

# CHAPTER I

## INTRODUCTION

### 1.1. Background of the Study

The Red Chittagong cattle (RCC) is known as potential type or variety for its own distinguished morphometric characteristics with physical fitness and superiority in respect of productive and reproductive performances. Now a days, RCC has been identified as one of the improved and promising variety of domestic animal genetic resource mostly localized in the southern regions of the country particularly in Chattogram, Rangamati, Cox's Bazar, Feni and Laksmipur, Naikhongchari of Bandarban districts of Bangladesh with higher concentration in the eastern plain land area of Chattogram district.

In Bangladesh, dairy cows are the main sources of milk. About 90% of the produced milk in the country comes from cows, 8% from goat, and the remaining 2% from buffalo (DLS 2018). Ours country is a densely populated developing one lies in the Northeastern part of South Asia where most of the rural people are dependent for their livelihood mainly on cropping and non-cropping agricultural sector like livestock, fisheries etc. Livestock sub-sector plays a crucial role in the traditional farming and contribute in national economy. According to Livestock Economic Review, DLS 2018, the per annum growth rate of 3.40% in GDP in 2017-2018 for livestock was the highest in all sub-sectors (Bangladesh Economic Review, 2018). The supply of the domestically produced livestock products (Meat, Milk, Eggs) are increased, for instance, milk by 94.06 lakh metric ton, meat by 72.60 lakh metric ton & egg by 1552 crore in amount (DLS, 2018) than last five years. The livestock sub-sector contributed 13% of total foreign exchange earnings and generated 20% of full time employment in Bangladesh (BBS, 2018). The current status of livestock population in Bangladesh is estimated to be 55.139 million and it is rising day by day where number of animals in million are Cattle 24.086, Buffalo 1.485, Goat 26.10 and Sheep 3,468 (BBS, 2018).

Our country has one of the highest cattle densities of 145 large ruminants/square Kilo meter (Sq.km) compared with 90 for India, 30 for Ethiopia and 20 for Brazil (Karim, 1997). Among these population 6 million are dairy cattle (DLS, 2018) of which 92% are indigenous and 8% are crossbred cows (BBS, 2018). The estimated numbers of dairy farm

in Bangladesh is 1.4 million with an average herd size of 1.3 cows (Hemme, 2008). The country has cattle population about 1.79% of the world and 5.47% of Asia (FAO, 2004) and dairy cattle ranks 12<sup>th</sup> in the world and 3<sup>rd</sup> in Asian countries (Alam et al., 1994).

Bangladesh has a population of 140 million people where more than 80 percent of them, or approximately 15 million households, are located in rural areas. An estimated two-thirds of those households own livestock. Although population growth is slowing, there are still almost 1000 people per sq km – the highest density of any country in the world (excluding small island-nations and city-states). The dwindling per capita land resource is one of the causes of persisting poverty in the country, according to contemporary human development reports from the United Nations Development Program (UNDP): More than half the population owns less than 0.5 acres; the bottom 40 percent possesses just 3 percent of the total land area; 48 percent live below the poverty line; and 30 percent consume less than 1900 calories per day (the minimum desired level is 2300 calories) (Haque- 2001).

Agriculture generates almost 65% of total employment, contributes a quarter of total foreign income and provides food security to the developing nation. Crop, fisheries and animal farming are dependent to each other in the country's history of agriculture, with livestock performing several functions, including the provision of food, nutrition, income, savings, draught power, manure, transport and other social and cultural functions.

In 2018, the livestock sector contributed 1.54% of gross domestic product (GDP), or 13.62% percent of agricultural GDP. However, economic benefits will multiply indirect benefits of draught power and manure for fuel and fertilizer are added to the direct economic output of meat, milk and hides, nevertheless, it generates 20% employment directly and 45% partially. Livestock also provide a value to financial reserve and cash flow for many marginal farmers who grow crops essentially for subsistence or who have little or no land at all(BBS, 2018).

RCC produces more or less 840 litres of milk per lactation on an average of 210 days lactation, few specialized areas where cross-breed yields range from 2000 to 3000 litres over a 210/300-day lactation. Per capita milk availability currently ranges from 158.19ml/day/head, but demand is 150.25 lakh where the gap between supply and demand is largely met by milk powder imports of about 20000 tonnes annually, valued at some

US\$70 million (BB, Annual Report, 2019). Imports represent 0.16 million tonnes of liquid milk equivalent annually, feeding some 6–7 percent of total consumption and accounting for an estimated 55 percent of the formal dairy market. Although there is no specific nutritional target in the country for milk consumption, the figure of 250 g per day (90 kg per year) often appears in national plans, implying an annual milk requirement of 12.8 million tonnes—more than five times current production (Altaf H.-2003).

The animal care criterion helps to a considerable amount to achieve ZERO HUNGER goal in SDG. Animal care (through the improved health of the cow) helps to increase productivity under the criterion of ‘product safety and quality’. At the same time, another aspect food security (the objective of SDG) can be achieved by increasing production volume and quality as well as contributing to farmer’s income needs of different age and social groups. Farmers income increases as a result of activities for market development criterion through, for example, a fixed milk price scheme and professional empowerment under Dairy Sustainability Framework (DSF) at SDG-2, 2016 (Rabobank).

The people of Bangladesh are rearing three categories of cattle like pure breed, crossbreed and local-breed within which best local cattle are available in some selected areas viz Pabna, Sirajgonj, Chittagong and Munshigonj areas. In Chittagong a beautiful Red cattle with some distinct characteristics are seen which are known as Red Chittagong Cattle and produce  $2.0 \pm 0.65$  kg milk in farm condition and  $1.80 \pm 0.87$  kg in rural condition per day (Khan et al., 2000). The crossbred animals provide higher amount of meat and milk and better performance but they are prone to suffer from various diseases, especially paracitic diseases are most common in crossbred and other indigenous cattle (Samad, 1988).

The following distinct characteristics of RCC in Bangladesh are identified and these are- Red Chittagong Cattle has red coat color, which is deep red to light brick red to yellowish red to whitish red. Other parts of the body such as horn, hoof, ears, eyeball, eyebrow, vulva, tail switch etc. are also red in color. They have some exotic blood. History of development of this variety is not clear and somebody speculated that variety has involved by interbreeding among them on the basis of natural selection (Ali, 1965). The Red Chittagong cattle are not internationally considered as a pure breed but as a variety (Mason, 1982). The most vital factor is that their immune system is highly resistant to

diseases than other varieties of cattle especially under rural production systems, require lower input support than others and produce milk and beef of high quality. Khan et al. (1999) reported that the red Chittagong cow attain sexual maturity earlier and calving regularly (usually one calf per year) than that of non-descriptive Deshi. Average lactation length is 242 days & milk yield is 960-1450 litre that means daily milk production is 4-6 litre. Birth weight is 15 kg which may reach at 47 kg during weaning at the age of 8 months but milk fat is lower in RCC than other cattle varieties. Adaptation and development of Red Chittagong cattle (RCC) in our local environment is favorable which enables them to produce and reproduce normally on the other hand imported breeds have serious problems. The indigenous cattle genetic resources of Bangladesh are now under threat condition because of urbanization and fast expansion of crossbreeding. For cattle development and rural livelihood enhancement in Bangladesh, conservation of RCC is emerging issue. Dairy farming is vital and potential agricultural sector in Bangladesh. Cattle, buffalo, and goat are mainly considered as dairy animals in Bangladesh. The crossbreds and purebreds are mostly Sindhi, Sahiwal, and Holstein Friesian breeds (Miazi et al. 2007).

Annual milk production was 3.97 million tons during 2005–2016 with an average annual growth rate of 13.5%. Smallholder producers dominate the dairy sector in Bangladesh. More than 70% of the dairy farmers are smallholders and produce around 70–80% of the country's total milk (Uddin et al. 2012). It is estimated that there are about 1.4 million dairy farms with an average herd size of 1–3 cows (Hemme et al. 2008). Low productive indigenous cow and lack of management best practices are common in the dairy sector (Uddin et al., 2011).

Hussain (2013) found dairy farms an average yield 200–250 litre per 305 day lactation, i.e., 0.66–0.82 liter per cow per day having 3.5 head of cattle. Downcast milk production generally indicates poor management practices and inadequate investment in genetics and veterinary services. But in recent year, local milk production increased from 2.27 million metric tons in 2005–2006 to 7.28 million metric tons in 2015–2016 (BBS 2017).

Dairy farms in Bangladesh are traditional especially in feed management, disease management, adoption of AI, etc. Dairy farmers are not aware of using modern disease management as well as the use of improved insemination for cows. Though dairying has been turned into a profitable business in recent years, farmers are not aware of the key factors affecting the dairy productivity and farm profitability. But the milk productivity

and profitability depends on different factors like feed management, cattle disease management, vaccination, de-worming of cattle, dairy farm size, breed of a cow, and others factors.

The country has an old tradition of dairying, dominated by trader/middlemen and traditional indigenous milk products, which are still very important. Nearly all local milk is produced by local farmers and the sector is governed by the informal milk market (93 percent) while the formal market (7 percent) has a small but important and growing market share. In the long-term support from the Government and development partners/projects kick-started the involvement of rural entrepreneur into formal dairy value chains; but schemes to promote larger, more intensive dairy farms have been largely unsuccessful due to poor services and market access. Government support is now very limited and has shifted to creating an enabling environment, with development efforts left to NGOs and the private sector.

Dairying in Bangladesh is growing faster but it also faces lots of problems of high input and low output prices. The condition leads to lower profitability in dairy farming. Diseases, along with scarcity of feed resources and nutrition are the most crucial constraints to milk production. However, with the smallholders production systems, the situation is more serious because of inadequate economic indicators such as cost and profitability, research on this aspect is very limited and controversial (Khan, 2007).

In Bangladesh, the Government, cooperatives, the private sectors and a few non-governmental organizations (NGOs) provide veterinary services and artificial insemination facilities to the dairy farmers. However the quality of the veterinary services provided by public sector institution is imperfect and those institutions providing these services are highly insufficient. Therefore, there is a need to restructure and reorient the livestock health and breeding services and extension services providing institutions.

The increase in demand for dairy products will put increasing pressure on dairy production systems. Sustainable dairy farming is not possible with traditional breeds and feeding practices owing to their less productive performance. For these purpose the concept of intensive dairy farming with high yielding crossbreds, intensification of production, animal health issues and a greater reliance of feeds and concentrates are required. The dairy farming in this country is dependent on crop residues, natural

resources and open grazing system as a source of feeds. However, the traditional source of feeds and fodders to support the dairy production is unlikely as available grazing areas and other common property resources that have already degraded. Therefore if milk production is to increase, then stall feeding system has to be followed.

The profitability of a dairy farm depends to a greater extent on productive and reproductive performance of the animals. For these reasons, the present study was therefore undertaken to investigate the productive and reproductive performances of crossbreds and Red Chittagong cattle(RCC) dairy farms in rural and peri-urban areas in Karnafuli, Patiya, Chandanaish & Satkania upazilla of Chattogram district and recommend farmers that are suitable in existing ecological and socio-economic condition.

Under both government and non-government support, the number of private owned market oriented dairy farms has grown from 2,490 in 1990-91 to 60,600 in 2005-06, resulting an increment in liquid milk production from 1.39 to 2.27 million metric ton (DLS, 2008). Despite this elevation, the current rate of production is still far behind to bridge the gap and able to meet up only 20% of the national annual demand. Moreover, milk consumption per capita has been increased to 45 ml in 2005-2006 compared to 36ml in 2000-01 with an annual elevation of 2% (DLS, 2008). Consumption of milk with the projected demand in some Asian countries including Bangladesh is growing by 3.5% per annum and the demand for milk will increase by 4.2% in response to the anticipated population growth rate of 1.6% by 2020 (CPD, 2008). However, if dairy production is to keep pace with the projected demand, increasing farm size and boosting average production per farm is imperative.

Profitable milk production however, heavily relies upon optimum reproductive performance along with a careful, efficient and cost-effective management of dairy herds (Griswold *et al.*, 2006). Poor reproductive efficiencies and a wide range of variation in Profitability of market oriented dairying in Bangladesh Rahman et al. management practices has been reported to be the common 56 feature of dairying in Bangladesh. Prolonged intervals between calving to conception (Alam and Ghosh 1988), ventilation and waste management (Miah *et al.* 2004), heat detection and frozen semen handling

(Shamsuddinet *al* 1995), quality and variability of feed ingredients (concentrates), seasonality and inadequacy of green forage supplementation (Mondalet *al* 2005) has been indicated to be some of the key factors and challenges for the dairy farmers to ensure profitable dairy production in Bangladesh.

Like other major dairy zone of the country, south eastern port city, Chattogram also experiences common profitability challenges and demand in liquid milk production against its rapidly growing urbanization. Consumer survey in Chattogram indicated a daily average deficit of 10000 litre liquid milk beyond the backup supply of 80,000 litres from commercial packet milk manufacturing companies of the country. It has been realized that the local commercial dairying currently been able to contribute only 10-15% of the total cumulative local need of liquid milk compared to their expected potential to serve. Specific research and initiatives are sought therefore, to develop appropriate strategy for targeted increase of average milk production per farm. An evaluation on the existing status of commercial dairying practices and identification of the areas of management that requires intervention are a prerequisite to ensure effective planning for profitable dairy farms in this region.

At rural cattle farming system, most of the farms were operated in a primitive way with their own resources. Moreover, shortage of high yielding dairy animals, scarcity of feeds, fodder and pasture land, lack of organized milk marketing system, lack of preservation and quality control of dairy inputs like as vaccines and outputs etc. exaggerate farmer's problem and no insurance coverage is also a big constraint in animal production services.

Taking all these above issues into account the present study was undertaken for analysis and partial fulfillment of M.S degree entitled as “**Comparative Socioeconomic Study on Crossbred and Red Chittagong Cattle Dairy Farmers in Some Selected Areas of Chattogram District**”.

## **1.2. Aims and Objectives:**

The aims of the study was compared the overall performances of commercial crossbred and RCC dairy cows and identified the constraints to make future policy recommendations for improvement of the dairy enterprises in the study areas.

**The specific objectives of the present study are as follows:**

- (i) To describe and compare the socioeconomic characteristics of crossbred and RCC dairy farmers;
- (ii) To analyze the existing production, housing and management systems of crossbred and RCC dairy farmers;
- (iii) To evaluate the productive and reproductive performances of crossbred and RCC dairy farmers;
- (iv) To assess and estimate the comparative farm profitability of crossbred and RCC dairy farmers;
- (v) To identify existing dairy farming problems and to address possible remedial measures for improving dairy farming in the study areas.



## CHAPTER II

### REVIEW OF LITERATURE

This chapter represents the findings of few important and relevant reviewed articles and made valuable remarks by the author herself. The respective discussion conducted to compare the socio-economic status of cross-bred as well as RCC dairy enterprises. The researcher mostly focused on socio-economic profiles of farm enterprises, productivity and re-productivity parameters, production & management system, per lactation cost and returns and finally farming constraints and their remedial measures for improvement of dairy industry. Presently the dairying is a main earning way as well as secondary income in the rural farm family. Cross-bred commercial dairy farming is relatively increasing in Bangladesh, on the other hand RCC cattle are also commonly raised at family level. Some people took into initiative to rear RCC at farm level with help of some renowned NGOs as semi commercial enterprises in the study areas. For this reasons, these two categories of farming system need to compare to each other both in production and economic consideration. However, some of the relevant previous studies to the present study are stated below:

#### **2.1. Productive and Re-productive Performances:**

Hosain and Routledge (1982) in their study found that the total milk production of Pabna milking cows and native cows stood at  $803 \pm 209$  and  $213 \pm 88$  liters respectively and their respective length of lactation periods were  $286 \pm 67$  and  $240 \pm 63$  days. They also observed that the length of dry period and calving interval were  $222 \pm 134$  and  $485 \pm 87$  days for Pabna milking cows and  $275 \pm 36$  and  $536 \pm 110$  days for native cows respectively.

