A cross sectional study on various cow level production parameter and correlation to certain disease in Savar dairy farm, Dhaka

Production report presented in partial fulfillment of the requirement for the degree of Doctor of Veterinary Medicine (DVM)

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CHATTOGRAM VETERINARY AND ANIMAL SCIENCES UNIVERSITY
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Abstract

The cross sectional study was performed to find out different production parameter and their association with certain diseases of dairy cattle at Savar dairy farm.One year's data (from 1st January to 31st December 2019) was collected from the register book and recent data collected from face to face questionnaire with the employee and veterinary surgeon. Among selected five sheds,the daily average milk yield, roughage and concentrate intake was 670 litre,934.4 kg and
475.4 kg respectively. Among 25 cows (five cows from each shed) 96% cows were cross breed and 4% cows were local breed,52% cows were at the below or age of 6.4 years, most of the cow's body weight 351 to500 kg, good BCS, 11 liter or below 11 litre per day,in first parity and late lactation. Acidosis was the most commonly(72%) occurred disease where lameness (16%) was least common. The highest used antibiotics was Gentamycin (36.4%) and the combination of amoxicillin and cloxacillin(36.4%) and the least was Renamycine (1%).Significant relation present between body weight with milk yield and roughage intake with milk yield. Body weight, number of parity and roughage intake have positive correlation with the milk yield. Mastitis and BCS have negative correlation with the milk yield .Cows in second lactation with 12- 14 litre milk yield have the highest risk of mastitis. Cow who intake 21.1 to 30 kg roughages with 9 to 14 milk yield have the more risk of occurring mastitis than the cows who intake 21 or less roughages with 7 to 12 litre milk yield The frequency of mastitis is highest in 3rd parity with 12 to 16 liter milk yield. From this study the overall productive performance and commonly occurring disease and their associated risk factors were identified which is helpful for better management and improved production of dairy cows.

Key word: Dairy cow, productive parameter, mastitis, feed intake.

Chapter- 1
Introduction

Dairy farming is gradually proving to be a profitable agribusiness (DLS 2003). Bangladesh is an agricultural country.Majority of its population live in rural areas. Most of rural farmers are engaged in cow rearing as there integrated farming. Dairy farming also supports substantial employment in production, processing and marketing (Michal 1991). However, dairy cattle in Bangladesh have been used as the dual purpose animal. The cattle population of Bangladesh about 24.23 million out of which 6 million are dairy cattle of local and cross breeds (DLS 2018- 2019). Among the cattle population are about 3.53 million milking cows, 2.61 million dry cows(cattle- banglapedia). Contribution of livestock in gross domestic product 1.54% (DLS 2018-2019.) GDP growth rate of livestock 3.40% (DLS 2018-2019). Total milk production 94.06% lack metric ton(DLS 2018-2019).

In Bangladesh maximum farms have free stall system. They give natural safety from storm, rain and sunlight (Das et al., 2016). In rural area the farm condition are not good. Maximum shed type of the farm are face out system. Maximum cattle are non descriptive type, which do not belongs to any specific breed and termed as indigenous cattle. Indigenous cow was an important constraint for future development of livestock sector. Cross breeding of local cows with Shahiwal, Holestein Friesians, Jersey etc are often seen in rural areas. These cross breed give higher yield in terms of milk.

In an intensive agrarian country like Bangladesh, feed resources for ruminants derived mainly from crop residues, cereal by products, shrubs, fodder trees, and grasses growing in way side bunk and embankment. The available cattle feeds in Bangladesh can be grouped into agro- industrial by product which include agricultural crop residue such as straw, sugarcane tops,bagasse etc and milling by products such as brans, green roughage include leaves of the jackfruits, ipil ipil, etc and aquatic plants such as Napier , Para, German,and seasonal crops like as maize, cowpea, khesari, oats etc(Cattle-Banglapedia).The bulk of the roughages for ruminant feeding is derived from crop residues of rice wheat,pulse,etc. Its estimate that about 190,000 m

tons of grain is available for livestock feeding, contributing only about 15.7% of the total amount of concentrated feed.(cattle- Banglapedia)

