

# Chapter 2: Materials and Method

The present study was conducted to learn the productive and reproductive performance of different genetic groups of cow at different farm condition of Noakhali in Bangladesh. The study was conducted for period of four months from july to October 2016.

**2.1 *Study area***

The study was conducted on three dairy farms in Noakhali district of which one of farm is within Noakhali municipal area and two are out of municipal area. They are Jamuna farm, Momota farm and Modern dairy farm.

**2.2 *Study population***

About 55 crossbred cows were selected from different dairy farms those already completed 3rd lactation. They were categorized into 50 %HF × 50% SL (8cows) and 75 % HF × 25 % SL (5 cows ) from Jamuna dairy farm, 50% HF × 50 % SL and 75 % HF × 25 % SL (4 cows ) from Momota dairy farm and 50% HF × 50% SL (5 cows) and 75% HF× 25 % SL (7 cows) from Modern dairy.

**2.3 *Method of data collection***

The data was collected from records books of respective farms and confusion was met discussing with Owners, Managers and employs.

**2.4 *preparation of the questionnaire***

 The questionnaire was prepared according to the objectives of the study. The questionnaire included questions to collect information on name of the farm animal ID, genotype, age at first heat, age at first calving, conception rate per service, gestation length, average daily milk yield, days open, calving interval and average lactation length

**2.4.1 *Genotype***

Genotype that means blood percentage was determined by observing AI record book that denotes the percentage of foreign blood bearing by the cows.

**2.4.*2 Age at first heat***

It was determined by observing first estrus date note down in record book in months.

**2.4.3 *Service per conception***

Service per conception was estimated by the average number of services for conception.

**2.4.4 *Age at first calving***

It was calculated by interval from date of birth to date of first calving and was expressed in months.

**2.4.5 *Gestation length***

It was determined by calculating interval from the date of successful AI to date of calving and was expressed in days.

**2.4.*6 Average daily milk yield per cow***

It was determined by total milk yield per lactation divided by lactation length and was expressed in liter.

**2.4.*7 Calving interval***

The calving interval was recorded on the basis of interval between dates of one calving to the date of next calving and was expressed in months.

**2.4.8 *Average lactation length***

Lactation length was calculated from the date of let down of milk after calving to the death of ending milking of a cow in days.

**2.4.9 *Management practice of farm***

Momota dairy farm is a well organized dairy farm situated in Begumgonj, Noakhali. Cows were reared in a tin shed building. Face in and face out stanchion barn housing system was practiced in this farm. They have available fodder land and adequate amount of grass for the cows. Concentrate feed was also supplied to cows. Bio-security was strictly maintained and the overall management system was sufficiently good. Hygienic condition was notably good, consequently cows were affected by diseases specially mastitis in lower amount. All record books were available in this farm.

Jamuna dairy farm was an organized farm situated in Maijdee, Noakhali. Rearing system was both face in and face out in tin shed and half wall house. The farm has satisfactory amount of land for fodder production like Napier, Maize etc. Cows were also fed concentrate feed adequately. Bio-security was satisfactory. Hygienic condition was excellent. Diseases especially mastitis was not frequent in this farm. Drying of was not maintained in case of some cows those produced milk up to calving. All record books were available here.

Modern dairy farm was a finely organized farm located in Choumuhoni, Noakhali. Cows were kept in tin shed house in face out and face in system. The farm had liberal amount of fodder land. Concentrate was also provided to cows more or less similar to other two farms. Bio-security was not good. Hygienic condition is poor.

**2.5 *Statistical analysis***

The collected data was analyzed using SPSS 16.0 software. Compare means with one way ANOVA method was used to calculate mean and standard error. Least significant difference (LSD) test was performed for knowing the level of significance among the means.

# Chapter 3: Results

About 55 crossbred dairy cows of three different commercial dairy farms were studied to know their productive and reproductive performance (e.g. age at first heat, age at first calving , service per conception ,gestation length, average daily milk yield, days open, calving interval and average lactation length).The result were shown in table 3.1and 3.2.