#### **2.2. Comparative Economic performances of crossbred with indigenous cattle:**

Rahman and Rahman (1991) conducted a study on economic analysis of dairy enterprise in four selected villages of Mymensingh district in Bangladesh. They observed that small farmers were generally the owners of high yielding cows or buffaloes in all the study areas. The findings showed that farmers in Bhabakhali, Mymensingh town and Birampur areas gained substantially by keeping milch animals. Feed cost was higher in the urban and milk pocket areas than in the rural and semi-urban areas. In buffalo area (Ahmed Bari) feed cost was highest. The gross returns per animal were positive for all types of cows. Net returns

were also positive and higher for the high yielding cows and buffaloes. The study identified some crucial problems such as high feed cost; low yield for indigenous breed, lack of livestock credit and insurance for dairy development.

### **2.3. Cost and Returns of Cross-bred Dairying**

Alam et al. (1992) conducted a broad based socio-economic survey in Bangladesh and found that the proportion of cross bred cattle was 11.69 per cent. The results of the study showed that the distribution of cattle holding were less unequal than land holdings. Thus the study claimed that investment in livestock development would help to improve the distribution of income in rural areas. The returns were higher by 91 per cent for cross -bred cows. Return over cash cost per lactation for cross - bred cows were 158 per cent higher than for local ones. However, the net returns were negative for both local and cross - bred cows. Some problems related to dairy raising were i) scarcity of feeds and fodder ii) lack of credit and insurance programme; iii) low price of milk etc. The study also strongly recommended for dairy rearing. The recommendations were: i) expansion of credit and insurance program ii) expansion of veterinary services and medicine iii) Supply of feeds iv) increased price of milk and v) improving restrictions on milk imports.

Alam et al. (1995) conducted a study entitled " economics of mini dairy farms in selected areas of Bangladesh" to evaluate the economics of dairy farming using data collected data from a total of 20 randomly selected farms, 10 each from Savar and Manikgonj thana in Dhaka district. The selected farms were classified by herd size into three categories, viz, small farm (1-5 cattle), medium farm (6-10 cattle) and large farm (11-20 cattle). The results of the study showed that cross-bred cows per farm were more in number (2.55) than of local cows (0.65). The number of crossbred cows increased as the farm size increased. The production of milk per cross-bred cows was higher (5.66 litres) than local ones (2.23 -litres). Highest (5.74 litres) milk yield per cross-bred cows was recorded for the large farms. The average lactation period for cross-bred cows were 304 days while the corresponding figure for local bred cows were 210 days. The used of fodder was low because the farmers were less interested in growing fodder crop production. Concentrates took the highest share (35 per cent) followed by labour charges (24 per cent) in production cost of farms. Production cost and returns for mini dairy farms were higher in large farms compared to medium, which indicate that mini dairy farming is economically profitable.

#### **2.4. Analysis of relative profitability:**

Ashrafuzzaman (1995) conducted a study to investigate the socio-economic characteristics of indigenous and cross-bred dairy cow owners to analyze the relative profitability of those dairy cows. The study covered two villages under Shazadpur thana of Sirajganj district. It was revealed from the study that 38 and 62 per cent of cows were indigenous and crossbred dairy type respectively in the study area. The per day total cost of raising a cross-bred cow (Tk. 35.05) was a little higher over an indigenous cow 6,65litres for a cross-bred cow which was about double the average milk yield per day of 3.62 litres 15.64 and Tk. 45.83 for and indigenous and crossbred dairy cow respectively indicating about three times higher net return from a cross-bred dairy over indigenous cows. The availability of paddy straw, green grass, concentrate, labour and capital were positively related with milk yield with minor exceptions. Although it was observed both type of dairy farmers did not efficiently use that resources. The cross-bred dairy cow owners proved to be more rational in allocating resources. Finally the study identified some problems and constraints such as lack of proper treatment and medicine, scarcity of feed and fodder, lack of proper treatment and hazards, lack of credit and low price of milk. The study observed that the small and marginal farmers by keeping 3-4 cross-bred dairy cows instead of indigenous dairy cows could earn a modest living by adopting family dairy farming or mini dairy farming as a profession. Kabir (1995) conducted a study to analyze the economic performance of subsidized dairy farms in Tangail district. The dairy farmers were found to have moderately increased the herd size after receiving subsidy. The net returns per farm were Tk. 14,463, Tk. 21,773 and Tk. 58,173 annually for local and cross and crossbred farms respectively. The investment per taka return was of Tk. 1.19, Tk.1.27 and Tk. 1.37 respectively for local, and cross and cross-bred farms. Overall performance of cross-bred dairy cows was comparatively better than that of local bred cows. Milk production as well as milk consumption in all categories of farms increased significantly after introduction of the government subsidy programme. Fodder areas in local and local and crossbred farms were reported to be increased substantially after the intervention. Labour employment, particularly female labour from family and child labour from hired sources significantly increased as a result of the introduction of the subsidy scheme. The sample dairy farmers of the study area also identified non-availability of grazing land, scarcity of feed, high prices of concentrate feed, inadequate veterinary services, high prices of medicines, non-availability of crossbred animals as the major constraints to dairy development. For sound dairy development, they suggested for lease of government

khas land for fodder production, establishment of feed mills, provision of adequate veterinary services, and supply of medicines at reasonable prices and government sale of crossbred animals.

### **2.5. Productive and reproductive performance of RCC:**

M. P. Mostari et al. (2007) examined the productive and reproductive performances of Red Chittagong Cattle (RCC) under farming system of Bangladesh Livestock Research Institute (BLRI) on 46 RCC sampled dairy cattle in different categories of the study. Examined productive and reproductive parameters were birth weight, weight at 3, 6 months of age and adult body weight, growth rate, daily milk yield, lactation length, lactation yield, age at puberty, weight at puberty, age at first calving, postpartum estrus period, service per conception, calving interval and gestation length of respective sample RCC cows. Study found the birth weight differed significantly ( $p < 0.01$ ) between male and female and the average birth weight of RCC calves at farm level was 14.87 kg where the growth rates and adult body weight also differed significantly ( $p < 0.05$  and  $p < 0.01$ ) between male and female except in growth rate from 3 to 6 months of age. The average daily milk yield, milk yield per lactation and lactation length of RCC cows were 2.24 kg, 526.81 kg and 238 days, respectively. The age at puberty, service per conception, post partum estrus period and calving interval of RCC heifers and cows were 15 months, 1.15, 40 days and 11 months were found, respectively. Thus results indicated that the RCC farming system both in genetically and economically superior variety in rural dairy farming enterprises in Bangladesh.

Azizunnesa *et al.* (2009) also conducted a similar study on Productive and Reproductive Performances of RCC farming system at rural areas in Chittagong. The findings of that study were examined and found age at puberty  $2.68 \pm 1.72$  years, days required to first heat during postpartum period  $3.08 \pm 1.00$  months, calving interval  $14.00 \pm 1.19$  months, service per conception  $1.36 \pm 0.60$  nos. and gestation period  $279.92 \pm 5.27$  days. In this study also examined few production performances like as per day milk production and lactation duration and found the respective parameters were  $2.10 \pm 0.63$  liter and  $238.8 \pm 30.6$  days. Maximum milk production per day per cow was found 4 liter where minimum it was 1 liter. Milk yield was found  $1.88 \pm 0.51$  liter supplied with only roughage on the other hand it was found  $2.42 \pm 0.57$  liter milk supplied small amount of concentrate along with

roughage. The level of production difference between two groups were found highly significant ( $p < 0.0001$ ).

## **2.6. Comparative Economic profitability of Rural Dairying practices:**

M. M. Islam *et al* (2010) also studied on comparative economic profitability between indigenous and crossbred cows reared at rural areas of Dinajpur district. A total of 70 dairy cows (20 cross-bred and 50 indigenous) from rural level of small and marginal dairy farmers (1-3 cows) were selected. Costs of feed, treatment and medication of cross-bred dairying were significantly higher ( $P < 0.01$ ) than the indigenous one. Per day milk yield was found  $1.86 \pm 0.57$  liter in indigenous cow whereas it was  **$5.94 \pm 3.49$**  liter for cross-bred dairy enterprises and income level from milk yields of crossbred cows were found 3.19 times higher than that of indigenous cows. The BCR regarding cross-bred and indigenous dairy cows were found **1.19** and **1.26**, respectively. It was also reported that, the current rearing cost of cross-bred cows was 2.71 times higher than that of indigenous cows. Considering the other traits not BCR it may be concluded that the raising of crossbred cows was more economic than the raising of indigenous cows.

S. M. J. Hossain *et al.* (2017) also conducted a socio-economic analysis on Red Chittagong Cattle (RCC) farmers in selected upazilas of Chattogram district. It focused on the present condition of RCC population, management system, prevalence of diseases and income gaining from RCC and other sources of the dairy rearers. Results showed that the RCC farmers had an average landholding of  $0.89 \pm 0.09$  acres which varied from  $0.22 \pm 0.01$  acres for almost landless to  $13.63 \pm 4.63$  acres for large farms. The average size of family members was found  $4.98 \pm 0.11$  per farm and 67.34% of them were in the active age group of 18-57 years. Main occupation of the community farmers were agriculture (51.96%) followed by service (21.75%) and then business (19.94%). On average the highest (33.55%) of family literacy level prevailed in primary education. The average RCC herd size per farm was  $1.70 \pm 0.04$  nos. and varied from  $1.50 \pm 0.50$  in large to  $1.78 \pm 0.06$  in landless farms and no relationship ( $r^2 = 0$ ) was found with landholdings. Women's involvement on RCC farming was (36.00%) and it was found the highest (42.52%) in landless farms and 7.09% of the farmers were found cultivating fodder where 77.78% cultivated napier and 22.22% german grass. The most prevalent diseases reported in the study areas by the farmers were Foot and Mouth Disease (FMD) and it was reported

26.20% where worm 21.13%. Average mortality rate of RCC was found 2.12% and found highest in case of calf (55.56%), followed by growing animals (22.22%) and adult (22.22%) where the death of animals was highest (55.56%) in rainy season. In case of vaccination about 29.44% of farmers reported to vaccinate their cattle against some viral and bacterial diseases and it was highest against FMD (53.43%) followed by BQ (28.92%) and Anthrax (17.65%). Annual average gross income per farm was found Tk.128016 and it varied from Tk.80618 to Tk. 847500 across different farm categories. Average annual income per RCC source was calculated to be Tk. 16412 and it varied from Tk.2500 for large to Tk. 28598 for small farms.

The RCC are recognized for their productive and reproductive performance with very less management practices. To know the actual situation, the researcher has taken an attempt to make comparison between cross-bred and RCC enterprises. Moreover this study tried to evaluate the economic profitability, feasibility, farm profitability, and existing marketing chains of milk in the selected areas of Chattogram District. To expose all the information regarding current status and future improvement of dairy farming under study areas the researcher has been conducted such type of research entitled as “**Comparative Socioeconomic Study on Crossbred and Red Chittagong Cattle Dairy Farmers in Some Selected Areas of Chattogram District**” for partial fulfillment of M.S thesis under the department of Agricultural Economics and Social Sciences, CVASU.

# CHAPTER III

## MATERIALS AND METHODS

This chapter discusses mostly on different steps that are used to conduct the research. Here the researcher investigates the comparative socioeconomic characteristics, animals feeding, housing, management practices, medication, vaccination, milk marketing channels etc. Along with this, assessment on economic profitability and problem confrontation of crossbred commercial dairy enterprises and Red Chittagong Cattle (RCC) were also done.

### 3.1. Selection of study areas

As my study title and objectives centered with Red Chittagong cattle (RCC), I chose two-stage stratified sampling procedures for selection of sample farmers to conduct field base experiment where most of the farmers raise this specific breed or interested to rear. In the first stage 4 upazilas named **Karnafuli, Patiya, Chandanaish, Satkania** were selected randomly from milk pocket areas in Chattogram district. These upazilas are well-known for milk production and distribution of Red Chittagong Cattle so that we could collect relevant information without any inconvenience.



Fig-1: Study Area Location map

### **3.2. Selection of sample farms:**

The sample dairy farms were selected from two categories small scale commercial dairy farms and some household RCC rearers randomly. The selected commercial dairy farms were categorized as small size (milch cow less than 5), medium size (milch cow varies 5 to 10) and RCC farmers (milch cow 3-5) under four upazilas from Chattogram. Total of 10 small sizes, 20 medium sizes and 10 RCC dairy farms were selected by stratified random sampling method from each upazila for study. In total 160 farms, where cross-bred forty (40) small sizes farms, eighty (80) medium sizes farms and forty (40) RCC farms came under study from the selected four study areas.

### **3.3. Study type and data collection:**

The research based on survey where specific objectives were set first to conduct the study. Accordingly a questionnaire was structured to gather information from different levels of farmers. Survey is mainly conducted by the researcher directly visit to farms & asking different questions about socio-economics, farm resources, management practices, production and farm profitability etc. The questionnaire contains a combination of closed, semi-open, open-ended and multiple choice questions about farm management and their respective profit-loss so on.

### **3.4. Method of data collection, time and reliability of data:**

The necessary data related to the set objectives of the study were collected by the researcher herself with the help of respective DLS officials and employees by directly visiting the selected farms during January to June 2019. Then a focus group discussion was arranged to know more details and cross examine the collected information. The collected data were cross verified for their consistency and the data were edited and coded by the researcher herself in CVASU laboratory.

### **3.5. Data Collection, Analytical Technique and Estimation of Economic Profitability:**

The collected data processed and analyzed in accordance with the objectives of the study. All data processing included field and office editing, coding and tabulation. The data entry template was designed in Microsoft Excel. Consistency cross checks and keystroke errors were also detected and corrected accordingly before further processing. The farm business analytical techniques were used for determination of per cow per year net profitability in



this study. Data were also analyzed using descriptive statistics like mean, percentage, ratios, and ranking.

**3.6. Measures used to record farm data:** The collected data were analyzed by using qualitative and quantitative measures mentioned as under:

**3.6.1. Qualitative measures:**

Qualitative measures were based on interviewed responses, subjective assessment on visual inspection or its combination wherever applicable. Farmers socioeconomic statuses were assessed based on their educational qualification, adoption of dairying primary or secondary business, investment status, average monthly income, family size and number of dependent(s), possession of fixed farm asset(s) and animal resources. Qualitative assessment on housing management were majorly based on housing type, floor type, drainage system, ventilation status, frequency of cleaning and dung management.

Similarly feeding management practices were mostly assessed based on type of feed offered, frequency and time of food offer, source and seasonal availability of feed stuff, source of water supply, drinking frequency. Health and preventive care practices were assessed on type of vet services, coverage of vet and advisory services, de-worming, vaccination, availability of vet care, consultancy etc.