Disease and parasite are major problem for the dairy industry in Bangladesh. Most dairy farm affected by different disease such as mastitis, FMD, HS, diarrhea, abortion and skin disease. Mastitis is a dangerous disease for lactating animals and reduce milk production(Ak Shamsuddoha *et al.*,2000). However medical facilities are poor at district and thana level livestock office. The price of essential animal drug are high. A 30% increase in cattle production would be possible if there disease were properly controlled properly (Khamar 1995).

The most frequently used antibiotics were found to be aminoglycoside such gentamycin, kanamycin, and streptomycin. Among the streptomycin was frequently used for treating Tuberculosis. Specifically gentamycin, and kanamycin were used for treating mastitis and pneumonia respectively (Ahmed *et al*., 2013)

Objective.

1. To find out the production status of dairy cows in Savar Dairy Farm
2. To identify diseases and their associated risk factor of dairy cows.
3. To identify the problem and possible solution related to rearing of dairy cows in Bangladesh.

Chapter- 2

Methodology

The methodology has been developed with a view to fulfill the objectives of the study.

Study area: The study was conducted at Central cattle breeding and dairy farm in savar.

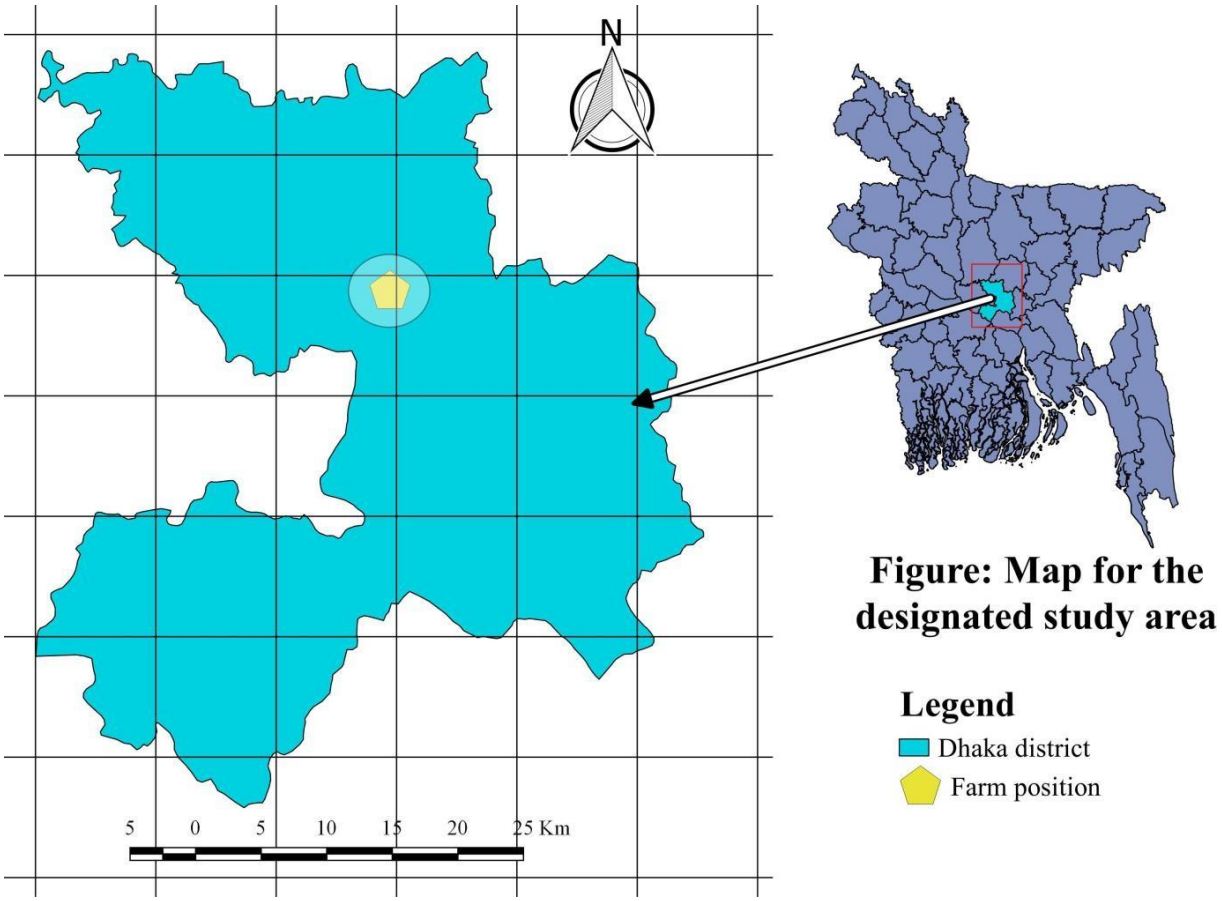

Figure: Map for the designated study area

Study period. The study period of 1st January to 31st December 2019.

Study population: The study population were cattle. The data were collected from central cattle breeding and dairy farm employee and register book. Data collected from five shed. Five cattle from each shed total 25 cattle randomly selected. The questionnaire contained breed, age, sex, BCS, milk production, and disease frequency etc.

Statistical evaluation:

Questionnaire and data management: A well-structured close ended questionnaire was preformed using the variables denoted in peer reviewed scientific studies. The questionnaire was reviewed and finally pretested for response of the farmers. Data was included at farm level (Roughage, concentrated, milk yield etc.) and animal level (age, sex, breed etc.). After collection of all the data that were entered into MS excel (Microsoft office excel-2007, USA) and sorted for data integrity checking. Data analysis was performed using STATA-13.0 (StataCorp, 4905 Lakeway Drive, College Station, Texas 77845 USA)

