**CHAPTER 1: INTRODUCTION**

* 1. **Impact of livestock and cattle farming in Bangladesh**

Bangladesh is a developing country which economy mostly depends on agriculture. Agriculture contributes about 12.64 percent in Gross Domestic Product (GDP; Economic Review, 2014-15). Livestock is one of the major branches of agriculture which contribute about 1.78% of total GDP (Economic Review, 2014-15). The livestock of Bangladesh mainly includes cattle, buffalo, goat, sheep, chicken and duck. Among these, Cattle are reared for mainly milk and meat production as well as their hides plays a great role in national economy. The population of cattle in this country is about 234.39 million (Economic Review, 2014-15). Most of the cattle in Bangladesh are indigenous type. Some cross breeds also present which are developed by artificial insemination justified by Rahman et al., 1998. 3212 artificial insemination sub-centre and points are placed for increasing the rate of AI. Up to 2014 the number of artificially inseminated cow was about 18.55 lakh (Economic review, 2014-15). Only 10 percent of our cows were reported as crossbred by BBS, 2012.

* 1. **Contribution of small holder farmer in cattle farming**

Small and Non-farm households together keep 67.1% to 82.6% researched of the total 43.98 million of farm animals and 137.2 million of poultry (Agriculture census, 2008). In Bangladesh, 83.9 percent of total households have their own livestock (animals or poultry or both). About 45.9 percent households possess cattle and 76.3 percent possess poultry. On average, each household owns 1.52 bovine animals, 0.9 goat and sheep and 6.8 chicken and ducks calculated by Banglapedia, 2014. In the rural area, cattle are kept mainly for draught purpose. Only a limited number of farmers have cow for milk production. Maximum cattle are non-descriptive type which do not belong to any specific breed and termed as indigenous cattle. These animals are kept mainly in the stall with limited grazing on the roadside, embankment slope, fallow land and paddy straw are their staple food. Husbandry practices and health care of these animals are poor expressed by Jabbar et al., 1984. The average milk production of local cows is very low and it varies between 300-400 liters per lactation period of 180 to 240 days. But, there is a great variation of milk production among cows. Generally crossbred cows under village condition yield from 600 to 800 liters per lactation of 210 to 240 days as reported by Islam, 1992. Household cattle’s rearing provides employment for the poorer segments of the population. The availability of this form of traditional self-employment to rural dwellers, particularly women, is important where there is scarcity of alternative income generating opportunities. Household cattle rearing thus widen the scope for the poor with limited access to land to enhance their income. Dairy animals can play a crucial role in household food security, through improved income and nutrition of the low-income groups. In Rangpur district area, small and large scale dairy farms have been increasing day by day. Recently, Government also has given the priority on the development dairying at farmer’s level to increase the supply of milk from small dairy farms.

* 1. **Previous work on small holder farming**

Adeleke et al., 2010 published their work as “smallholder agriculture in East Africa: trends, constraints and opportunities.” “Risk management in smallholder cattle farming: a hypothetical insurance approach in Western Kenya” was published by Otieno et al., 2006. Miranda et al., 2010 studied on “cattle feeding and management practices of small-holder farmers in Kampong Cham Province, Cambodia”. Boby, 2013 worked on “an economic analysis on household cattle rearing” in Gazipur district of Bangladesh. Khan et al., 2013 previously worked on “performance of different genetic group of cows under Bangladesh condition” at Sarsha Upazila in Jessore district of Bangladesh. Rahman et al., 1995 assessed the reproductive status of zebu cattle in Tangail milk shed area.

* 1. **Objectives of this study**

The present study was aim at to fulfill the following objectives-

To identify the average herd size in traditional farming on smallholdings

1. To attain a details on the rearing systems commonly used by small holder farmers
2. To find the differences in feeding strategy used in small holdings
3. To reveal the production and reproduction performances in in rural small holder farming

**CHAPTER 2: METHODOLOGY**

* 1. **Study area**

This study was conducted in eleven unions under Tangail upazilla of Tangail district. Data were collected from March to June 2016.