**3.6.2. Quantitative Measures:**

Total farm area and shed size (length X width) were measured using local land measuring units (shotok) and later converted into standard unit (sqm). The size of each shed was divided by the number of animals kept therein to calculate relative floor space and stocking density. Number of windows and entry into shed, access to sunlight and air were used to relatively assess ventilation status of housing. The daily supply amount of roughage per animal was measured indirectly from the number of thumb full volume of daily supply or by measuring the filled in volume of the manger. Total weight of own formulated concentrate mixture of a farm was divided by the total number of animals offered that amount to indirectly calculate the average amount of concentrate supply per animal per day. Readymade concentrate supply were measured by volume of supply pot multiplied by feed offering time for each animal.

### **3.7. Farm profitability:**

Farm profitability is the key indicator of sustainability of each enterprise. For estimating net farm profitability by assessing costs and returns of respective dairy enterprises the following measures were undertaken:

#### **3.7.1. Annual farm income:**

Yearly farm income was obtained by summarization of the returns/receipts from annual sale of animal products such as milk sales (raw, partially processed & processed), annual sale of live animals including young's (animal sales e.g. bull calf, culling cows), saleable annual farm by products (dung, bio-fuel, bio-gas), miscellaneous income from seasonal crop and vegetables grown on farm land (farm byproducts & miscellaneous sales) and increase in value of stock at the end of year (change in values of stock).

#### **3.7.2. Annual farm cost/expenses:**

The total annual cost of farm operation was based on both annual variable costs and fixed or overhead costs. The components used to calculate annual variable cost includes animal replacement cost, feed cost, cost of hired/contract/daily labor and imputed family labor, therapeutic and preventive care cost, annual breeding cost and annual transport cost. Annual overhead or fixed cost calculation comprised of wages and allowances of permanent farm employees, annual maintenance and running cost of farm utilities, vehicles and structures, annual farm operation cost (utility-power, water, gas) and miscellaneous annual business expenses like telephone, travelling, farm consultancy fees, farm improvement initiatives and additional or unexpected costs in farm operation.

#### **3.7.3. Annual farm operating profit:**

Annual farm operating profit was calculated as per method described by Makeham and Malcom (1995) using the formula as follows: a) Total annual income (BDT/USD) receipts – total annual variable costs = Gross Margin, b) Gross margin – total annual overhead/fixed cost = Farm annual operating profit, c) Net farm profitability,  $\pi = \text{Total Return (TR)} - \text{Total Cost (TC)}$  where total cost is estimated as Total Fixed Cost (TFC) plus Total Variable Cost (TVC).

#### **3.7.4. Annual operating profit/cow:**

Annual average operating profit/cow was calculated by dividing the annual farm operating profit (in BDT/in USD) by average number of cows at each categories of farm (number of cows at farm 12 months preceding the time of survey plus number of cows remained in farm at the end of survey obtaining average per cow profit).

# CHAPTER IV

## RESULTS AND DISCUSSIONS

This Chapter presents the results discussion and findings of the study regarding socio economic status, production, management, marketing and net profitability of small & medium level cross-bred dairy enterprises and Red Chittagong Cattle farms in the study areas. The comparative respective result discusses and presents both tabular and graphical analysis as under:

### 4.1. General Characteristics of Dairy Farm Owners:

This section covers all the information related to current status of dairy farming practices under different categories of dairy farms.

#### 4.1.1. Crossbred and Red Chittagong cattle Dairy Enterprises-General Profiles:

The socio demographic characteristics of crossbred and RCC dairy enterprises are summarized in Table-1. Highest number of crossbred farmers about 52.50% of small scale & 68.75% of medium farm owners lies under 30-45 years age group where it is 55% in RCC dairy enterprises. Majority of dairy farm owners comparatively found literate having higher secondary about 52.50% in case of small scale and 75.74% in case of medium cross-bred dairy farm owners whereas it stood higher about 60% in case of RCC dairy enterprise.

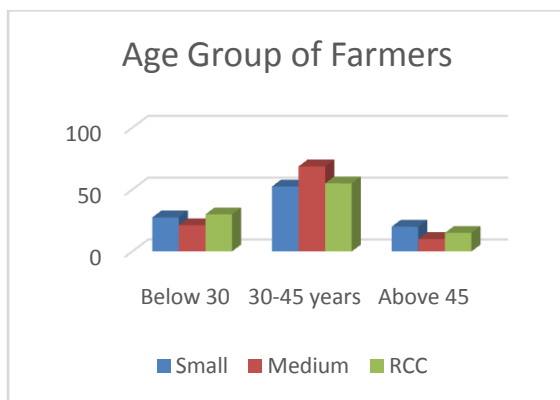


Fig-2: Age distribution of farm owners

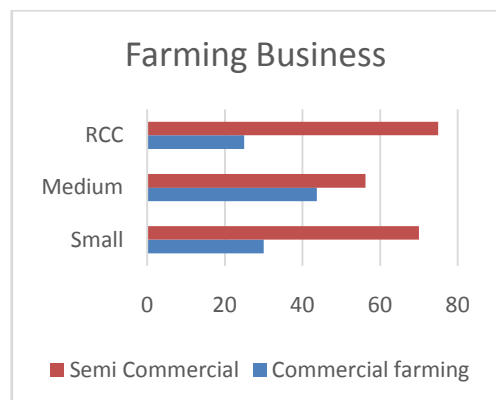


Fig-3: Professional distribution of Farm owners

In case of occupational status, it was found higher for Dairying and cropping about 32.50%, 33.75% and 37.50% for small scale, medium and RCC dairy farmers respectively.

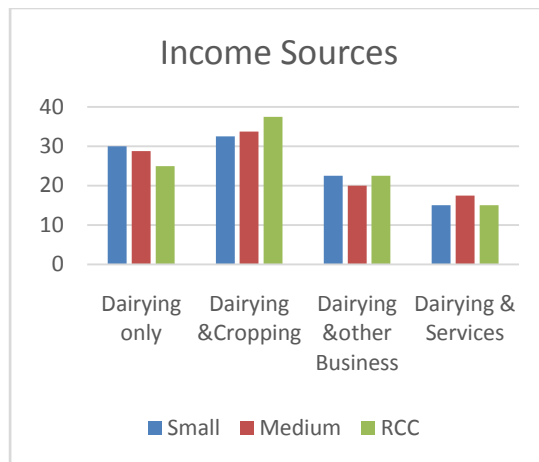
**Table-1:** Comparison of General Characteristics of crossbred Dairy with RCC dairy Farmers.

Particulars of Variables	Farm Categories			
	Small Sizes Farm (<5 Cows) N = 40	Medium Sizes Farm (5 to 10 Cows) N=80	RCC Farm (<5 Cows) N=40	ALL Farm (N=160)
<b>Farm Owner's Age:</b>				
Below 30 Years	11 (27.50)	17(21.25)	12 (30.00)	40 (25.00)
30- 45 Years	21 (52.50)	55(68.75)	22(55.00)	98 (61.25)
Above 45 Years.	8 (20.00)	8(10.00)	6 (15.00)	22 (13.75)
<b>Educational status:</b>				
Primary to Secondary	16 (40.00)	20 (25.00)	11(27.50)	47 (29.37)
Higher Secondary	21(52.50)	46(75.75)	24 (60.00)	91 (56.88)
Graduate and above	3 (7.50)	14(17.50)	5(12.65)	22 (13.75)
<b>Income Sources</b>				
Dairying only	12 (30.00)	23 (28.75)	10 (25.00)	45(28.12)
Dairying &Cropping	13 (32.50)	27 (33.75)	15 (37.50)	55 (34.38)
Dairying &otherBusiness	9 (22.50)	16( 20.00)	9(22.50)	34 (21.25)
Dairying & Services	6(15.00)	14 (17.50)	6(15.00)	26(16.25)
<b>Income level</b>				
Below Tk. 500,000	16 (40.00)	14 (17.50)	22 (55.00)	52 (32.50)
Tk. 500,001-Tk.10,00,000	20(50.00)	39(48.75)	13 (32.50)	72 (45.00)
Above Tk.10,00,000	4 (10.00)	27 (33.75)	5 (12.50)	36 (22.50)
<b>Farming: a profession</b>				
Commercial farming	12 (30.00)	35 (43.75)	10 (25.00)	57(35.63)
Semi Commercial	28 (70.00)	45 (56.25)	30 (75.00)	103 (64.37)
<b>Duration of Farming:</b>				
Below 5 Years	17 (42.50)	23(28.75)	15 (37.50)	55 (34.37)
5 - 10 Years	18 (45.00)	35(43.75)	19 (47.50)	72 (45.00)
Above 10 Years	5 (12.50)	22(27.50)	6 (15.00)	33 (20.63)
<b>Ownership of Farm</b>				
Owned	25 (62.50)	65(81.25)	35 (87.50)	125(78.13)
Rented in	6 (15.00)	13 (16.25)	5 (12.50)	24 (15.00)
Shared in	9 (22.50)	2(2.5)	0 (00)	11 (6.87)
<b>Nature of Financing</b>				
Fully Own Financed	11 (27.50)	35 (43.75)	22 (55.00)	68 (42.50)
Both own and Bank Financed	12 (30.00)	25(31.25)	11 (27.50)	48 (30.00)
Fully Bank Financed	11 (27.50)	2 (2.50)	4 (10.00)	17 (10.62)
Borrowed from Relatives etc.	6 (15.00)	18 (22.50)	3 (7.50)	27 (16.88)

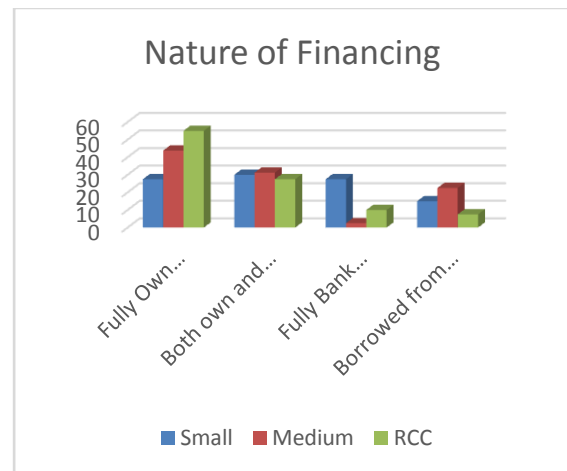
**Source:** Field survey, 2019

In case of the status of the yearly income level, it was found that about 55 % of the RCC dairy farm owner's average income lies below in taka five lakhs whereas most of the cross-bred dairy farm owner's average yearly income lies between Tk. 5 to 10 lakh and

estimated about at 50% and 48.75 % for small scale and medium dairy farmers respectively. About 75% RCC farm owners said that dairy farming is their occasional business however 70% small and 56.25% medium farm owners took the dairying as an additional source of income.



**Fig-4: Income Source distribution of Farm owners**



**Fig-5: Nature of Financing of the Farm owners**

About 47.50% RCC farmers have experience of 5-10 years and 45% small and 43.75% medium have same experience. Fully own farms are highest in no. for all types of dairy industries such as RCC 87.50%, small 62.50% and medium 81.25%. Farm owners operated their farms by fully own finance about 55% cases in RCC respondents whereas 43.75% in medium and 27.50% for small scale dairy farm (**Table-1**).

#### **4.1.2. Supervision and management practices in studied Dairy Farms:**

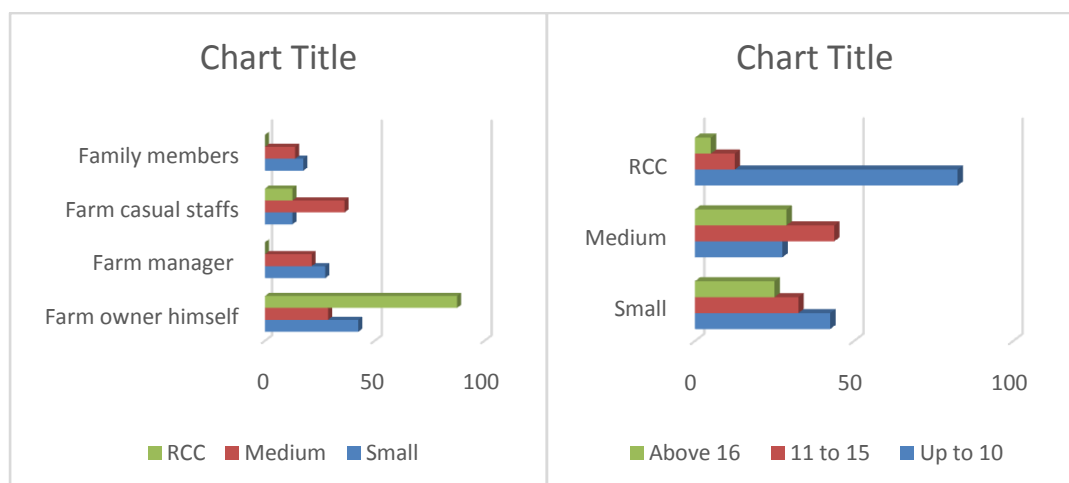
Farm supervision level and resource management features are presented in **Table 2**. Farm owners reported to be involved in overall farm supervision in majority of farms (46.87%), while only 17.50% farms have salaried experienced managers. About 24.38% farmer depends on farm staffs while 11.25% get help from their family members. On the other hand 60% of owner actively involved with regular decision making while 26.87% of owners seek advice from their employed farm manager time to time as decision maker and 13.13 % cases only manager involved in all the operation oriented decision making activities. About 87.50% RCC owners said that they operate all the duties in their farms, at the same time 42.50% small farmers also did so but 36.25% medium farmers need casual staffs to help them.

**Table-2: Supervision and Management practices in crossbred & RCC Dairy Farms.**

Particulars of Variables	Farm Categories			
	Small Sizes Farm (<5 Cows) N = 40	Medium Sizes Farm (5 to 10 Cows) N=80	RCC Farm (<5 Cows) N=40	ALL Farm (N=160)
<b>Supervision and farm management practice</b>				
Farm owner himself	17( 42.50)	23(28.75)	35(87.50)	75 (46.87)
Farm manager	11(27.50)	17(21.25)	0(0.00)	28 (17.50)
Farm casual staffs	5(12.50)	29 (36.25)	5(12.50)	39(24.38)
Family members	7 (17.50)	11(13.75)	0(0.00)	18 (11.25)
<b>Decision making in farm operation</b>				
Farm owner himself	17(42.50)	44(55.00)	35(87.50)	96 (60.00)
Farm owner + manager	15 (37.50)	25 (31.25)	3(7.50)	43 (26.87)
Only manager	8 (20.00)	11 (13.75)	2(5.00)	21 (13.13)
<b>Total herd size in farm</b>				
Up to 10	17 (42.50)	22 (27.50)	33 (82.50)	72 (45.00)
11 to 15	13 (32.50)	35 (43.75)	5 (12.50)	53 (33.13)
Above 16	10 (25.00)	23(28.75)	2 (5.00)	35 (21.87)
<b>Farm premises (Sqm)</b>				
Up to 1000 Sqm	12 (30.00)	24 (30.00)	36 (90.00)	72 (45.00)
1000 to 2500 Sqm	17 (42.50)	35 (43.75)	3 (7.50)	55 (34.38)
Above 2500 Sqm	11 (27.50)	21(26.25)	1 (2.50)	26 (20.62)

**Source: Field survey, 2019**

Farm operation is directly decided by owner himself in about 87.50% RCC respondents whereas 55.00% medium and 42.50% small farmers participate in decision making.