Descriptive analysis: Variables at herd and cow levels were identified and checked. Herd level quantitative variables were Roughages, concentrated, milk yield, and number of milking cows which were represented in terms of mean, median, minimum and maximum. The retrieved cow level quantitative factors (age, sex, body weight, BCS etc.) were recoded into categories and finally frequency distribution of categorical factors were presented in percentages. Effect of lactation stage with milk yield and number of parity with milk yield causing mastitis were separately illustrated graphically using box plot.

Univariable linear regression: Factors were selected for univariable analysis using milk yield as the response variable. Univariate model was constructed without any random effects at farm level. Linear relationship between the significant factors with response variable was concluded using univariable linear regression model. The results were expressed in terms of co-efficient value (β), standard error and *p*-value. The accepted level of significance was 0.2.

Chapter- 3

Result

Shed level characteristics

Among five shed, the average number of lactating cows are 45 and their daily average milk yield is 670 litre, the average daily roughage and concentrate intake is 934.4 kg and 475.4 kg respectively.

Table 1. Shed level characteristics (n=5)

Variable name	Mean	Median	Minimum	Maximum
Number of lactating cows	45	46	38	50
Roughage /day (kg)	934.4	920	640	1200
Concentrate /day (kg)	475.4	460	357	600
Milk yield/ day (Litre)	670.0	670.0	580	750

Cow level characteristics

In case of cow level data, there have mostly cross breed (96%) cows whereas local breed are few in number (2%). 52% cows are at the age of 6.4 years or less and 48% are the 6.5 to 15 years age old. The majority of the cows (60%) having 351 to 500 kg body weight whereas 40% cows having 350 kg or less body weight. 60 % cows are in good BCS (Body Condition Score) condition whereas only 12% cows are cachectic. Cows with 1st parity is more (36%) than 4th or more parity. 56% cow gives 11 litre or less milk daily whereas 44% cows give 11.1 to 16 litre milk daily. Most of the cows(60%) are in late lactation,24% in mid lactation and 16% in early lactation. Daily 9.1 to 15 kg concentrate feed required for 72% cows and only 28% cows required 9 or less concentrate feed. 56% cows required 21.1 to 30 kg roughages feed daily whereas 44% required 21 or less concentrate feed. Among diseases, milk fever, acidosis, mastitis, lameness occur at 96%,72%,60%,16% respectively. The mostly used (36%) antibiotics Gentamycin and combination of Amoxycillin and Cloxacillin .Penicillin and Renamycin used 18.2%, 9.1% respectively.

