CHAPTER I

INTRODUCTION

More than 70 percent of Bangladesh's population and 77 percent of its workforce lives in rural areas (World Bank,2016). Nearly half of all of Bangladesh's workers and two-thirds in rural areas are directly employed by agriculture, and about 87 percent of rural households rely on agriculture for at least part of their income (World Bank, 2016). Livestock and poultry are the integral part of the agriculture. Livestock in Bangladesh mainly composed of Cattle, Buffalo, Sheep and Goat. The population of Cattle, Buffalo, Sheep and Goat were 24.086, 1.485, 3.468 and 26.1 Million respectively (DLS, 2017-18). In Bangladesh cattle were mainly reared for milk purpose and dairy industry was a crucial component of an agro-based economy for a country like Bangladesh (Islam et. al, 2006) Livestock plays an important role in the economy Livestock contribution in GDP was 1.54% and GDP volume (Current prices) 396246 Million Taka, Share of Livestock in Agricultural GDP was 13.62% and GDP growth rate of Livestock was 3.40%. Livestock have contribution in employment which was directly 20% and partly 45%. As Bangladesh was not able to produce sufficient amount of cow milk for her own demand till now and for that reason farms were established in small and medium scale throughout the country specially Chittagong, Pabna, Sirazgonj, Bogra etc. Total demand for the 2016-17 year is 150.29 Lakh Metric Ton (250 ml/day/head) and production is 94.06 Lakh Metric Ton so the availability is 158.19 (ml/day/head) so the Deficiency is 56.23 Lakh Metric Ton (DLS-2017).

In Bangladesh dairy farming were mainly divided into household dairy farming, semi-intensive and intensive commercial dairy farming. In household dairy farming there were very few numbers of cows mainly for their own purpose and for the business semi-intensive and intensive farms were established. In commercial dairy farms they were very much conscious about their herd and close observation and monitoring were done. For the fill up of the public demand farmers have a clear choice of high yielding variety like Holstein Friesian. As the cattle breeding policy allow to maintain the HF breed than farmers tends to rear HF crossbreed (HF*Local). Friesian*Local crossbred cow's milk production performance under Bangladesh condition considerably improved over the decades (Bhuiyan,2011) and this crossbreed animals contributes about 24% of the 6.9 million breedable cows and heifers (Huque et al., 2011). Chittagong considered as one of the important dairy belts in Bangladesh and very few study organized here to know the commercial dairy herd structure as well as different quantitative traits like milk production/lactation, calf mortality, and calf birth weight on lactation number, BCS and age of the crossbred cows information is very limited. Therefore, the current study was designed in consideration of the following objectives.

Objectives

1. To study the herd dynamics of commercial dairy farms at Chittagong district.
2. To study different traits in consideration of cows age, body condition score and lactation numbers of cows.

CHAPTER II

MATERIALS AND METHOD

The study was conducted in 11 selected commercial dairy farms at Chittagong of Bangladesh from November 2017 to March 2018. The farms were scattered throughout the city area. These areas were also chosen for the reason that large amount of crossbreed cattle dairy farm established in Chittagong district; therefore the area was considered suitable to conduct field survey. All the individual animal of the selected dairy farms were included in the study and farms were selected by simple randomization. There were total 851 animals where 350 were dairy cows (at least one calving) besides there were dry cows (currently not in milking)), Heifers (≥1 year to 1st pregnancy), Bulls (more than 2 year aged), Bullock (castrated male), calves (30-365 days) etc.

A structured questionnaire was constructed to acquire data regarding the study. The questionnaire was designed to comprise mostly closed and open ended face to face questions to ease data processing, minimize variation, and improve precision of responses (Thrusfield MV, 2005). Important farm and cow level intended data related to study were collected and recorded. Through the questionnaire important farm and cow level intended data related to study were collected and recorded.

Birth weight (Kg) = the birth weight of a new born calf was termed as birth weight.

Body weight = the weight of an adult male or female in kg.

$$\text{Body wt} = \frac{\text{Body length} \times (\text{Heart girth})^2}{300} \times 2.20$$

Body condition scoring of dairy cows in the US is generally performed according to a 1 to 5 scale (Wildman *et al.*, 1982) and the method was applied in this study.