**Fig-6: Supervision & Management Practices**

**Fig-7: Herd Sizes of the Farms**

About 82.50% RCC farmer and 42.50% small farmers have less than ten cows but 43.75% medium farmers have 11 to 15 cows.90.00% RCC farmers said that total farm premises is

less than 1000 sqm but it is higher in case of small and medium farms. About 42.50% small and 43.75% medium farms have 1000 to 2500 sqm farm premises (Table-2).

#### 4.1.3. Housing Practices of crossbred and RCC Dairy Farms

About 85.00% RCC farmers rear their animals in open houses but 60% small farmers prefer semi pacca tin shed house, however 47.50% need building structure for better performance.

**Table-3: Housing Practices of crossbred and RCC Dairy Farms.**

Particulars of Variables	Farm Categories			
	Small Sizes Farm (< 5 Cows) N = 40	Medium Sizes Farm (5 to 10 Cows) N=80	RCC Farm (< 5 Cows) N=40	ALL Farm (N=160)
<b>Type of Farm House:</b>				
Open House	13 (32.50)	11(13.75)	34(85.00)	58(36.25)
Semi Pacca Tin shed	24(60.00)	31(38.75)	4(10.00)	59(36.88)
Building	3(7.50)	38 (47.50)	2(5.00)	43(26.87)
<b>Distance of Cow shed:</b>				
Attached to owner House	12(30.00)	31 (38.75)	20(50.00)	63(39.38)
Near to owner House	24(60.00)	45(56.25)	16(40.00)	85(53.12)
Far from owner House	4(10.00)	4(5.00)	4(10.00)	12(7.50)
<b>Space/Cow</b>				
Congested and open floor	14(35.00)	34(42.50)	22(55.00)	70(43.75)
Sufficient & rough floor	26(65.00)	46(57.50)	18(45.00)	90(56.25)
<b>Ventilation Status:</b>				
Good (window both side)	21(52.50)	64(80.00)	31(77.50)	116(72.50)
Moderate (window only one side)	14(35.00)	15(18.75)	9(22.50)	38(23.75)
Poor ( No window)	5(12.50)	1(1.25)	0(0.00)	6(3.75)
<b>Flow of Air in shed:</b>				
Natural and Electric	11(27.50)	44(55.00)	7(17.50)	62(38.75)
Natural only	29(72.50)	36(45.00)	33(82.50)	98(61.25)
<b>Disposal of Animal wastage:</b>				
Dip in a Pit	7(17.50)	1(1.25)	4(10.00)	12(7.50)
Drain out	24(60.00)	10(12.50)	11(27.50)	45(28.13)
Sold	5(12.50)	30(37.50)	16(40.00)	51(31.87)
Fuel /Fertilizer / Biogas etc.	4 (10.00)	39 (48.75)	9(22.50)	52(32.50)

**Source: Primary data, 2019**

About 50% RCC farmers have farms adjacent to their dwelling house, 60% small and 56.25% medium farmers built their farms near to their house. About 65% small and 57.50% medium farmers provide sufficient space with rough floor whereas 45% RCC farmers can provide these. Ventilation status is up to the mark for all kinds of farms such as RCC 77.50%, small 52.50%, medium 80%.

About 82.50% RCC and 72.50% small farmers have natural air flow but 55% medium farmers need electric fans along with natural air. 40% RCC farmers sold animal wastage, 60% small farmers drained out this and 48.75% medium farmers use their wastage to produce biogas (Table-3).

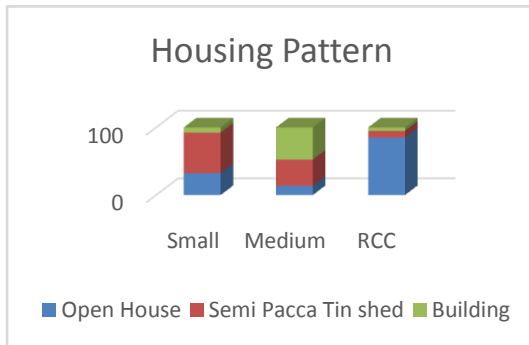


Fig-8: Farm Housing Patterns

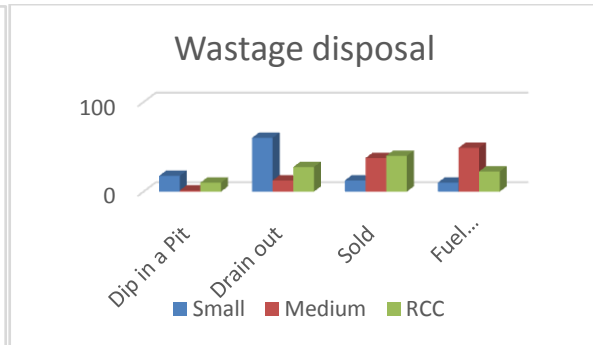


Fig-9: Farm Wastage Disposal Patterns

#### 4.1.4. Feeds and Feeding systems of Small Scale crossbred with RCC Dairy Farms.

The farms offered the green fodder along with deshi or local green grass to their cows was found about 30.63%, hybrid fodder 21.87 % and both local and hybrid about 47.50 % farms.

Table-4: Feeds and Feeding systems of crossbred and RCC Dairy farms.

Particulars of Variables	Farm Categories			
	Small Sizes Farm (< 5 Cows) N = 40	Medium Sizes Farm (5 to 10 Cows) N=80	RCC Farm (< 5 Cows) N=40	ALL Farm (N=160)
<b>Types &amp; Sources of Feeds:</b>				
Own (roughages and green grasses)	12 (30.00)	55 (68.75)	37 (92.50)	104 (65.00)
Partly supplied (roughages and green grasses)	17 (42.50)	11 (13.75)	3 (7.50)	31 (19.37)
Purchased (roughages and green grasses)	11(27.50)	14 (17.50)	0(00.00)	25 (15.63)
<b>Types of supplied Green Roughages</b>				
Traditional/local grass	9 (22.50)	5 (6.25)	35 (87.50)	49 (30.63)
Hybrid green fodder	13 (32.50)	22 (27.50)	0 (00.00)	35 (21.87)
Both	18 (45.00)	53 (66.25)	5 (12.50)	76 (47.50)
<b>Types of supplied concentrates</b>				
Own formulated	29 (72.50)	35 (43.75)	36 (90.00)	100 (62.50)
Readymade concentrates	11 (27.50)	45 (56.25)	4 (10.00)	60 (37.50)
<b>Nature of water drinking</b>				
DCP in water	27(67.50)	60 (75.00)	0 (00.00)	87 (54.38)
Salt and water mixed only	9(22.50)	15 (18.75)	6 (15.00)	30 (18.75)
Clean water only	4 (10.00)	5 (6.25)	34 (85.00)	43 (26.87)

Source: Field survey, 2019



About 92.50% RCC farmers have own supply of roughages and green grasses, 68.75% medium farmers also have same opportunity, on the other hand 42.50% small farmers need supply from others.

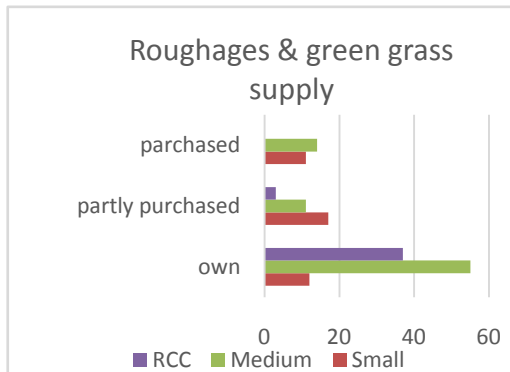


Fig-10: Farm Feeding supply Patterns

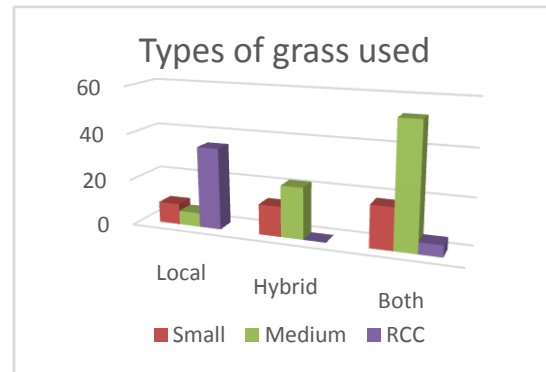


Fig-11: Nature of used grasses of the Farms

About 87.50% RCC farms supplied only local grass but 45% small and 66.25% medium farmers supplied both local and hybrid green grass to animals. 90% RCC and 72.50% small farmers offer own formulated feed on the other hand 56.25% medium farmers give readymade concentrates to animals. 85% RCC farmers give only clean water but 67.50% small and 75% medium farmers add DCP in water (Table-4).

#### 4.1.5. Comparison of Production potentials of crossbred Dairy industries and RCC Farm Owners

The production potentials of observed cows are described in Table 5. About 42.50% RCC farms reported that there have 70 percent cows under milking, in medium farms 62.50% have more than 80 percent and in small farms 67.50% said that 70-80% are milch cow.

Table-5: Production potentials of crossbred Dairy and RCC Farms.

Particulars of Variables	Farm Categories			
	Small Sizes Farm (< 5 Cows) N = 40	Medium Sizes Farm (5 to 10 Cows) N=80	RCC Farm (< 5 Cows) N=40	ALL Farm (N=160)
<b>Percentage of milch cows</b>				
Up to 70 %	4(10.00)	10(12.50)	17 (42.50)	31 (19.38)
> 70 % to 80 %	27(67.50)	28(35.00)	10 (25.00)	65 (40.62)
> 80 %	9(22.50)	42(52.50)	13 (32.50)	64 (40.00)
<b>Proportion of pregnant cows</b>				
Up to 25 %	17(42.50)	10(12.50)	15 (37.50)	42 (26.25)
25 % to 35 %	19(47.50)	30(37.50)	15 (37.50)	64 (40.00)
Above 35 %	4(10.00)	40(50.00)	10 (25.00)	54 (33.75)
<b>Proportion of Dry cows</b>				
Up to 15 %	17(42.50)	35(43.75)	23 (57.50)	75 (46.88)
15 % to 25 %	16(40.00)	28(35.00)	12 (30.00)	56 (35.00)
Above 25 %	7(17.50)	17(21.25)	5 (12.50)	29 (18.12)
<b>Calving status of milch cows</b>				
Up to 3 calving	20 (50.00)	55 (68.75)	27 (67.50)	102 (63.75)
4 to 5 caving	15 (37.50)	20 (25.00)	9 (22.50)	44 (27.5)
Above 5 calving	5 (12.50)	5 (6.25)	4 (10.00)	14 (8.75)

Source: Field survey, 2019

The proportion of pregnant cows is estimated about 25-35% in case of 47.50% small farms, above 35% in case of 50% medium farms and 25-35% in case of 40% RCC farms. Percentages of dry cows are up to 15% in case of 42.50% small farms, 43.75% medium farms and 57.50% RCC farms. About 50% small farms, 68.75% medium farms and 67.50% RCC farms are in a state of less than 3 calving. (Table 5)

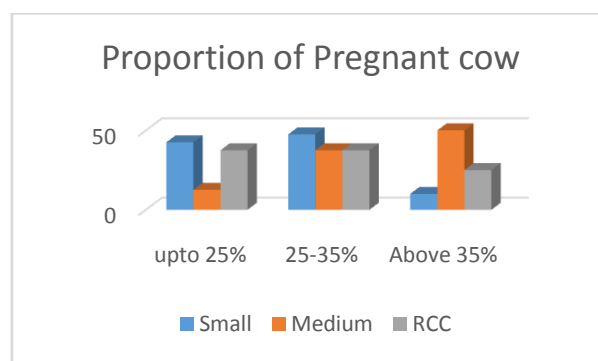
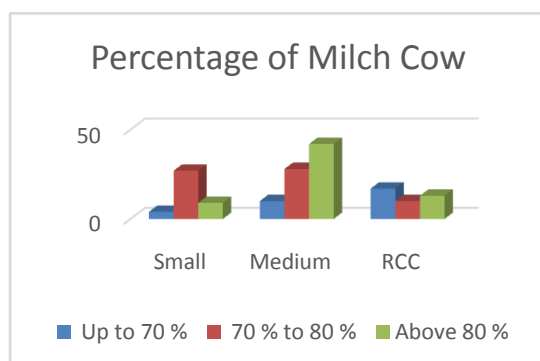


Fig-12: Distribution patterns of Farm's Milch Cows

Fig-13: Patterns of Farm's Pregnant Cow

#### 4.1.6: Comparison of Disease occurrences of crossbred Dairy with RCC farms.

The incidence of diseases of the cows under the respective dairy farms were recorded and analyzed as per occurrences of common types diseases in different categories of farms is summarized in Table-6.

Table-6: Common Disease occurrence of cows at different categories of Dairy farms.

Particulars of Variables	Farm Categories			
	Small Sizes Farm (< 5 Cows) N = 40	Medium Sizes Farm (5 to 10 Cows) N=80	RCC Farm (< 5 Cows) N=40	ALL Farm (N=160)
<b>Frequency of Milk fever cases in last year</b>				
Less than 4 cases	29 (72.50)	48(60.00)	32 (80.00)	109 (68.13)
Above 4 cases	11 (27.50)	32 (40.00)	8 (20.00)	51 (31.87)
<b>Frequency of mastitis cases in last year</b>				
Less than 5 cases	31(77.50)	52 (65.00)	37 (92.50)	120 (75.00)
Above 5 cases	9 (22.50)	28 (35.00)	3 (7.50)	40 (25.00)
<b>Frequency of uterine infection cases in last year</b>				
Less than 5 cases	26 (65.00)	44 (55.00)	36 (90.00)	106 (66.25)
Above 5 cases	14 (35.00)	36 (45.00)	4 (10.00)	54 (33.75)
<b>Frequency of FMD cases in last year</b>				
Less than 5 cases	18 (45.00)	38 (47.50)	27 (67.50)	83 (51.88)
Above 5 cases	22 (55.00)	42 (52.50)	13 (32.50)	77 (48.12)
<b>Frequency of metabolic diseases in last year</b>				
Less than 5 cases	11 (27.50)	32 (40.00)	38 (95.00)	81 (50.63)
Above 5 cases	29 (72.50)	48 (60.00)	2 (5.00)	79 (49.37)

Source: Field survey, 2019

Frequency of milk fever attacked to the milch cows is less than 4 cases are found about 72.50% and 60% for small and medium crossbred dairy farms respectively whereas it

stood at 80% in RCC farms. Occurrences of mastitis are less than 5 cases in 77.50% small, 65% medium and 92.50% for RCC dairy farms. Uterine infections found in less than 5 cases in 65% for small, 55% for medium and 90% RCC farms. FMD cases are found above 5 cases in 55% for small, 52.50% for medium but less than 5 cases were found about 67.50% RCC farms. Metabolic diseases are above 5 cases in 72.50% small farms, 60% for medium farms but less than 5 cases in 95% RCC farms (Table-6). So diseases resistance in case of RCC dairy cows comparatively higher than that of cross-bred dairy cows in the study areas.