Table 2. Cow level characteristics (n=25)

Variable name	**Categories**	**Frequency (%)**
Breed	Cross	23 (96.0)
	Local	2 (4.0)
Age (Years)	6.4 or less	13 (52.0)
	6.5 to 15	12 (48.0)
Body weight (Kg)	350 or less	10 (40.0)
	351 to 500	15 (60.0)
BCS	Good	15 (60.0)
	Moderate	7 (28.0)
	Cachectic	3 (12.0)
Number of parity	1	9 (36.0)
	2	6 (24.0)
	3	5 (20.0)
	4 or more	5 (20.0)
Milk yield (Litre)	11 or less	14 (56.0)
	11.1 to 16	11 (44.0)
Lactation stage	Early (0-3) months	4 (16.0)
	Mid (3-6) months	6 (24.0)
	Late (7-9) months or more	15 (60.0)
Concentrate feeding per day (kg)	9 or less	7 (28.0)
	9.1 to 15	18 (72.0)
Roughage feeding per day (kg)	21 or less	11 (44.0)
	21.1 to 30	14 (56.0)
Diseases	Acidosis	18 (72.0)
	Milk fever	24 (96.0)
	Lameness	4 (16.0)
	Mastitis	15 (60.0)

Antibiotics usage	Amoxycillin and cloxacillin	4 (36.4)
	Penicillin	2 (18.2)
	Gentamycin	4 (36.4)
	Renamycin	1 (9.1)

Association between milk yield and various cow level factors

There have significant relation between body weight with milk yield and roughage intake with milk yield. Body weight, number of parity and roughage intake have positive correlation with the milk yield. Mastitis and BCS have negative correlation with the milk yield.

Table 3. Association between milk yield and various cow level facto Univariate linear regression model (Accepted level of significance ≤ 0.2)

Variable	**β (Co-efficient)**	**Standard error**	***P***
Body weight	1.4	1.2	0.2
Number of parity	0.4	0.5	0.4
Roughage intake	1.5	1.2	0.2
BCS	-0.97	0.8	0.26
Mastitis	-0.3	1.2	0.8

Relationship of milk yield against mastitis and various lactation stages

Cows in the first lactation with lower milk yield have less frequency of mastitis than cows in second and third lactation with higher milk yield. Cows in second lactation with 12- 14 litre milk yield have the highest risk of mastitis.