* 1. **Study and sample population**

The study population was cattle are rearing on smallholdings in Tangail district. These sample population was cattle on 103 small holder farmers. This study did not used any strategic sampling method rather used a sampling by convenience method. The farmer who have less than 2 hector land basically counted as small holder farmer. The number of animal per farm mostly varied from 2 to 10 in this study. Only the cattle population was counted in this study. The number of indigenous cattle and number of crossbreed cattle also recorded.

* 1. **Data collection**

A predefined questionnaire was used to collect data on farming, production and reproduction performances which include herd size, rearing system, feeding strategy, breed structure, daily milk yield and conception rate. Self practiced dairy technologies were listed. By conversation with farmers all the possible data were collected and recorded in the data sheet.

* 1. **Data analysis**

Collected data were entered into Microsoft office 2007 Excel worksheet. Descriptive statistics for different variables were analysed using Analysis Toolpack from Excel. Other statistical analyses were performed using GraphPad Prism version 7.00 for Windows, GraphPad Software, La Jolla California USA, www.graphpad.com”.

**CHAPTER 3: RESULTS AND DISCUSSION**

**3.1 Average number of animals per smallholder farm**

Of the 103 small holder cattle farms studied,the mean herd size was 4. A mean of 3.6 head of cattle per household in smallholder dairy system was founded by Ngategize, 1989. This study also supported by Uddin et al., 2010 which identified herd size for small scale extensive farming ranges from 1 to 4 and herd size for small scale intensive farming ranges from 3 to 7 which support this study.

**3.2 Rearing system of animals**

In smallholder farming rearing system mainly divided into two groups, in house system and semi-intensive system. The semi intensive system was about 78% whereas in house system only contributed 22% (Table 1).

Table 1: Rearing system of animals in study area

|  |  |
| --- | --- |
| Rearing system | Number (percentage) |
| In house | 23 (22%) |
| Semi-intensive | 80 (78%) |

**3.3 Roughage feeding system**

Cattles of smallholding farms were mainly feed by cut and carry method and pasture based grazing. About 64% cattle were fed under cut and carry method and pasture based grazing were done by 36% cattle (Table 2). Babul, 2005 reported that 53% of total farmers used restricted grazing which is almost similar to this study.

Table 2: Roughage feeding strategy for the study population

|  |  |
| --- | --- |
| Roughage feeding strategy | Number (percentage) |
| Cut and carry | 66 (64%) |
| Pasture based grazing | 37 (36%) |

* 1. **Population structure**

The population of cattle was formed by both indigenous type and crossbreed type. The indigenous cattle were presented at 29% on the other hand the crossbreed cattle were presented at 71% of the study population. Type of dairy cattle in the study area of Khan et. al., 2013 was Holstein cross 25%, Sahiwal cross 25%, Sindhi cross 25% and Indigenous cow 25% which is similar to present study. Khan et al., 2010 observed that farm owners had 85.4% crossbred cattle (like Friesian cross and Jersey cross) and 14.6% indigenous cattle. The percentage of indigenous cattle in present study is somewhat greater than earlier study of Khan et al., 2010

Figure 1: Breed structure of the study population

* 1. **Daily milk yield**

The average milk production was about 4.34 ± 0.26 liter per day. The average milk production of indigenous cattle was about 2.66 ± 0.14 liter per day. Daily milk production by crossbreed was about 6.97 ± 0.55 liter (Table 3). The milk production between indigenous and crossbred cattle was statistically significant (p>0.0001). The average milk production of local cows varies between 300-400 liters per lactation period of 180 to 240 days and crossbreed cows under village condition yield from 600 to 800 liters per lactation of 210 to 240 days reported by Islam, 1992. Previous study of Khan et al., 2013 also reported that average milk yield by indigenous was about 2.38 liters per day and the production of crossbreed was about 8.39 liters per day which strongly support this study.