#### 4.1.7. Distribution of Herd Sizes of the Studied Farms

The distribution of herd sizes of the studied farms constitutes of milch cows, dry cows, heifer, calf, bull and bullock etc. in the studied farms and it was presented in Table 7.

**Table-7: Distribution of herd sizes of the dairy farms according to age of animals.**

Particulars of Variables	Farm Categories				Herd Percentage (%)
	Small Sizes Farm (< 5 Cows) N = 40	Medium Sizes Farm (5 to 10 Cows) N=80	RCC Farm (< 5 Cows) N=40	ALL Farm (N=160)	
<b>Milch Cows:</b>					
Below 5 Yrs	55(11.88)	320 (16.75)	34(7.89)	409(14.59)	<b>36 %</b>
5 to 7 Yrs	77(16.63)	254 (13.30)	63(14.62)	394 (14.06)	
Above 7 Yrs.	28 (6.05)	146(7.64)	43(9.98)	217(7.74)	
Above 7 Yrs.	28 (6.05)	146(7.64)	43(9.98)	217(7.74)	
<b>Dry Cows:</b>					
Below 5 Yrs	32(6.91)	106 (5.55)	20 (4.64)	158(5.63)	<b>23%</b>
5 to 7 Yrs	48(10.37)	220 (11.53)	45 (10.44)	313(11.16)	
Above 7 Yrs.	21(4.54)	124(6.49)	25(5.80)	170 (6.06)	
<b>Heifers:</b>					
Below 12 months	34(7.34)	51 (2.67)	19 (4.41)	104(3.72)	<b>9%</b>
12 to 20 months	22(4.75)	65 (3.40)	25(5.80)	112(3.99)	
Above 20 months	4(0.86)	14 (0.73)	16(3.71)	34(1.21)	
<b>Calves:</b>					
Below 6 months	50(10.80)	240(12.57)	34(7.89)	324(11.55)	<b>31 %</b>
6 to 12 months	67(14.47)	225 (11.78)	60 (13.92)	352(12.55)	
Above 12 months	20(4.32)	125 (6.54)	42(9.74)	187(6.67)	
<b>Bulls:</b>					
Below 3 Yrs	0(00)	5(0.26)	3 (0.70)	8(0.29)	<b>1 %</b>
3 to 5 Yrs	5(1.08)	15(0.79)	2 (0.46)	22(0.78)	
Above 5 Yrs.	0(00)	0(00)	0(00)	0(00)	
All	<b>463 (100.00)</b>	<b>1910 (100.00)</b>	<b>431 (100.00)</b>	<b>2804 (100.00)</b>	<b>100 %</b>

Source: Field Survey-2019

It was found that, the highest number of farm animals was found milch cow (36 %), 2<sup>nd</sup> highest was found calves are about 31%, 3<sup>rd</sup> highest is found dry cows are about 23 % , heifers are in fourth position with 9% and lowest one is bullocks is about 1 % in the studied farms (Table-7). A composition of herd sizes moreover same for two categories of cross-bred and RCC dairy farms in the study areas.

#### 4.1.8. Productive and Reproductive performances of dairy cows (Crossbred and RCC Dairy Farms)

The productive and reproductive performances are the key indicators of farm profitability. The average productive and reproductive traits of the respective observed dairy cows are presented in Table-8 mentioned below:

**Table-8: Productive and Reproductive performances of crossbred and RCC Dairy Cows.**

Particulars of Variables	Farm Categories			
	Small Sizes Farm (< 5 Cows) N = 40	Medium Sizes Farm (5 to 10 Cows) N=80	Large Size Farm (< 5 Cows) N=40	ALL Farm (N=160)
<b>Ave. lactation length of cows:</b>				
Up to 220- 240 days	5 (12.50)	10 (12.50)	24 (60.00)	39 (24.37)
241 to 260 days	25 (62.50)	43 (53.75)	13 (32.50)	81 (50.63)
260 to 280 days	10 (25.00)	27 (33.75)	3 (7.50)	40 (25.00)
<b>Ave. Milk yield per cow per day:</b>				
Up to 4 liters	6(15.00)	13 (16.25)	40 (100.00)	59 (36.87)
5 to 8 liters	17(42.50)	18(22.50)	0 (00.00)	35(21.88)
9 - 12 liters	10 (25.00)	27(33.75)	0 (00.00)	37(23.12)
Above 12 litres	7(17.50)	22(27.50)	0(00.00)	29(18.13)
<b>Ave. Length of calving interval</b>				
Up to 275 days	9 (22.50)	31 (38.75)	5 (12.50)	45 (28.13)
276 to 290 days	24 (60.00)	35 (43.75)	17 (42.50)	76 (47.50)
Above 290 days	7 (17.50)	14 (17.50)	18 (45.00)	39 (24.37)
<b>Ave. age of puberty:</b>				
Below 2 yrs	7 (17.50)	36 (45.00)	2 (5.00)	45 (28.13)
2 to 2.5 yrs	25 (62.50)	39 (48.75)	15 (37.50)	79 (49.37)
Above 2.5 yrs	8 (20.00)	5 (6.25)	23 (57.50)	36 (22.50)
<b>Ave. dry period of cows</b>				
Up to 215 days	7 (17.50)	25 (31.25)	13 (32.50)	45 (28.13)
215 to 230 days	21 (52.50)	45 (56.25)	23 (57.50)	89 (55.62)
Above 230 days	12 (30.00)	10 (12.50)	4 (10.00)	26 (16.25)
<b>Ave. Conception rate of Cows:</b>				
Single time	25 (62.50)	51(63.75)	15 (37.50)	91 (56.87)
2 to 3 times	12 (30.00)	21 (26.25)	22 (55.00)	55 (34.38)
Above 3 times	3 (7.50)	8 (10.00)	3 (7.50)	14 (8.75)
<b>Ave. Calf mortality rate of Cows:</b>				
No mortality	19 (47.50)	59 (73.75)	34 (85.00)	112 (70.00)
Up to 10 to 30 %	14 (35.00)	19 (23.75)	4 (10.00)	37(23.13)
Above 30 %	7 (17.50)	2 (2.50)	2 (5.00)	11 (6.87)

**Source: Field Survey, 2019**

The average lactation length was found 241-260 days which accounted 62.50% for small scale, 53.75% for medium cross-bred farms but for RCC farms it was found less than 240 days about 60% of dairy cows. Average milk yield per cow per day found 5 to 8 litres for

small scale about 42.50% and 9 to 12 litres found for medium farms about 33.75% but in case of RCC farms it stood at less than 4 litres in 100% RCC farms.

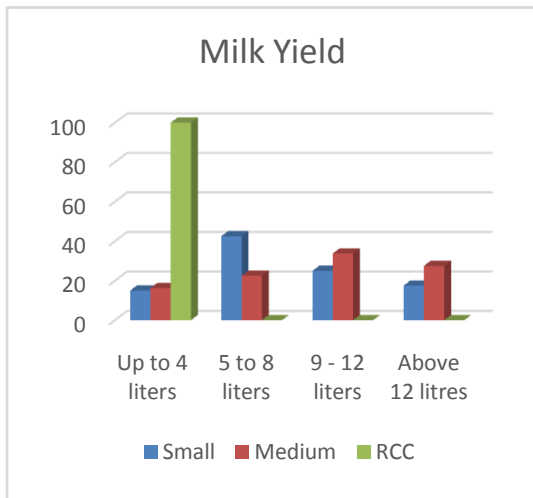


Fig-14: Average age of Puberty

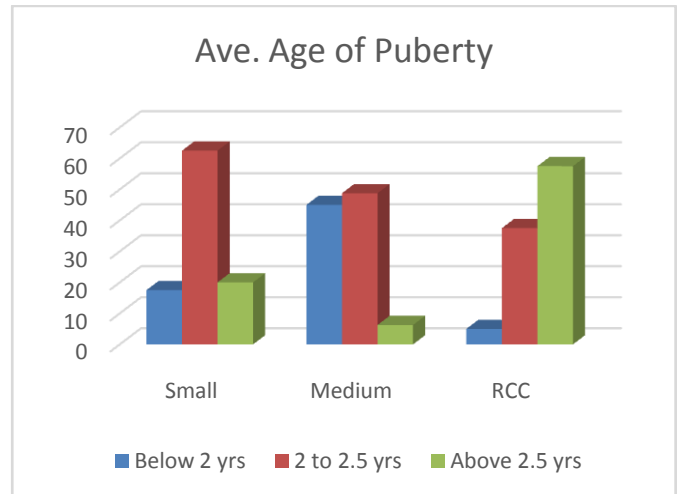


Fig-15: Average milk yield

Average calving interval found 276 to 290 days about 60% and 43.75% for small scale and medium farms but above 290 days in case of 45% RCC farms. About 62.50% small farms and 48.75% medium farms reported that calves attain puberty at 2 to 2.5 years but 57.50% of RCC farm owners reported more than 2.5 years. In case of dry period, lies between 215 to 230 days for cross-bred cows which is reported about 52.50% for small, 56.25% for medium and about 57.50% for RCC farms. Average conception rate of cows are found single time about 62.50% for small and 63.75% for medium cross-bred farms but about 55% in case of RCC farms need 2-3 times A.I services. In case of mortality rate of calves, the farm owners reported about 47.50% for small and 73.75% for medium farms and about 85% for RCC farms there was no mortality of calves last year in their farms. It revealed that, the mortality of calves was found lower in RCC farms than Cross-bred dairy enterprises.

#### 4.2. Assessing of Cost, Returns and farm profitability of crossbred and RCC Dairy Farms:

The purpose of this section is to assess the costs, returns and farm profitability of small scale commercial dairying practices under different categories of farms. The items of costs included in this study were feeds, labor, veterinary charges, housing costs, dairy appliances, transportation costs, capital invested and operating capital. The total costs per cow per lactation were classified into cash and non-cash costs. Cash costs were those cost which the dairy cow owners had to pay out of their pocket to acquire the inputs. On the other hand, non-cash costs were estimated for home supplied feeds, family labor, interests on the value of a dairy cows, interest on housing value, interest on operating capital and depreciations of housing costs (interest rate at per bank rate) etc. On the returns side, gross

returns, net returns above total costs and net returns above cash costs were determined and analyzed in this study.

#### 4.2.1. Costs of Dairying at different categories of farms:

The required costs of rearing of per cow per year in commercial dairying are presented in **Table-9**. The total costs per cow per year were estimated at Tk.92944, Tk.132999 and Tk.50082 for small, medium and RCC dairy farms, respectively. It was found that the cash expenses shared the major part of the total costs which accounted for Tk. 79920, Tk.113980 and Tk. 43720 and shared in respective total cost are 85.99, 85.70 and 87.30 percent for small, medium cross-bred farms and RCC dairy farms, respectively. The non-cash expenses per lactation year per cow stood at Tk.13024, Tk.19019, and Tk. 6362 for small, medium and RCC farms, respectively which is accounted for 14.01, 14.30 and 12.70 percent of their respective total costs. It revealed that, both cash/non-cash costs and total costs of rearing per cow per lactation for cross-bred dairy farms much higher than that of RCC cows.

**Table-9: Average Cost of rearing Per Cow per lactation of the Dairy Farms**

Particulars of items	Per cow annual Cost under categories of Farm(in BDT)												% in Total Cost
	Small Sizes Farm (< 5 Cows) N = 40			Medium Sizes Farm (5 to 10 Cows) N=80			RCC Farm (< 5 Cows) N=40			ALL Farm (N=160)			
	Non cash	Cash	Total	Non cash	Cash	Total	Non cash	Cash	Total	Non cash	Cash	Total	
Straw	2500	4150	6650	2300	6200	8500	1000	1120	2120	5800	11470	17270	<b>6.26</b>
Green Grass	3200	5120	8320	2600	8180	10780	1200	1100	2300	7000	14400	21400	<b>7.75</b>
Concentrates including salt	-	36500	36500	-	43400	43400	-	29200	29200	-	109100	109100	<b>39.53</b>
<b>Total</b>	<b>5700</b>	<b>51470</b>	<b>57170</b>	<b>4900</b>	<b>62680</b>	<b>67580</b>	<b>2200</b>	<b>33620</b>	<b>35620</b>	<b>4267</b>	<b>49257</b>	<b>53517</b>	<b>53.54</b>
<b>Worker</b>	4570	19200	23770	9850	30000	39850	2500	6000	8500	16920	55200	72120	<b>26.13</b>
<b>Veterinary charge and Treatment</b>	400	3500	3900	1000	6900	7900	400	2000	2400	1800	12400	14200	<b>5.14</b>
<b>Cost of Housing</b>	-	4000	4000	-	6250	6250	-	1200	1200	-	11450	11450	<b>4.15</b>
<b>Artificial insemination charges</b>	-	400	400	-	400	400	-	300	300	-	1100	1100	<b>0.40</b>
<b>Dairy equipment cost</b>	-	1500	1500	-	1750	1750	-	1000	1000	-	4250	4250	<b>1.54</b>
Cost of transportation		1200	1200		1450	1450		750	750		3400	3400	<b>1.23</b>
Interest on total operating cost	2354.5	-	2354.5	3269.2	-	3269.2	1262.8	-	1262.8	6886.5	-	6886.5	<b>2.49</b>
Miscellaneous: (Rent, Tax etc.)	-	4350	4350	-	9450	9450	-	1050	1050	-	14850	14850	<b>5.38</b>
<b>All</b>	<b>13024.5</b>	<b>79920</b>	<b>92944.5</b>	<b>19019.2</b>	<b>113980</b>	<b>132999.2</b>	<b>6362.8</b>	<b>43720</b>	<b>50082.8</b>	<b>38406.5</b>	<b>237620</b>	<b>276026.5</b>	<b>100.00</b>

Source: Field Survey, 2019

As per reported data by the farm owners/representatives, the item wise estimated costs of rearing per dairy cows per lactation year were analyzed and describe below:

#### **4.2.1.1. Feed price of Rearing Dairy Cows**

Value of feed was one of the major cost items of rearing dairy cows, costs of feed included expenses on paddy straw, green grasses, concentrates, feed additives, salt etc. The purchased feeds were valued according to the supplied feeds were actually paid by the dairy farm owners. Home and own farm supplied feeds were also charged according to the average prices prevailing in the market. Feed cost covered Tk. 51470, Tk. 62680 and Tk.33620 which was accounted for 55.38, 47.13 and 67.12 percent of the respective total cost per cow per year for small, medium and RCC categories of dairy farms, respectively (Table-9). Thus, the total feed costs comprise a large proportion of total costs in case of RCC farms; on the other hand, feed cost is higher in Small scale than medium scale. The differences in the cash expenses on feeds were found moreover same for all categorize of dairy farms. The cash expenses for feed per cow per year small, medium and large sizes farms were found Tk.45770, Tk.57780 and Tk.31420 respectively which is 88.93%, 92.18% & 93.46% and found it was assessed comparatively higher for RCC cattle farms. On the other hand, the non-cash costs for feed items per lactation per cow were accounted for Tk. 5700, Tk. 4900 and Tk.2200 respectively which accounted for 11.07, 7.82 and 6.54 percent of their respective total feed costs (Table-9) which was assessed higher in small scale dairy farms. Among the various feed items, paddy straw, green grasses and concentrates including salts were the most important cost items. It was accounted per cow per year were attributed to paddy straw 6.26 percent, green grasses 7.75 percent and 39.53 percent to concentrates to the total costs considering all categories of dairy farms.