The data generated were stored in a Microsoft Excel spreadsheet (Microsoft Corporation) and the collected data was edited and analyzed using Proc GLM of SAS (SAS, 2008) following the completely randomized design as

$$Y_{ijkl} = \mu + + F_i + L_j + BCS_k + e_{ijkl}$$

- Y_{ijkl}= mean value of traits
- μ= Overall mean
- F_i= Effect of ith farms
- L_j = Effect of jth lactation
- BCS_k= Effect of kth Body condition score of cows
- e_{ijkl} = Random error distributed as N (0, σ2)

Mean with standard deviation of the different data were calculated and analyzed.

CHAPTER III

RESULTS

The study showed that there were total of 851 individual animals including 350 dairy cows, only 5 male calves, 185 female calves, 143 heifers, 7 bull calves, 152 dry calves, 3 bulls, 6 bullocks. There was only single farm found that owned male calves. (Table1)

Table1: Herd structure of the selected dairy farms

FARM NAME	Male Calf	Female Calf	Heifer	Bull Calf	Dry	Bull	Bullock	Dairy cows
F01	0	10	9	0	3	0	0	28
F02	0	22	6	0	4	0	0	18
F03	0	15	17	0	16	0	0	22
F04	0	15	4	0	10	0	0	37
F05	0	15	15	0	20	0	0	40
F06	0	5	6	2	6	1	0	20
F07	0	13	11	3	8	0	4	26
F08	0	35	30	0	35	2	0	78
F09	0	13	9	0	7	0	1	20
F10	0	17	20	0	8	0	0	25
F11	5	25	16	2	35	0	1	36
Total	5	185	143	7	152	3	6	350
Grand Total								**851**

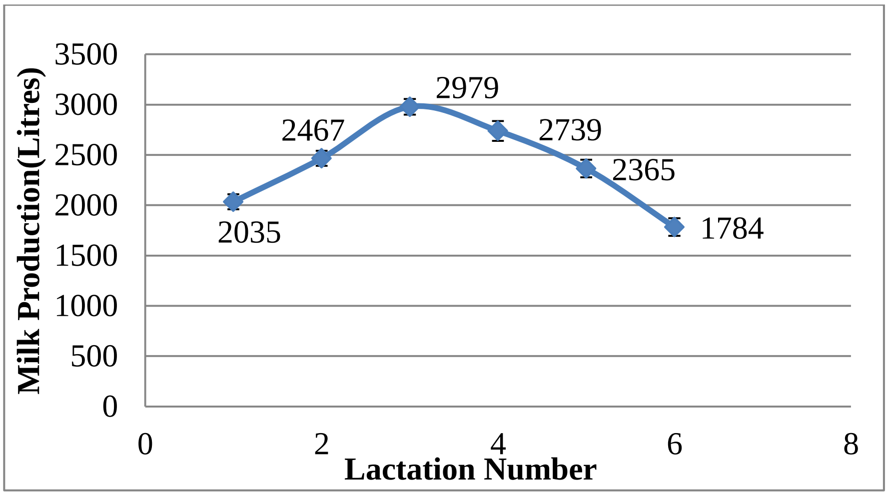
Whereas dairy cows were subdivided into lactation number and it showed that at 1st lactation the highest number of animals were reared and at the 7th lactation minimum number of dairy cattle. The number of dairy cattle at 2nd, 3rd, 4th, 5th , 6th lactation were 86, 78, 55, 24, 02 respectively (Table 2)

Table2: Number of milking cows of different farms according to farm and lactation number in milking

	Lac No	Name of the farm											**Total**
		F01	F02	F03	F04	F05	F06	F07	F08	F09	F10	F11	
No Of Cows	1	7	5	7	12	14	7	9	17	5	9	12	**104**
	2	6	6	4	9	11	6	8	14	8	8	6	**86**
	3	6	3	5	12	6	4	8	19	5	3	7	**78**
	4	4	3	5	3	5	2	1	21	1	4	6	**55**
	5	5	1	1	1	1	1		7	1	1	5	**24**
	6					2							**02**
	7					1							**01**
Total		28	18	22	37	40	20	26	78	20	25	36	**350**
Percentage		**8**	**5.14**	**6.28**	**10.57**	**11.42**	**5.71**	**7.42**	**22.28**	**5.71**	**7.14**	**10.28**	