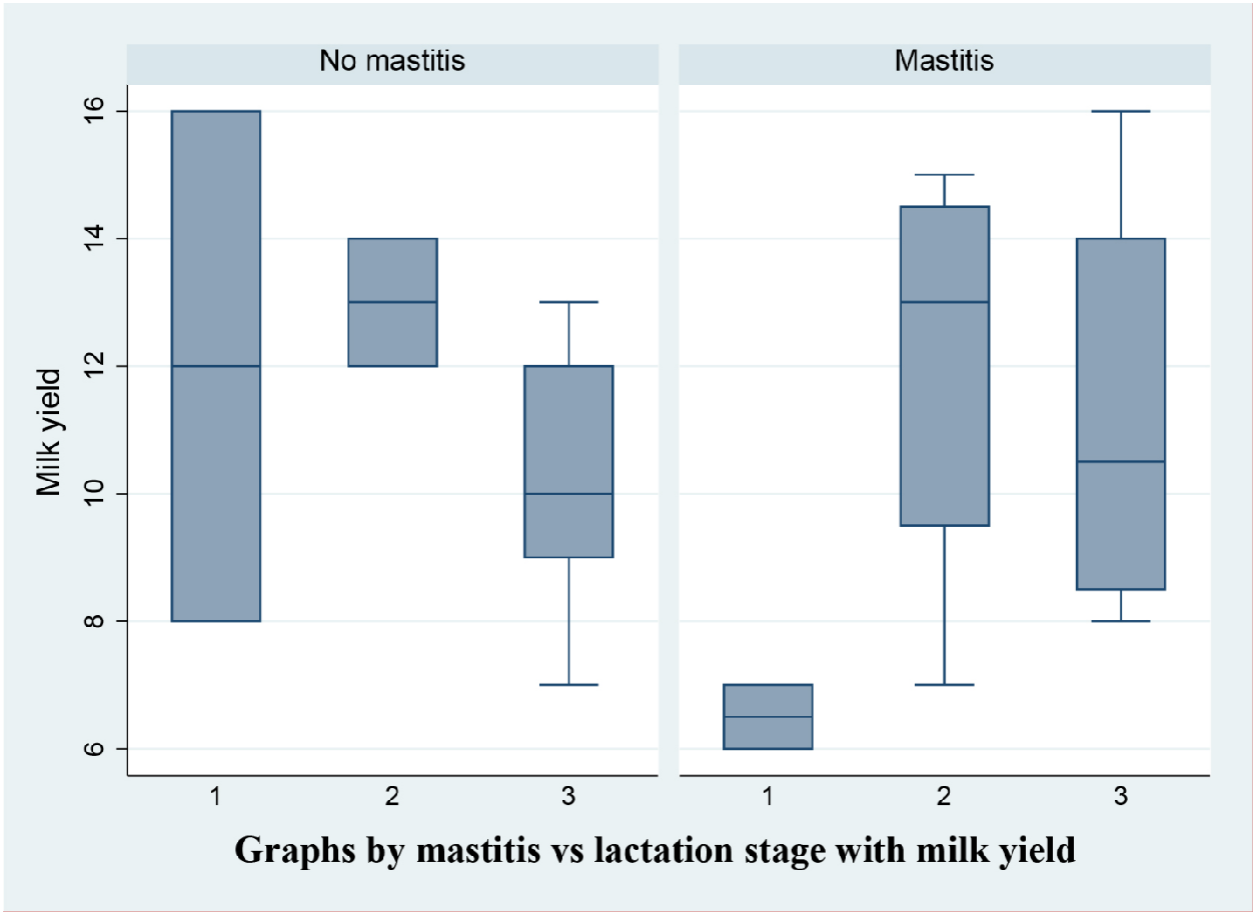

Figure 1. Relationship of milk yield against mastitis and various lactation stages

Relationship of milk yield against mastitis and various categories of parity

Cows in first parity with 6 to 12 litre milk yield are prone to mastitis than 8 to 13 litre milk yield in same parity. During second parity ,cows having 7 to 15 litre milk yield have the more risk of occurring mastitis than 9 to 11 litre milk yiled in same parity. Mastitis occurs more at third parity with 12 to 16 litre milk yield than 12 to 14 litre milk yiled. At 4^{th} paritycows having 7 to 14 litre milk yield occurs mastitis more than 12 to 14 litre milk yield.