#### **4.2.1.2. Labor Cost of Rearing Dairy Cows**

Worker required for providing services for housing, grazing, feeding, supervision and management of farm's cows. In order of importance, the labor cost came next to feed cost in Table 9. Here most of the farms have family support in the farm which is calculated under non cash cost. Non cash cost is 4570tk, 9850tk, 2500tk for small, medium and RCC dairy farms, respectively which is calculated on a lump-sum basis , provided by farmer himself and his/her family members. Total hired employees cash costs per lactation year per cow were estimated at Tk.19200, Tk.30000 and Tk. 6000. Summation of cash & non-cash cost needed for worker to operate farms are TK.23770, Tk. 39850 and Tk. 8500 which

shared in respective to total charges were found 8.61, 14.44 and 3.08 percent for small, medium and RCC dairy farms, respectively.

#### **4.2.1.3. Veterinary charges of Rearing Dairy Cows**

The charges of veterinary services were calculated by taking into account the actual cost, incurred by the farm owners for a milch cow per lactation year. Doctor's fees, medicines, detergent and disinfectants were the major components of the total veterinary charges. The total veterinary charges per lactation per cow were amounted to be Tk.3900, Tk.7900 and Tk.2400 for small, medium and RCC dairy farms, respectively. The veterinary charges is covered about, 1.41, 2.86 and 0.87 Percent of the total costs per lactation year per cow for small, medium and RCC dairy farms, respectively (Table-9).

#### **4.2.1.4. Housing Cost:**

The values of housing were calculated by taking the entire amount including initial shed building & preparation cost, the depreciation cost, year wise repairing costs and interest on the average value of housing shed. Depreciation cost was measured by dividing the original value of housing by its total probable length of life (present age plus remaining life) of house. Interest rate was assumed to be 5.50 percent per annum (according to bank interest rate). The amount of housing cost per cow per lactation year stood at nearly Tk. 4000, Tk. 6250 and Tk.1200, respectively and the housing costs covered about 1.45, 2.26 and 0.43 percent of the total costs per lactation year per cow for small, medium and RCC dairy farms (table-9). As RCC mostly reared in open houses it requires lower housing cost. All the studied farms are established on farmer's own land so rent for cowshed is not needed here. It was also found that the interest on the housing value shared the major portion of housing costs.

#### **4.2.1.5. Artificial Insemination charge of Rearing Dairy Cows**

Most of the commercial dairy farms used Artificial Insemination techniques for conception of their reared dairy cows through high quality frozen semen from improved bull given by DLS or BRAC A.I. technicians. Some owners give the services for conception of cows naturally by their own bulls. The average artificial insemination costs per cow were found Tk.400, Tk.400 and Tk.300 for small, medium and RCC farms, respectively. Thus, the above estimated results indicated that, the total costs per cow per lactation year was found higher in case of small and medium dairy farms and lower for RCC dairy farms where



most of the owners depend on natural service by RCC bulls to prevent breeding with other breeds. Another reason behind this practice is to resist dystochia caused by overweight of calf of heavy breeds.

#### **4.2.1.6. Cost of Dairy appliances:**

Dairy equipment like milking machine, buckets & other necessary items are needed to run dairy farms. The cost is lower for RCC cattle 1000, in small scale it is 1500 and for medium level it stands 1750. The percentage of dairy appliances cost to total cost is 0.54 and 0.63 & 0.36 percent respectively for Small, Medium and RCC farms.

#### **4.2.1.7. Transportation costs:**

Transportation of milk, feeds, fodder, heifer & milchcows, calves, manure and other things are included within transportation cost which is 1200, 1450 and 750 respectively for Small scale, medium scale crossbred & RCC dairy enterprises. Their percentage wise contribution is 0.43, 0.53 and 0.27 for Small, Medium & RCC dairy enterprises.

#### **4.2.1.8. Interest on total operating cost**

The costs of capital included in the present study were the interest on the total operating capital. The interest on the operating capital was also charged at the rate 5.5 as per Bangladesh bank interest rate per annum. Interest on operating capital was computed by the following formula: **Interest = (Operating Cost × rate of interest / 2) × 100**. The interest on operation capital per year per cow were estimated Tk. 2354.5, Tk.3269.2 and Tk.1262.8 for small, medium and RCC farms, respectively & it covers 0.85, 1.18 & 0.46 percent of total costs for Small, Medium & RCC farms.

#### **4.2.1.9 Miscellaneous cost**

Utility bills, rents, taxes and other undefined charges are included within this heading which is accounted per cow basis at Taka 4350 for Small, 9450 for Medium & 1050 for RCC cattle enterprises. In percentage, it is 1.58, 3.42 & 0.38 respectively for Small, Medium & RCC farms.

From the above discussion it was found that for all categories of cost items Crossbred farms required more costs than that of RCC dairy rearing system.

#### **4.2.3. Returns of Crossbred and RCC Dairy farms:**

This section will discuss about comparative profitability of Crossbred and RCC dairy farms in small scale at the rural level. The Gross and net returns of small scale commercial dairy on different categories of farms per cow per year over estimated cash

and total costs. The returns from dairy cows consisted of selling of milk and milk products, value of consumed milk and milk products, average value of produced calf , selling of cow dung, value used cow dung as fuel and manure of fodder land, selling others materials, bags etc.

**Table-10: Average Returns Per Cow per Lactation period of the Dairy Farms.**

Particulars of Item	Per cow per year returns of dairy farms			
	Small Sizes Farm (< 5 Cows) N = 40	Medium Sizes Farm (5 to 10 Cows) N=80	RCC Farm (< 5 Cows) N=40	ALL Farms (N=160)
Earning from milk and milk products	100800	168000	33600	<b>100800</b>
Value of consumed milk and milk products	11200	28000	5600	<b>14933</b>
Ave. Value of calves	35,000	40,000	25,000	<b>33333</b>
Cow dung prices	2575	3100	1600	<b>2425</b>
Value of used cow dung as fuel and fodder land	1950	2250	1040	<b>1747</b>
Selling materials (Gunny Bags, salvage materials etc.)	467	1450	280	<b>732</b>
Gross Return(in BDT)	<b>151992</b>	<b>242800</b>	<b>67120</b>	<b>153971</b>
Gross Margin per cow per Year (in BDT)	<b>72072</b>	<b>128820</b>	<b>23400</b>	<b>74764</b>
Gross Margin per cow per Year (in USD)	<b>850.95</b>	<b>1520.98</b>	<b>276.28</b>	<b>883</b>
Net Return per cow per Year (in BDT)	<b>59047.5</b>	<b>109800.8</b>	<b>17037.2</b>	<b>59962</b>
Net Return per cow per Year (in USD)	<b>697.17</b>	<b>1296.41</b>	<b>201.16</b>	<b>732</b>
BCR (un-discounted)	<b>1.64</b>	<b>1.83</b>	<b>1.34</b>	<b>1.48</b>

**Source: Field Survey, 2019**

The average sale proceeds of milk were calculated on the basis of the average lactation period, average quantity of milk produced per day per cow and the average price received by farm owners per litre of milk directly and value of consumed milk. It was assumed that the calves of dairy cows were sold out just after lactation period. The value of calf was estimated on the basis of the respondent's expectation however RCC calves were sold comparatively at higher price because of consumers' choice.

The average values of cow dung and selling other material per cow are calculated by taking respondent's opinion on this type of income as lump sum basis. **Table-10** showed that, the gross return per lactation year per cow stood at Tk.151992, Tk.242800 and Tk.67120 for small, medium of cross-bred and RCC dairy farms, respectively. The

average returns from selling of milk and milk products per cow per lactation year were found Tk. 100800, Tk.168000 and Tk. 33600 respectively which was accounted for 66.32 percent, 69.19 percent and 50.06 percent of respective gross returns for small, medium and RCC farms.

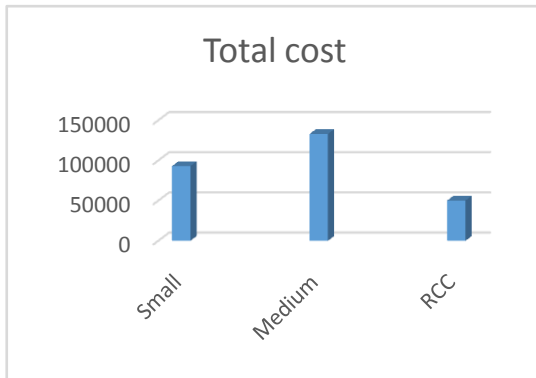


Fig-16: Total cost

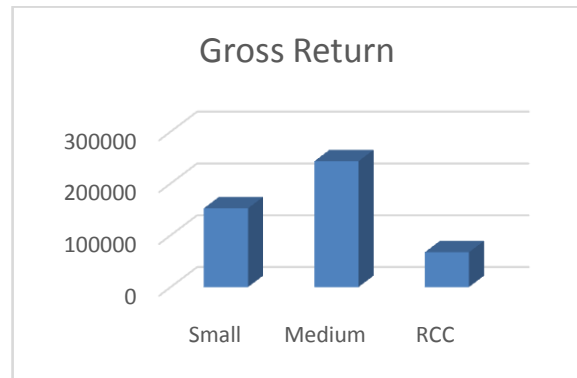


Fig-17: Gross Return

The average returns of produced calf were found Tk.35000 tk, 40000 tk, 25000 tk for small, medium and RCC farms. This variation occur because of birth weight where RCC calves born with less body weight but it's meat quality is high, so it is demandable in market price. The returns of selling of cow dung were found Tk. 2575, Tk.3100, and Tk.1600 for small, medium and RCC farms, respectively. Value of used cow dung as fuel and manure in fodder land were 1950tk, 2250tk, 1040tk for small, medium and RCC farms, respectively. Selling others materials like as bags etc. are found in Tk.467, Tk.1450, Tk. 280 for small, medium and RCC farms, respectively. The Gross margin per cow per lactation year over cash were estimated at Tk.72072 (850.95 USD), Tk.128820 (1520.98 USD), Tk.23400(276.28 USD) and net return over total costs were also estimated in Tk59047 (697.17USD), Tk.109800 (1296.41USD), Tk.17037(201.16 USD), respectively for small, medium and RCC farms. The Benefit Cost Ratio (BCR) were accounted for **1.64, 1.83 and 1.34**, respectively for small, medium and RCC dairy farms. The share of Gross Margin (GM) were found 61.05 percent,55.05 percent and 63.83 percent for small, medium and RCC farms, respectively and respective Net Return (NR)in gross return were also found about 38.85 percent, 45.22 percent and 25.38 percent, respectively.

Research findings indicated that, at rural dairy farming practices the net profit per cow per lactation year resulted higher in case of medium sizes cross-bred dairy enterprises/farms than that of other categories of dairy farms basically RCC dairy farms in the study areas.

#### **4.2.3. Marketing Channels of Dairy Farms in Chattogram district:**

The milk marketing channels in Chattogram are haphazardly maintained by the producers but they largely depend on middleman like ghose, goala etc. who tried to deprived the genuine farmers for their own profit. Generally dairy farmers sell their milk straight to the local market, neighbors, tea stalls and local restaurants. Most of the times they sell their milk through different types of middlemen like Gowala, Ghosh, Aratdar and retailer. Intermediaries operating at diverse level of milk marketing can earn margins that affect primary milk producers directly or indirectly. Moreover, these intermediaries sometimes deteriorate the quality of milk by adulterate it, which cause market defamation of the producers. The amount of milk trading by the farmers through different routes differs from farm to farm. The usual milk marketing channels are described below:

##### **4.2.3.1. Traditional Milk Marketing Channels:**

Local milk marketing practice is very common in Chattogram and milk marketing channels are not regular and organized. Producers may sell their milk directly to local market, neighbors and tea stalls. But most of the times, they sell their surplus milk to the Gowala. In the traditional milk marketing channel, Gowalas collect milk from the producers, sometimes mix water or milk powder for more profit, and sell this in the urban market. In the rural area Gowala perform the door-to-door milk collector from milk producers and deliver the milk to consumers (Rahman et al. 2002). Some of the Gowalas are milk producers themselves, selling rurally collected milk in addition to their own produce. They sell this milk to different types of consumers in urban & city area, such as, individual city dwellers, contact households, tea stalls and hotels or restaurants. Price is always insecure both for primary producers as well as for Gowala in such milk marketing channel. At times, Aratdar and retailers also try to control the market. Aratdar is a commission agent and mediates between producers and Gowlas/ retailers, consumers as well as hotels and restaurants. Aratdars charge a fixed amount of commission form of monetary value or milk from producers.

**Table-11: Marketing components (milk and milk products)**

Particulars of Item	Market intermediaries			
	Small Sizes Farm (< 5 Cows) N = 40	Medium Sizes Farm (5 to 10 Cows) N=80	RCC Farm (< 5 Cows) N=40	ALL Farms (N=160)
Consumers at farm gate/households	12 (30.00)	12 (15.00)	20 (50.00)	44 (27.50)
Consumers at local market	7 (17.50)	5 (6.25)	5 (12.50)	17 (10.62)
Consumers at peri- urban/City market	2 (5.00)	2 (2.50)	0 (00)	4 (2.50)
Local Gosh	14 (35.00)	36 (45.00)	15 (37.50)	65 (40.63)
Sweetmeat shop	5 (12.50)	25 (31.25)	0(00)	30 (18.75)
<b>All</b>	40 (100.00)	80 (100.00)	40 (100.00)	160 (100.00)

**Source: Field Survey, 2019**

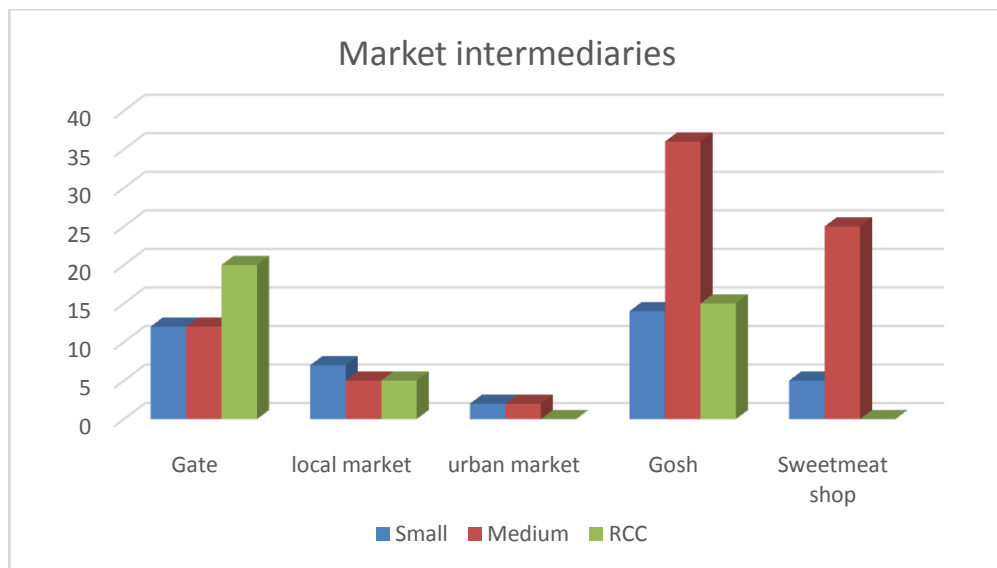
The middlemen are connecting tool between producer and consumers, however, price of milk is not prefixed and the middlemen may not pay farmers regularly. Price varies from place-to-place and from season-to-season. Gowala the main actors also cannot ensure the fresh and pure milk for the consumers because collect milk from the rural area early in the morning and sell this to consumers until the evening without any preservative measures. Mixing water and milk powder in the fresh milk is common adulteration practices among the Gowalas in this marketing channel.