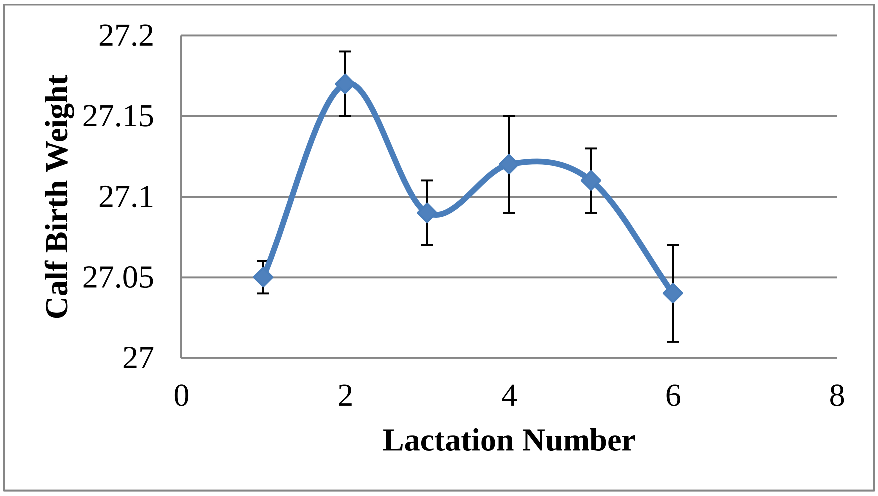
In this study, milk production and lactation number correlation up to 6th lactation have studied. At 7th lactation a single animal was found in the studied area. In 1st, 2nd, 3rd, 4th, 5th, 6th lactation number milk productions were 2035, 2467, 2979, 2739, 2365, 1784 liters respectively. We found highest milk production at 3rd lactation and lowest at the 6th lactation. (Chart1)

Chart 1: Milk production and Lactation number relations



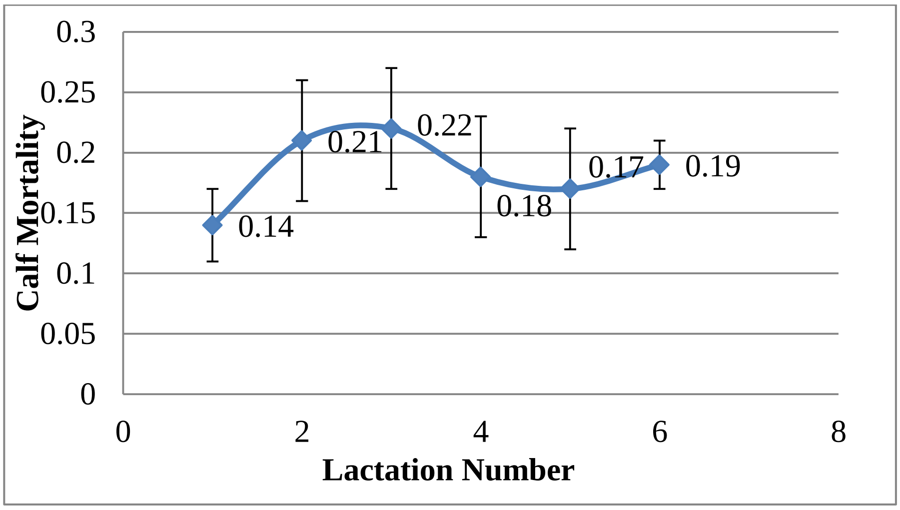
Besides in this study calf birth weight on lactation number correlation studied. We found calf birth weight slight higher at 2nd lactation and calf birth weights were almost similar **(Chart2)**