Table 3: Mean Daily milk yield in cattle on smallholdings

|  |  |  |
| --- | --- | --- |
| Breed/type | Daily milk yield in liter(Mean ± standard error) | P value |
| Indigenous | 2.66 ± 0.14 | <0.0001 |
| Crossbred | 6.97 ± 0.55 |
| Overall | * 1. ± 0.26
 |  |

**3.6 Contribution of male genotype in insemination**

The cattle of smallholder farm were inseminated with local and local × Friesian cross and local × Sahiwal cross. In smallholder farming, about 36% cattle was inseminated with indigenous cattle. The 38% cattle was inseminated with local × Friesian cross breed. The rest of cattle in the study area were inseminated with local × Sahiwal cross genotype. The earlier study of Khan et al., 2010 identified that 87% farmers used crossbred bulls for insemination of cattle which is higher than this study.

Figure 2: Contribution of different male genotype in insemination practice in study area.

Local = all indigenous bull including Red Chittagong cattle, LXF = 50% local × 50% Friesian cross and LXS = 50% local × 50% Sahiwal cross.

**3.7 Number of insemination per conception**

Overall insemination per conception in smallholder farming was about 1.66 in which indigenous cattle and crossbreed cattle was inseminated at 1.79 and 1.59 consequently. Jabbar and Ali, 1988 studied the productive performance of Indigenous and crossbred cows in Bangladesh and demonstrated the overall service per conception was 1.66 which is same as this study. Number of service per conception for local Friesian was 1.68 and cross was 1.79 as reported earlier by Sultan and Bhuiyan, 1997. Rahman et al., 1998 also revealed that service per conception was 1.3 for indigenous and crossbreed for 1.35. The findings of Leaver, 1997 supported that unavailability of fodder may cause poor conception. The conception rate of present findings in pasture based cow was about 1.55 and the semi-intensive cow was about 1.70 at P value 0.4700. This study measurement in close agreement was somewhat less but almost similar to findings of earlier research by Bhuiyan, 1999 which value was 1.87. Busch et al., 1996 also supported this statement. But study of Shamsuddin et al., 2001 revealed that cows managed intensively tended to conceive at a higher (p = 0.05) rate (53%; n = 156) than those reared extensively (43%; n = 288) which disagrees the findings in this study. It may due to much availability of grass in the study area.

Table 4: Number of insemination per conception in study population

|  |  |  |
| --- | --- | --- |
| Variable | Number of insemination(Mean ± standard error) | P value |
| Overall | 1.66 ± 0.10 |  |
| Indigenous | 1.79 ± 0.18 | 0.4559 |
| Crossbred | 1.59 ± 0.12 |
| Pasture based cow | 1.55 ± 0.21 | 0.4700 |
| Semi intensive | 1.70 ± 0.10 |

**CHAPTER 4: LIMITATIONS**

* This study was only focused on small holder farming. So, the condition of large farms or middle large farms was not justified.
* The study period was too short so the number of normal pregnancy was not identified.
* All the data were collected by questionnaire based method. So, recall bias may be present.
* Some new characteristics of this study could not be justified because lack of study in this subject.

**CHAPTER 5: CONCLUSION**

Overall study described the present condition of small holder farming in Tangail district. We need to expand the size and management of these farms. The production performance of crossbreed cattle of this study as well as previous was significantly higher than the indigenous cattle as observed in previous study. Therefore, introduction of more crossbred cattle on smallholdings could be considered with a well-planned management of local genetic pool. Though the number of insemination required for per conception was higher in crossbreed in this study, crossbreed is best for maintaining both productional and reproductional status of a farm due to their production milk and higher weight calf than the indigenous. This study also provided an indication that pasture based grazing could be helpful in decreasing the number of insemination per conception.

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