#### **4.2.3.2. Assessment of existing marketing channels**

In my studied areas of Chattogram, producers follow different types of milk marketing channels, such as direct selling to customers and indirect channels to Ghose, tea & sweetmeat shops etc. The overall marketing channels of milk were examined thoroughly and identified channels are described in table-11. The identified overall participants were the farm owners, consumers at farm gate/household level, consumers at local market, consumers at periurban market, local Gosh, sweetmeat shops, local Bepari, Milk cooperatives and milk processors.

**Table-11** showed that consumers at farm gate or household level bought about 30% in small farms under cross-bred farms and 50% in RCC farms. Farm owners sold their farm

product (milk) to local gosh it stood at about 45%, 35% and 37.50% for small scale, medium and RCC farms respectively.



**Fig-18: Market intermediaries**

About 31.25% medium farmers sell their milk to sweetmeat shop whereas only 12.50% small farmers do so. Consumers at local market are 17.50% for small, 6.25% for medium and 12.50% RCC farms.

# CHAPTER

## CONSTRAINTS AND POSSIBLE REMEDIAL MEASURES

### 5.1. Introduction:

Our farmers faced a lot of problems from the very beginning because of their illiteracy, ignorance to scientific farming practices, over reliance on market intermediaries for feed collection & selling milk, at the same time the perishable nature of milk itself a big constraints for milk entrepreneurs.

Risks and uncertainty are quite common facts in dairy farming business. The selected farm owners in the study areas have experienced in dairying since significant years and were confronting many serious production and marketing oriented problems. An attempt have been made in this chapter to identify the major constraints and problems faced by the farmers in dairying practices and to discuss the possible solutions of these problems so that the farmers can obtain better economic return from cattle farming business. In order to identify various problems of rearing cows and their solutions, questions were asked to the concerned farm owners/managers and probable findings are discussed in this section.

### 5.2. Major constraints of farmers

The problems of dairying practices as reported by the farm owners are presented in Table 12. The reported problems by different categories of dairy farm owners regarding milk production and marketing of milk by the dairy enterprises are mentioned below:

#### 5.2.1. Excess feed cost

Concentrates, both readymade & ingredients for mixture are very costly due to their less availability in our country; most of the raw materials are imported which add extra charge on farmers. Moreover farmers are bound to aratdar & feed seller because they give loans to the farmers. For green grass and straw, farmers dependent on seasonal grass, roadside grass etc. because several farmers donot have their own pasture land. The grazing facilities or pasture land are very limited especially during cropping season, rainy season and dry period in peri-urban areas in Chattogram. Now a day, the grazing land (pasture land) of the study areas has been decreasing of the last couple of year due to introduction of vegetables, banana and boro rice cultivation as well as other essential infrastructure development activities. Most of the requirement of feeds and fodder especially concentrates was

maintained by purchasing directly from local market but from few years the prices of feeds and fodder are very rising relating milk prices. Under the circumstances more than 93.00 percent of the selected dairy farm owners reported against this problem. This problem was higher in case of small and RCC groups as 100 percent farm owners reported this and about 87.69% medium farmers have this problem (Table-12).

**Table-12: Identified Problems of Dairying system.**

Particulars of problems	Farm Categories			
	Small Sizes Farm N = 40	Medium Sizes Farm N=80	RCC Farm N=40	ALL Farm (N=160)
Excessive prices of feeds & fodder	40 (100.00)	77 (87.69)	40 (100.00)	121 (93.08)
Lower market value of milk.	37 (92.50)	75 (69.23)	40 (100.00)	105 (80.77)
Lack of primary training facilities	38(95.00)	75(69.23)	40(100.00)	132(82.50)
Scarcity of quality feeds & Fodders	29 (72.50)	69 (81.54)	34 (84.00)	103( 79.23)
Conception failure	15 (37.50)	43 (18.46)	21 (44.00)	38 (29.23)
Variation in market demand of produced milk and inputs	25 (35.00)	55 (53.85)	28 (72.00)	78 (60.00)
Insufficient Vet. Care & services	23 (57.50)	49 (44.62)	19 (36.00)	61 (46.92)
Occurrences of diseases	24 (60.00)	45 (76.92)	9 (22.50)	78 (48.75)
Inadequacy of A.I. service	16 (40.00)	24 (36.92)	11 (44.00)	51 (39.23)
Lack of preservation methods	19(47.5)	65(81.25)	12(48.00)	96(60.00)
Higher utility bills	35(87.5)	72(90.00)	38(95.00)	145(90.63)
Lack of training & extension work	21 (52.50)	49 (75.38)	12 (48.00)	82 (63.08)
Fraudulent practices	14 (35.00)	22 (33.85)	8 (32.00)	44 (33.85)
Non availability of good bull / semen	13 (32.50)	15 (23.08)	12 (48.00)	40 (30.77)
Lack of credit facilities	25 (62.50)	43 (66.15)	17 (68.00)	85 (65.38)
Feed poisoning and mineral deficiency	7 (17.50)	7 (10.77)	2 (8.00)	16 (12.31)

Source: Field survey, 2019

### 5.2.2. Lower market price of products:

The prices of milk were comparatively low because few middlemen are involved in marketing system in the study area. As a result the milk producer gets low milk price relating to high



feed prices as the small scale dairying are scattered in nature in peri-urban areas in Chattogram. The average price of milk per litter in the study area was estimated at Taka 40 (forty) at production point, which was lower than the prices prevailed in city areas at 70tk (seventy) of Chattogram. The problem of low price of milk was reported by 92.50% small, 69.23% medium and 100% RCC farm owners (Table-12).

### **5.2.3. Lack of primary training facilities:**

About 100% RCC owners, 95% small and 69.23% medium farmers reported that they do not get opportunity of any kind of training, they operate the business by gathering experience from their ancestors which is very primitive measures. But they realize the necessity of specialized training on farming, otherwise they have to run a business in loss. However some farmers have experience due to working under other bigger projects.

### **5.2.4. Scarcity of quality feeds and fodders:**

Though RCC can survive with low quality feed stuffs, but productive performance of animals will reduce by such type of feed. Animal health and production of milk depend on quality feeds, proper rationing and regular standard feeding practices timely help to maintain healthy growth, better production. But in our country everywhere grown up animal feed industry and feed shop operate feed factory with poor management and only fair quality assurance facilities. There is no proper public authority to check the quality of animal feed stuffs to apply their power to monitor quality regularly. About 72.50% small, 81.54% medium and 84% RCC farm owners mentioned this problem. (Table 12)

### **5.2.5. Conception failure of dairy cows**

Among the common problems of dairy farming practices conception failure is a crucial one which causes economic loss to farmers, sometime AI needed more than one time for a single conception of a cow which leads to be delayed in calving in farming system. About 37.50% small, 18.46% medium and 44% RCC farm owners reported this problem. (Table 12).

### **5.2.5. Variation in market demand of produced milk and fluctuation of input prices:**

The profitability and sustainability of farms depend on better and regular market price of produced milk and price of inputs of practices in dairying. In our country there found only very few organized milk marketing system developed throughout the country. Occasionally the milk price grow up and the farm profitability also reached in better position but year round the milk

price especially the inputs prices over fluctuated with short notice of time. About 35% small, 53.85% medium and 72% RCC farmers mentioned this problem. (Table-12).

#### **5.2.6. Disease Occurrences**

Disease incidence especially FMD, Mastitis, uterine infections and metabolic diseases are affected the rearing of dairy cows in the study areas. Diseases affect the milk yield and reduced the herd productivity, sometimes calf mortality tends to heavy loss of the dairy farms. About 60% small, 76.92% medium and 22.5% RCC farms reported this problem.(Table 12).

#### **5.2.7. Insufficient Veterinary Care & services**

A large no. of farms situated in remote areas where Government veterinary hospital cannot provide their service easily so it was the demanding issue for raising dairy cows in the study area. Most of the dairy cow owners felt that the Govt. veterinary care and services should be expanded to village level so that they can rear their animals without much pain. But actually Govt. personnel cannot provide regular better services for the development dairy industry in Bangladesh as there was only one veterinary surgeon at the upazila level& farm visit is difficult in few cases due to poor transportation system. Moreover supply of medicine and vaccines to the upazila office was quite insufficient to cover a whole upazila.About 57.50% small, 44.62% medium and 36% RCC farmers mentioned this problem. (Table-12).

#### **5.2.8. Inadequacy of AI service**

The Artificial Insemination services are provided by the Government organization likes as DLS and few NGO especially by BRAC throughout Chattogram district by AI centers and sub centers up to union level in Bangladesh. It is one of the methods used for the improvement of dairy breeds and better performances of dairy cows. But farmers reported that their service is not up to the mark and sometimes donot get response from AI providers. About 40% small, 36.92% medium and 44% RCC farms reported this problem.(Table-12).

#### **5.2.9. Lack of milk preservation methods:**

Milk is perishable in nature which makes it vulnerable to be spoiled in a short time but in our milk pocket zone there is no facility for preservation of raw milk. For instance, chilling, condensing, canning etc. can be done to preserve milk. About 47.50% small, 81.25% medium and 48% RCC farms faced this problem.(Table 12).

#### **5.2.10. Higher utility bills**

Farmers have to pay the utility bills as a commercial basis, which cause a high amount of bills year round; they desire that Government will take necessary steps to support them by making new rules for the promising farmers. About 87.5% small, 90% medium and 95% RCC farmers addressed this issue (Table 12).

#### **5.2.11. Lack of training & extension work**

The quality of employees and their development through training and education are major factors in determining long-term profitability of a small business and it is a good policy to invest in the development of management skills. Dairying is an agro based farm business which deals with live animals and their production depends on farm management systems. The Knowledge on scientific production, rationing and animal health management system is essential for the development of dairy industry in Bangladesh. About 52.50% small, 75.38% medium and 48% RCC farmers have this problem. (Table-12)

#### **5.2.12. Fraudulent practice**

Adulteration of milk is a common fraudulent practice by milk traders and daily labors which hampers the reputation of dairy farmers. On the other hand most of the farm owners' sell their products to the middlemen in kinds and sometimes the milk traders did not give the actual milk price to the farmers. In the study area it was found that the majority of the dairy farm owners used to sell milk at home to Goala. About 35% small, 33.85% medium and 32% RCC farmers can notice this problem (Table-12).

#### **5.2.13. Less availability of good Bull and quality Semen**

Most of the dairy farm owners used frozen semen for breeding through using AI techniques by DLS and supplied by some NGOs. Few farmers use their own produced bull in their farm areas also but their quality is very low than that of imported bull and milk yield of cows with quality calves depend on the genetic characteristics of parents. So quality bull or good quality frozen semen makes a farm economically profitable and extension of farm sustainability. About 32.50% small, 23.08% medium and 48% RCC farm owners felt this problem (Table-12).

#### **5.2.14. Lack of credit facilities**

Credit facilities are insignificant for farmers, most of the cases they borrow loans from mahajon, bank and NGOS with high interest for which they feel panic during farm business. Government took initiatives to give krishi loan at 5% interest but farmers are not fully aware about it due to less publicity and few farms cannot access in institutional loan system for their illiteracy and lack of political backup. About 62.50% small, 66.15% medium and 68% RCC farm owners reported this problem (Table-12).

#### **5.2.15. Feed poisoning and mineral deficiency**

Feed poisoning and mineral deficiency is found another problem of rearing cows commercially under small holder farming system. This problem is created for lack of quality dairy feed and mineral deficiency in feed and water. Sometimes it created animal health hazzard in the farm level and reduced productivity of cows. About 17.50% small, 10.77% medium and 8% RCC farm owners reported this problem.(Table-12).

### **5.5. Resolution methods**

We arranged a focus group discussion with those stakeholders with a view to reveal some remedial measures of their discussed problems in order to overcome the barriers of dairying practices at peri-urban areas of Chattogram. The dairy farm owners of the study area were asked to suggest how to overcome the identified problems, they put forward following suggestions for overall development of dairying practices as a sustainable level by the different sizes of dairy farm according to herd sizes.

#### **5.5.1. Strict regulation for Feed Prices:**

Dairy owners are hostage to feed sellers and market intermediaries for concentrate feeds, on the other hand natural grasses being abolished due to pressure on pasture land for dwelling houses and human food producers. Cattle feed Manufacturer Company made syndicate to capture more profit, so feed factory and sellers should be under control, feed prices should be reasonable to terminal farmers.

So for introducing sustainable and commercial dairy farming practices by livestock entrepreneurs High Yielding Variety fodder production should be extended throughout the country by providing technological knowledge.

Necessary measures should be taken to increase their knowledge in the long run to accept and adopt better practices regarding commercial dairy farming. Special attention should be given for motivating the farmers to cultivate more fodder crops like Para, Napier, maize, Jamboo, German grasses at fellow land and road sides nearby their house to meet up the requirement of feeds and fodder of the dairy cows.

#### **5.5.2. Controlling price fluctuation of milk:**

All the respondents strongly agreed that price fluctuation must be checked by authorities otherwise real farmers fall in loss day after day. Market intermediaries are mainly responsible for over price and most of the adulterations, so their activities are harmful for dairy industries, for this reason they must be regulated by government rules. Price fluctuation can be prevented by proper monitoring, supervision and strict law application.

#### **5.5.3. Ensure regular supply of quality feeds & fodders:**

Farmers faced problems for animal feed during drought, flood and other natural calamities, along with this some imported ingredients may be deteriorated which create problem on feed processing. Adequate supply of readymade feed should be available throughout the year by proper preservation of raw materials. Silage and hay making may solve the problem at a lesser context, but better technology should be applied to preserve fodder during peak season which can be used at the scarce period.

#### **5.5.4. Adequate Artificial Insemination:**

AI technicians need to be properly trained and better heat detector machine should be introduced in this sector to get effective result per service for conception. Frozen semen which is used for AI should be properly preserved so that they can give better result. More professionalism needed for helping the dairy sector from the service providers.

#### **5.5.5. Ensuring adequate Veterinary services:**

Veterinary services need to be more organized in studied areas, veterinarians and other field staffs should be available to farms whenever needed. Enough supply of medicines and required appliances should be available to the areas so that emergency can easily be

managed. Thus to make sustainable profit of farms the opportunities of veterinary services and health care facilities should be available by Govt. and private level simultaneously.

#### **5.5.6. Training facilities on management practices:**

Herd productivity under the farms depends on proper feeding, housing and management practices of the dairy cows under farms. Thus scientific feeding, housing and management practices should be introduced for getting maximum yield of the dairy cows. To get the knowledge they require more training on scientific management practices.

#### **5.5.7. Controlling of fraudulent practices:**

Regular checking and monitoring of the feed formulation company, as well as feed prices in market will help to reduce fraudulent practices in feeding materials. Adulteration checking in markets will reduce the hampering of milk and milk products.