Chart 2: Lactation wise calf birth weights



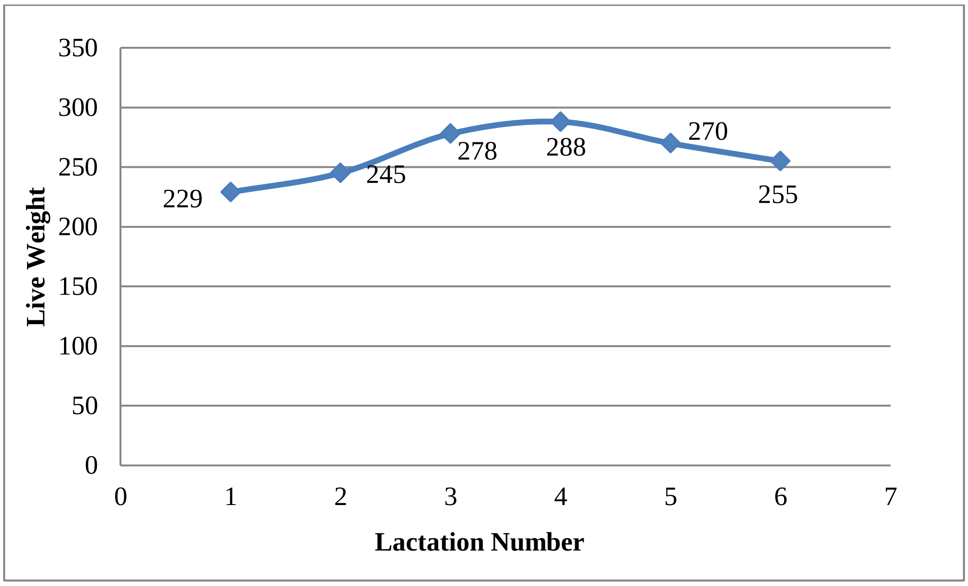
Whereas in case of calf mortality the study found highest amount of mortality in 3rd lactation (22%) and lowest percentage at 1st lactation (14%). The other mortality finding was almost similar **(chart3)**

Chart 3: Calf mortality on different lactation numbers



Live weight were found highest at 4th lactation which was 288 kg and lowest at 1st lactation (229). Weights were 245, 278, 270, 255 kg in 2nd, 3rd, 5th and 6th lactation respectively **(Chart 4)**

Chart 4: Lactation number and corresponding live weight



In this study live weight, lactation production, calf mortality, calf weights were studied in terms of BCS. Whereas live weight were found 241±2.76, 257.57±2.13, 276.56±1.89 ,lactation production were found 2491.53± 92.28, 2774.576±86.33, 2192±268.72 liters , calf mortality were 19±3, 0.16±3 , 21±03 % and Calf birth weight were 26.07±0.15, 27.73±0.15, 26.8±0.66 kg at BCS of 2, BCS of 3 and BCS of 4 respectively (Table 3)

Table 3. The mean with standard error of different traits under different body condition score (BCS) of cows in studied farms

Traits	BCS2	BCS3	BCS4
LiveWt	241±2.76	257.57±2.13	276.56±1.89
LacProd	2491.53± 92.28	2774.576±86.33	2192±268.72
CalfMort	0.19±0.03	0.16±0.032	0.21±0.03
CalfWt	26.07±0.15	27.73±0.15	26.8±0.66

Legends: BCS= Body condition score LacProd-Lactation production

CalfMort-Calf mortality CalfWt-Calf weight

Live weight were 228.41±1.55, 267.69±1.60, 281.45±1.96, 288.61±2.07, 274±2.64 Lactation production was 2055.90±74.1, 2510±98.9, 3008±89.59, 3111±77.34, 2900.66±69.3, 2887.4±94,calf mortality were 10±3, 14±5, 17±5, 16±0.05,19±7 , 22±1 % and Calf birth weight were 26.35±0.24, 29.67±0.20, 27.59±0.22, 26.99±0.33, 28.5±0.44, 27.54±0.30 kg at 3rd,4th, 5th, 6th, 7th and 8th year of age respectively**(Table 4)**

Table4- The mean with standard error of different traits under different age of cows in studied farms.

Trait	Age of the cows					
	3	4	5	6	7	8
LiveWt	228.41 ±1.55	245.49 ±1.2	267.69 ±1.60	281.45 ±1.96	288.61 ±2.07	274 ±2.64
LacProd	2055.90±74.1	2510 ±98.9	3008 ±89.59	3111 ±77.34	2900.66 ±69.3	2887.4 ±94
CalfMort	0.10 ±0.03	0.14 ±0.05	0.17 ±0.05	0.16 ±0.05	0.19 ±0.07	0.22 ±0.1
Calf Wt	26.35 ±0.24	29.67 ±0.20	27.59 ±0.22	26.99 ±0.33	28.5 ±0.44	27.54 ±0.30

Legends: LiveWt-live weight LacProd-Lactation production

CalfMort-Calf mortality CalfWt-Calf weight

CHAPTER IV

DISCUSSION

The study showed the dairy farms were reluctant to rear male calves along with bulls and bullocks. Only one farm have reared male calf and the farmers not interested because from the male calf they found no future milk production and rearing of male calf was costly.