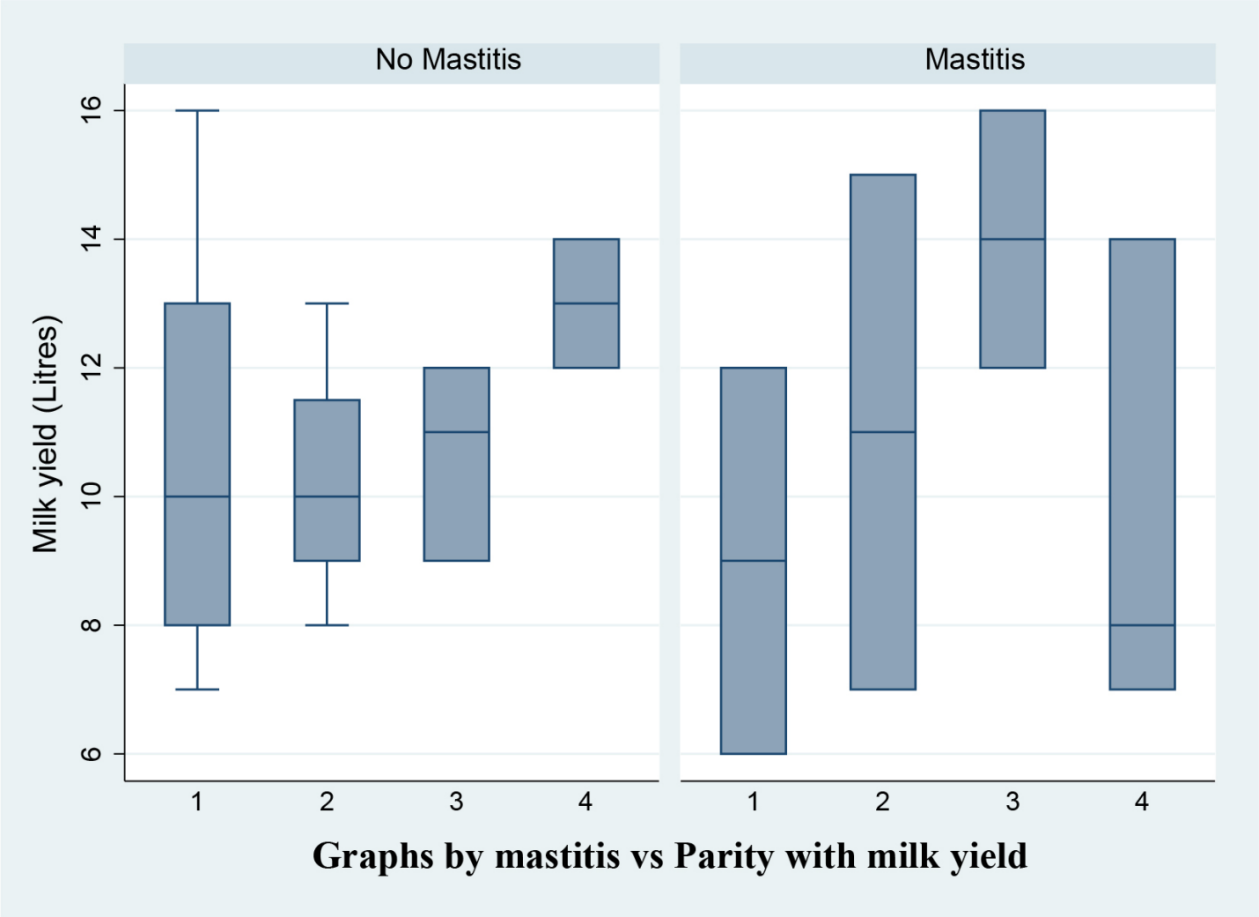

Figure 2. Relationship of milk yield against mastitis and various categories of parity

Relationship of milk yield against mastitis with roughages intake

Cow who intake 21.1 to 30 kg roughages with 9 to 14 milk yield have the more risk of occurring mastitis than the cows who intake 21 or less roughages with 7 to 12 litre milk yield.