**Table 3.1 Comparison of productive and reproductive performance of crossbred cows (50% HF× 50% SL) among different farms.**

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| --- | --- | --- |
|  | **Farms** |  |
| **Traits** | **Modern dairy farm****Mean ± SE** | **Jamuna dairy farm** **Mean ± SE** | **Momota dairy farm** **Mean ± SE** | **F-value** | **Level of significance** |
| AFHAFCSPCGLMYDOCILL | 21.25 ± 1.4834.63 ± 1.252.37 ± 0.10280.00 ± 0.5614.37 ± 0.4893.33 ± 7.1014.16 ± 0.39288.75 ± 6.15 | 21.44 ± 1.4333.89 ± 1.042.04 ± 0.33278.89 ± 0.6515.18 ± 0.7897.96 ± 5.7814.26 ± 0.46298.11 ± 4.40 | 23.40 ± 1.7533.60 ± 1.602.40 ± 0.30277.20 ± 0.6614.39 ± 0.1695.46 ± 7.0713.33 ± 0.18291.20 ± 3.48 | 0.460.163.093.970.560.141.180.99 | NSNSNS\*\*NSNSNSNS |

\*\*Mean significance at 5% level (p˂0.05), NS=non significant, (AFH= age at first heat, MY =milk yield, AFC=age at first calving, DO=days open, SPC= service per conception, CI= calving interval, GL= gestation length, LL= lactation length).

The gestation period of cows is significance (p˂0.05) among Modern, jamuna and Momota dairy farm which is exhibited in Table no.3.1. It is found that the gestation period of Modern, Jamuna and Momota are 280.00 ± 0.56, 278.89 ± 0.65 and 277.20 ± 0.66 respectively. The lowest gestation period is in momota dairy farm and the highest gestation period is in Modern dairy farm. The other parameter (age at first heat, age at first calving, service per conception, milk yield, days open, gestation length and lactation length) are not statistically significant. The highest MY (15.18 ± 0.78), DO (97.96 ± 5.73), CI (14.26 ± 0.46 months) and LL (298.11 ± 4.40 days) and the lowest MY (14.37 ± 0.48 L/day), DO (93.33 ± 7.10), LL (288.75 ± 6.15) and AFH (21.25 ± 1.48 months) in Modern dairy farm. The highest AFH (23.40 ± 1.72 months), SPC (2.40 ± 0.30) are found in Momota farm and the lowest AFC (33.60 ± 1.60 months) and CI (13.33 ± 0.18) are found in Momota dairy farm.

**3.2 Comparison of productive and reproductive performance of crossbred cows (75% HF× 25% SL) in different farms.**

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| --- | --- | --- |
|  | **Farms** |  |
| **Traits** | **Modern dairy farm Mean ± SE** | **Jamuna dairy farm Mean ± SE** |  **Momota dairy farm Mean ± SE** | **F- value** | **Level of significance** |
| AFHAFCSPCGLMYDOCILL | 19.00 ± 0.0029.50± 0.502.00 ± 0.00282.00 ± 0.0015.67 ± 0.00132.00 ± 2.0014.33 ± 0.00282.00 ± 4.0 | 17.00 ± 2.0026.50 ± 2.502.30 ± 0.00281.50± 0.5019.83 ± 0.83102.00± 16.0013.66 ± 0.33297.50 ± 3.50 | 19.43 ± 0.6130.29 ± 0.602.15 ± 0.16276 ± 0.92 19.81 ± 0.94112.57 ± 10.1913.47 ± 0.27291.29 ± 1.12 | 1.553.130.837.982.860.771.378.96 | NSNSNS\*\*NSNSNS\*\* |

\*\*Mean significance at 5% level (p˃0.05), (NS= non significant), (AFH= age at first heat, AFC=Age at first calving, SPC=Service per conception, GL=Gestation length, MY=milk yield, DO=Days open, CI=Calving interval, LL=Lactation length).

Table 3.2represents that, the gestation and lactation length among Modern, Jamuna and Momota dairy farms are highly significant (p<0.05). The lactation length in Modern, Jamuna and Momota dairy farms are 282.00 ± 4.0, 297.50 ± 3.50, 291.29 ± 1.12 days and gestation lengths are 282.00 ± 0.00, 281.50± 0.50, 276 ± 0.92 days respectively. The highest lactation length is found in Jamuna dairy farms and lowest lactation lengths in Modern dairy farms. The highest gestation length found in Modern dairy farms and the lowest ge at first heat, age at first calving, service per conception, gestation length milk yield, days open, calving interval and lactation length)are not statistically significant (p>0.05). The highest AFH (19.43 ± 0.61 months), AFC (30.29 ± 0.60 months), are found in Momota dairy farms and lowest AFH (17.00 ± 2.00 months), AFC (26.50 ± 2.50 months) are found in Jamuna dairy farm. The highest SPC (2.30 ± 0.00) and MY (19.83 ± 0.83 L/day) are found in Momota dairy farm and the lowest SPC (2.00 ± 0.00) and MY (15.67 ± 0.00 L/day) are found in Modern dairy farm. The highest CI (14.33 ± 0.00 days), DO (132.00 ± 2.00 Days) are found in Modern dairy farm and the lowest CI (13.47 ± 0.27 days), DO (102.00± 16.00 days) are found in Modern and Jamuna dairy farm, respectively.