The study found that highest amount of milking cows was at 1^{st} lactation and lowest at 7^{th} lactation. As the dairy cows milk production was decreasing these were not profitable to rear older cows besides due to some pathological condition many older cows were culled.

The study found that there were relationship between lactation number and milk production in case of Holstein Friesian crossbreed. Akçay *et al.* (2007) reported that, in Holstein cattle, lactation number had a significant effect on milk yield at 305 days. It resulted that 3^{rd} lactation producing highest amount of milk which was the same finding of Vijayakumar *et al.*,*(*2017) where findings were the highest milk yield was noted in 3rd lactation cows (33.14±0.23 kg), but opposing the finding of Ray *et al.*, who highest production occurred in either lactation 4 or 5. Petrovic *et al.* (2009) reported that lactation number had a significant effect on milk yield and the cows in their 3rd, 4th and 5th lactation had higher milk yield than other lactations. Similar findings have been reported in Holstein cattle (Türkyılmaz *et al.*, 2005).

Yaylak and Kumlu (2005) reported that lactation number and body condition score had a significant effect on milk yield in Holstein cattle and milk yield increased with the increase of body condition score prior to calving.

Dhumal *et al*. (1989) found no relation between milk yield and parity although 4th parity was detected with highest production by Bajwa *et al.* (2004).

In this study the calf birth weight were 27kg (on average) which was approximately similar to the findings of Rahman *et al.*, 2015 where the Birth weights of crossbred calves from the cross between Holstein-Friesian and Local cattle genotypes were very close to the mean weight of calves at birth for (29.89 kg) male and (28.56 kg) female but the birth weight of calves averaged as 41.034±4.218 kg in Swedish red cattle (Topal et al.,2010). The study finding were higher on the study of Nahar *et al.* 1992 who found HF×L birth weight 21 kg. Holstein Friesian Cross Birth weight (KG) was 25±1.9 (Nath et al.,2016)and the study showed that BCS affected the milk production and in BCS of 3 the production was highest. Domecq *et al.* (1997) reported that, in Holstein Friesain cows, body condition scores had a significant effect on milk yield of the cows at the 120th day of lactation. Roshe *et al.* (2006), Waltner *et al.* (1993) and Berry *et al.* (2007) reported that, in Holstein Friesain cows, there was a significant linear relationship between body condition scores and milk yield. Treacher *et al*. (1986), who reported that moderately conditioned cows at calving produced more milk than fat cows (2.8 vs. 3.9; 5 point scale).

The finding of this study showed the body weight of the female cows were below the finding of Nath et al.,2016 where the Average body weight (kg) of female 475kg.

Calf mortality were almost in the dairy farms in this study which is almost similar the findings of Debnath *et al.*, (1995) where Calf mortality up to 12 months of age is 13.4% under farm level conditions have been reported in Bangladesh. Besides The overall mortality of calf diseases was 6.29% which was lower than many previous reports like 9.3%, 71.1% and 30.7% of Megersa *et al.* (2009), Hossain *et al.* (2013) and Ferede *et al.* (2014), respectively.

CHAPTER V

LIMITATION

For the study it depends on the recorded data which may influence the results soma data were found dissimilar with the record and direct interview.

CHAPTER VI

CONCLUTION

It may be concluded by the study that cow in lactation third under age 6 with BCS 3 was produced highest dairy milk yield under commercial farming conditions of Bangladesh.

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BIOGRAPHY

F. M. Yasir Hasib an intern veterinarian from Chittagong Veterinary and Animal Sciences University (CVASU) was born in Jamalpur, Bangladesh. He was born in a liberal and eminent family. After completing SSC and HSC from Nasirabad Govt. High School and Govt. Hazi Mohammad Mohsin College at 2009 and 2011 respectively, He was getting himself admitted into CVASU in 2013. He was intellectual and well-behaved person and a hard worker as well. He participate a number of activities as a student such as IVSA, Debating Society, AAVB, Animal welfare groups etc. and he will be a competent veterinarian in future.