#### **5.5.8. Make available credit facilities:**

All most all the dairy farm owners were found young, in some cases few women were the entrepreneur of the farms. There have no enough fund to expand or run their farms and they were always in shortage of fund which hampered smooth running of the farm business. Proper advertisement of loans for small business men will help them to know about the krishiloan. Govt, should take initiatives to make easy way to take loans from different banks without any harassment.

# CHAPTER VI

## SUMMARY AND POLICY RECOMMENDATIONS

This chapter presents the summary and conclusions of the present study and also provide some recommendations for future planning to develop the RCC and crossbred commercial dairying in Bangladesh. Before presenting the summary contents of different chapters are discussed in brief below.

### 6.1. Summary

As an emerging economic giant country of south Asian subcontinents, Bangladesh shows excellent result by contributing a lot in GDP with the help of livestock. The commercial dairying along with RCC farming in family level as a part of livestock plays a significant role for employed young energetic and risk taking entrepreneur of Chattogram. This study revealed that, dairying creates employment opportunities throughout the year for farm family members as well as other illiterate personnel easily than that of crops enterprise. The present study made comparison between crossbred commercial dairy enterprises with family reared RCC cattle farms to know the profitability, feasibility, productive & reproductive traits etc. to know socioeconomic aspects of both. The cost of dairying varied slightly among the three herd sizes are 92944 for Small, 132999 for Medium and 50082 for RCC but BCR both cash and full cost basis were higher in Medium size farms having 5-10 cows. It was concluded that the medium size farms were found most profitable and sustainable economically because they easily manage their farms by their own available effort and time. However, taking all the condition under consideration, RCC cattle need less management cost but due their lower production rate, BCR is not up to the mark. Moreover, most of the RCC farms under study area are not organized as commercial farms, so it can be said that result will be better if farmers rear this variety of cattle with better care, because their adaptability is higher with local environment and feed.

The present study has been undertaken with the objectives to evaluate and categorize farms on current status of profitability, describe and compare the socio-economic and existing farm management practices in relation to farm profitability with a view to analysis of **“Comparative Socioeconomic Study on Crossbred and Red Chittagong Cattle Dairy Farmers in Some Selected Areas of Chattogram District”** in the study areas.

In this study carried out the socio economic profiles, production and management systems with disease occurrences of small scale dairy farms under different categories of farms. This study was also examined the costs, returns, farm profitability and marketing channels of different categories of farms. The Gross margin per cow per lactation year over cash were estimated at Tk.72072, Tk.128820, Tk.23400 and net return over total costs were also estimated in Tk.590487, Tk.109801, Tk.17037 respectively for small, medium and RCC farms. The Benefit Cost Ratio (BCR) was accounted for **1.64, 1.83 and 1.34** respectively for small, medium crossbred and RCC dairy farms.

## **6.2. Recommendations**

Farmers gave valuable advice for better dairying practices in private management system by proper monitoring of retail market to control price fluctuation of feeds & fodder by companies, ensuring regular supply of quality feeds & fodders by proper preservation method specially for drought and monsoon season, better quality semen should be available & provided by trained AI personnel, ensuring prompt adequate veterinary services and health care facilities, introducing training facilities on proper feeding and management practices, expansion of AI facilities to remote areas, providing regular training & Veterinary extension services, appropriate monitoring system for controlling of fraudulent practices by middlemen, making available credit facilities etc. for overall betterment of RCC & commercial dairy farms in Bangladesh.

## **6.3. Limitation of Research Work:**

Due to scattered distribution of different farms, sometimes data collection need more time for transportation and difficulties in road communication. Moreover, farm's data are not properly arranged, this made some difficulty during farmer selection. Dairy farm owners and the employed managers were found not to be equally cooperative and friendly. Most of the RCC dairy rearers are women who feel shy during interviewing them which create a complicated situation. The actual data regarding production and income is not easy to collect from the farm owners due to they hide the income oriented real facts.

## **6.4. Acknowledgements:**

I would like to thank and acknowledge logistic support and operational fund provided by the Chattogram Veterinary and Animal Sciences University (CVASU), Bangladesh to conduct this study. My supervisor & other tutors helped me lot to conduct the research, at the same time I am grateful to DLS officials and staffs for their cordial support during data collection. Farmer's cooperation, support and contribution in data sharing are unforgettable. I also thankfully acknowledged the help of faculty members of AESc department of CVASU.



## REFERENCES

- Alam, M.G.S. and Ghosh, A. (1988) Reproductive performance in cows: its relation to parity and season. *Bangladesh Vet J* 22, 51-61.
- Alam, J. (1995) *Livestock resources in Bangladesh: Present status and future potential*. University Press Limited, Dhaka, Bangladesh.
- Alam, J. (1997) Impact of smallholder livestock development project in some selected areas of rural Bangladesh. *Livestock for Rural Development*, 9(3):1-6.
- Alam, J., Sayeed, M.A., Rahman, S.M.A., Yasmin, F. and Begum, J. (1998) An economic study on poultry farms in Bangladesh. *Bangladesh Journal of Livestock Research*, 2:1-5.
- Alam, S.M. (2004) A study on backward and forward linkage of poultry farming in some selected areas of Savar Upazila under Dhaka district. M.S. Ag. Econ. thesis, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh.
- Azizunnesa, Sutradhar, B.C., Hasanuzzaman, M., Miazi, O.F., Aktaruzzaman, M., Faruk, M.O. (2010) *Univ. j. zool. Rajshahi. Univ.* Vol. 28, pp.27-31.
- Ba, N.X., Van, N.H., Ngoan, L.D., Leddin, C.M., Doyle, P.T., (2008) Effects of Amount of Concentrate Supplement on Forage Intake, Diet Digestibility and Live Weight Gain in Yellow Cattle in Vietnam. *Asian-Australasian Journal of Animal Sciences* 21, pp. 1736-1744.
- BBS (Bangladesh Bureau of Statistics) (2018) *Statistical year book*. Dhaka, Bangladesh.
- Behera, U.K., Yates, C.M., Kebreab, E., France, J., (2008) Farming systems methodology for efficient resource management at the farm level: a review from an Indian perspective. *Journal of Agricultural Science* 146, pp. 493-505.

- Cabrera, V.E., Solis, D., Corral, J., (2010) Determinants of technical efficiency among dairy farms in Wisconsin. *Journal of Dairy Science* 93, pp. 387-393.
- Cho, J., Overton, T.R., Schwab, C.G., Tauer, L.W. (2007) Determining the amount of rumen-protected methionine supplement that corresponds to the optimal levels of methionine in metabolizable protein for maximizing milk protein production and profit on dairy farms. *Journal of Dairy Science* 90, pp. 4908-4916.
- CPD (2008) Alternative Plan of action needed to boost up domestic livestock production. In Centre for Policy Dialogue National seminar report (Dhaka, CPD, Bangladesh).
- Dairy Value Chain Study in Bangladesh Heifer International Bangladesh, March 2013
- DLS (2018) Perspective Plan (Livestock) for 2000-2020. In Annual Report (Dhaka, Department of Livestock Services, Bangladesh). pp. 1-125.
- DLS (2018) Livestock Economics Section, Department of Livestock Services. Ministry of Fisheries and Livestock.
- Economics of improving reproductive performance in dairy herds, *Advances in Dairy Technology*, Vol 19. University Alberta DeptAgr, Food & NutriSci, Edmonton, pp. 201-214.
- FAOSTAT, (2015) Asian Livestock benefiting from innovation. FAO Online Statistical Reports. Available at: <http://faostat.fao.org/>.
- Fuhrmann, T., (2006) Managing the dairy farm: Key performance indicators, Beauchemin, K., Doepel, L. (Eds.) *Advances in Dairy Technology*, Vol 18. University Alberta DeptAgr, Food & NutriSci, Edmonton, pp. 3-8.
- Griswold, K., Beck, T., Baver, D., Douglass, M., Goodling, R., Hilty, B., Holden, L., Hovingh, E., Ishler, V., O'Connor, M., Tyson, J., Varga, G., (2006) Identifying management areas that limit farm profitability using a combination of industry benchmarks and economic loss factors. *Journal of Animal Science* 84, pp.186-186.

- Gunlu, A., Yalcin, C., Imik, H., Kirikci, K., (2003) Relationship between average milk production cost and some selected technical and socio-economic factors surrounding dairy herds. *Indian Journal of Animal Sciences* 73, pp.1159-1162.
- Hemme, T., Garcia, O. and Khan, A. R. (2005) A review of milk production in Bangladesh with particular emphasis on small-scale producers. Pro-Poor Livestock Policy Initiative (PPLPI), 2005. Available at: <http://www.fao.org/ag/pplpi.html>
- Hossain, M. A. and Routledge, S. F. (1982) Performance of crossbred and local cattle under village conditions in Pabna district of Bangladesh. Proceeding of maximum livestock production from minimum land. Seminar Paper, pp: 161-167.
- Khan, M. K. I., Ali, A., Husain, S. S. and Bhuiyan, A. K. F. H. (1999) Reproductive performances of different genetic group of cows under farm condition. *Ban. J. Anim. Sci.*, 30(1-2): pp:15-19
- Khan, S. J. (2010) Study on the growth promoters used for cattle fattening in Bangladesh. M.S. Thesis submitted to the Department of Animal Nutrition, Bangladesh Agricultural University, Mymensingh (Cited from Huque and Sarker, 2014).
- Mondal, S. C., Alam, M. M., Rashid, M. M., Ali, M. Y. and Hossain, M. M. (2005) Comparative Study on the productive and reproductive performance of different dairy genotypes reared in Bang. Agril. Univ. dairy farm. *Pak. J. Nutr.* 4: pp: 222-225.
- Makeham, J.P., Malcom, L.R., (1995) Economic and financial aspect of farm business. In: *The Farming Game Now*, 29-45.
- Meena, M.S. and Malik, B.S. (2009) Participatory identification of reproductive problems among dairy animals and constraints faced by farmers in Haryana. *Indian Journal of Animal Sciences* 79, pp:1172-1175.

- Miah, A.G., Salma, U. and Hossain, M.M. (2004) Factors Influencing Conception Rate of Local and Crossbred Cows in Bangladesh. *International Journal of Agriculture & Biology*. Vol.6, pp:797-801
- Miller, J., (2006) Determinants of regional profitability on dairy farms. *Journal of Animal Science* 84, pp:249-249.
- Mitra, B.K., (2005) Community Livestock and Dairy Development GMPF/UNDP/FAO Project, BGD/98/009. Yearly Progress Report.
- Islam, M.M., Topader, A. H. and Rob, A. (2010) *Bang. J. Anim. Sci.* 2010, 39(1&2) pp: 191 – 196
- Mondal, S.C., Rashid, M.M, Ali, M.M. and Hossain, M.A.(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, pp:222-225.
- Moran, J.B. (2009) Key Performance Indicators to Diagnose Poor Farm 470 Performance and Profitability of Smallholder Dairy Farmers in Asia. *Asian-Australasian Journal of Animal Sciences* 22, pp:1709-1717
- Mostari, M.P., Huque<sup>1</sup>, K.S., Hasanat<sup>2</sup> M.S. and Gulshan<sup>3</sup>, Z.(2007) Bangladesh Livestock Research Institute, Savar, Dhaka-1341, Bangladesh, *Progress. Agric.* 18(2): pp:109-114,
- Mulligan, F.T., O'Grady, L., Rice, D.A., Doherty, M.L., (2006) A herd health approach to dairy cow nutrition and production diseases of the transition cow. *Animal Reproduction Science* 96, pp:331-353.
- Pursley, R. (2007) Profitable reproductive management of high-producing dairy herds, In: Doepel, L. (Ed.) *Advances in Dairy Technology*, Vol 19. University Alberta Dept Agr, Food & Nutr Sci, Edmonton, pp. 187-200.
- Rabobank Industry Note(2016) 574, October 2016

- Rahman, M. S., Miah, M. A.M and Rahman, M. H. (2000) Dairy cow rearing efficiency in income and employment: a study of two areas of Bangladesh. *Bang. J. An. Sci.* 2000, 29(1-2): pp:11-20
- Gopi, R.,Narmatha\*, N.,Sakthivel, K.M., Uma, V. and Jothilakshmi, M.(2017) *Asian J. Dairy & Food Res*, 36 (1) pp: 16-20
- Shamsuddin, M., Rahman, M. A., Sarder, M. J. U. (1995) Management related variation in the health and fertility status of cows in Mini-dairy farms. *Bangladesh Journal of Animal Sciences.* 24:pp:7-17.
- Shamsuddin, M., Goodger, W.J., Hossein, M.S., Azizunnesa, Bennett, T. and Nordlund, K., (2006) A survey to identify economic opportunities for smallholder dairy farms in Bangladesh.
- Hossain, S. M. J.,Bhuiyan, A.K.F.H.,Haque, K. S.,Akteruzzaman, M., Sarker, N.R. andSultana,N.(2017) Bangladesh Livestock Research Institute, Savar, Dhaka. Department of Animal Breeding and Genetics, Bangladesh Agricultural University, Mymensingh Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh
- Stup, R.E., Hyde, J. and Holden, L.A., (2006): Relationships between selected human resource management practices and dairy farm performance. *Journal of Dairy Science* 89, pp:1116-1120.
- Suzuki, K., Kanameda, A., Ogawa, T., Nguyen, T.T., Dang, T.T.S., Luu, Q.H. andPfeiffer,D.U., (2006) Productivity and socio-economic profile of dairy cattle farmers amongst rural smallholder communities in northern Vietnam. *Livest. Sci.* 101,pp: 242
- Stout, W.L., Fales, S.L., Muller, L.D., Schnabel, R.R., Elwinger, G.F. and Weaver, S.R., (2000) Assessing the effect of management intensive grazing on water quality in the northeast US. *Journal of Soil and Water Conservation* 55, pp:238-243.
- Uddin, M. N., Uddin, M. B., Mamun, M., Hassan, M. M. and Khan, M. M. H. (2012) Small Scale Dairy Farming for Livelihoods of Rural Farmers: Constraint and Prospect in Bangladesh. *Journal of Animal Science Advances*, 2(6): pp:543-550.

# PHOTOGRAPHY



**Fig: 14 Interview and Focus group discussion with Farmers**



**Fig:15 DLS personnel**

## **BIOGRAPHY**

JapuChakraborty was born in Chattogram, Bangladesh in 1984. She is the younger daughter of Kanai LalChakraborty and DiptiChakraborty. She passed the Secondary School Certificate Examination from LatifaSiddiquee Girls High School in 2000 having first division with star marks followed by Higher Secondary Certificate Examination from Sitakunda Degree College in 2002 with first division. She completed her graduation degree on Doctor of Veterinary Medicine (DVM) from Chattogram Veterinary and Animal Sciences University (CVASU), Bangladesh in 2007 with CGPA 3.57. During her graduation, she received clinical training from Madras Veterinary College and Veterinary College & Research Institute, Namakkal, Tamilnadu, India. She has a great enthusiasm in research and has done some pathological and clinical research works along with production reports on cattle farm management during intern period and service life. In professional life she is an established veterinary surgeon, served the country as a member of the dept. of Livestock Services under Ministry of Fisheries & Livestock for more than 7 years. Now, she is a Candidate for the degree of MS in Agricultural Economics, Department of Agricultural Economics and Social Sciences, Faculty of Veterinary Medicine, CVASU.