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#  Chapter 4: Discussion

The mean productive and reproductive performance of 50% HF ×50% SL cross bred cows among different farms are shown in table 3.1. It appears that gestation length of 50% HF ×50% SL cross bred cows among modern Jamuna and Momota dairy farms are statistically significant (p< 0.05) whether the other productive and reproductive parameter (age at first heat, age at first calving, service per conception, average daily milk yield, days open, calving interval and average lactation length) are not statistically significant (p>0.05). The lowest gestation length (277.20 ± 0.66 days) is found in Momota dairy farm and highest gestation length (280.00 ± 0.56 days) is found in Modern dairy farm. Gestation length of cross bred dairy cows under farm and urban conditions were studied by Hasan (1995) and Kabir et al. 2009 and showed that breed had no significant effect on gestation length which agreed with the present study. The lowest gestation length (277.20 ± 0.66 days) is found in Momota dairy farm may be due to good management and environment, because the overall management system (specially feeding, hygiene and strong bio-security) of Momota dairy farm was better than Modern and Jamuna dairy farm. The mean productive and reproductive performance of 75% HF × 25% SL crossbred cows among different farms are exhibited in table no 3.2. It showed that lactation and gestation length of 75% HF × 25% SL crossbred cows among Momota, Jamuna and Modern dairy farms are statistically significant (p<0.05) whether the other productive and reproductive parameter (age at first heat, age at first calving, service per conception, average daily milk yield, days open, calving interval) are not significant (p>0.05). In case of gestation length these result are similar with the result of Hasan (1995) and Kabir *et* al. (2009). It may be due to management and environmental effect on same genetic group of cows. Among three farms, the overall management system especially feeding (available green grass in the whole year), hygiene and bio-security of Momota dairy farm was better than Jamuna and Modern dairy farm. The management system of Modern dairy farm was not so good in comparison with others. In case of length these results disagreed to Bhuiyan and Sultana (1994) Hasan(1995), Rukonazzaman *et* al.(2009) and Uddin *et* al. (2008). It may be due to different feeding and hygienic management among the farms. The feeding and hygienic management in Jamuna and Momota dairy farms were better than Modern dairy farm. The highest lactation found in Jamuna dairy farm despite feeding and hygienic management was much better in Momota dairy farm. Because in Momota dairy farm, drying off was strictly maintained in case of some cows those produced milk up to calving.

# Limitation

In this study comparison of productive and reproductive performance of different genetic group of crossbred cows at different farming condition were briefly discussed. Due to lack of sufficient data of each of the genotypic cow precision of the result must be less or more. So, more studies are recommended to draw an absolute and reliable conclusion.

# Conclusion

In this study an attempt was made to find out the productive and reproductive performance of different genetic group of cows in different farming condition in Noakhali, Bangladesh. It is known that the productive and reproductive performance of cows are greatly depends on their genetic merit. This study exhibited that despite genotypic cows are present in different farms, there is a variation exists in gestation and lactation length. Therefore, it may be because of variation in farm management, feeding management and environment. In Momota dairy farm overall management system and environment was excellent, as a result, the gestation period was found lowest among the farms. On the other hand, the lactation period of crossbred cows of Momota dairy farm is lower than Jamuna dairy farm, as they maintain drying period. So, productive and reproductive performance does not depend on genetic merits of cows. Therefore, in case of obtaining better performance farm management, feeding and environment should be given emphasized.

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#  Biography of Author

I am Md. Khaled Hasan, son of Mr. Abdur Rouf and Mrs. Shamsun Naher, was born on the 6th August 1990 at Noakhali in Bangladesh. I am the only son of my parents and I have a sister in my family. In 2007, I have completed my secondary school with a GPA 5.00 and in the year 2009 I passed my higher secondary education from Noakhali Govt. College. Then I have got myself admitted into Chittagong Veterinary and Animal Sciences University in the faculty of doctor of veterinary medicine. In future I dream to be a BCS cadre and want to serve the nation.