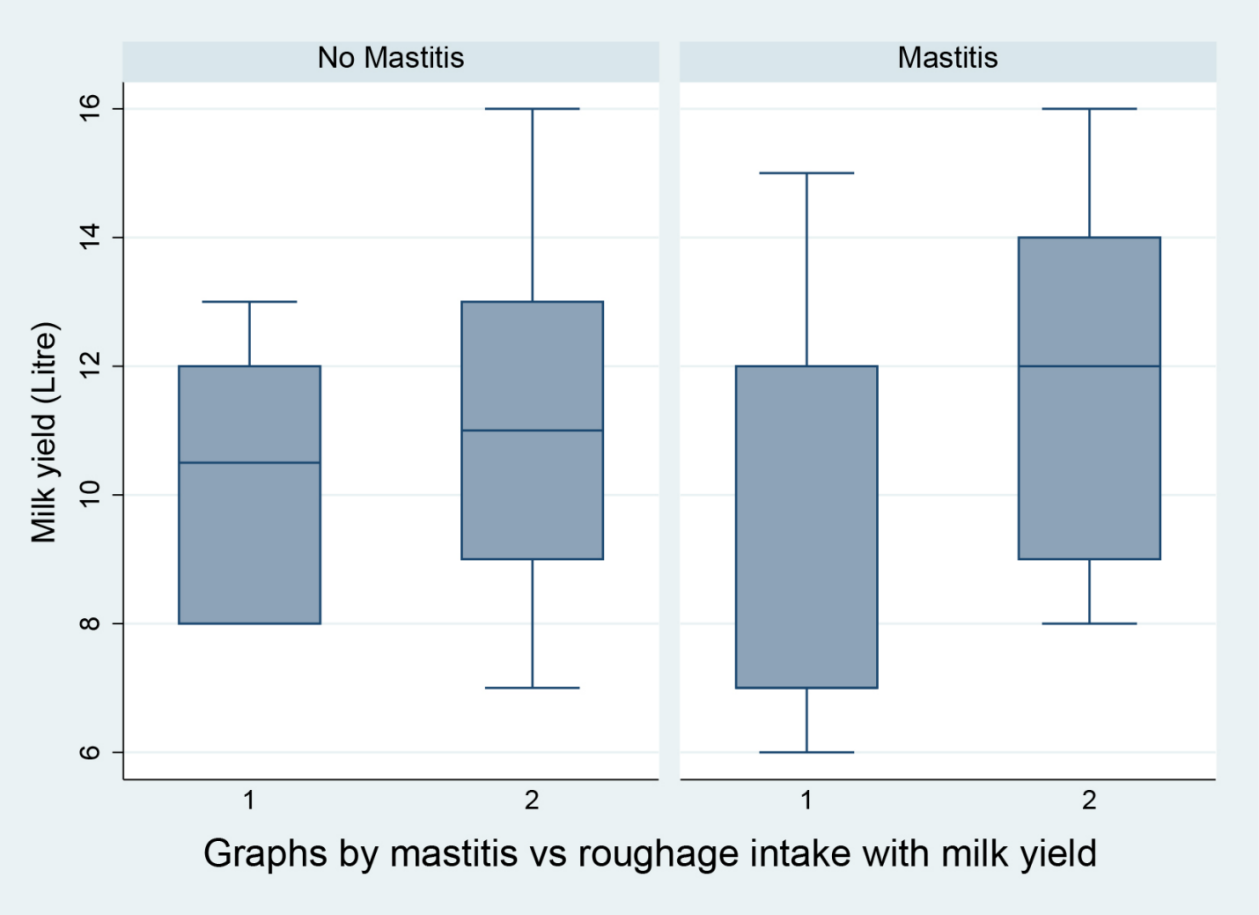

Figure 3: Relationship of milk yield against mastitis with roughage intake

Chapter- 4
Discussion

In our study most of the animal were cross breed and few local breed. Highest milk production of this farm was third lactation. The maximum milk production of the animal 11liter 56% animal and more than 11 liter was 44% animal. In our study total milk per lactation 670 liter. Similar study was made by (Halim 1992) who found that total milk production per lactation were 700 liter. The age of the cows was 6.4 or less 52% and more than 6.4 years was 48%. From the study there was no significant effect between milk production and mastitis in first lactation. Lactation period was significantly associated with milk production, which was similarly demonstrated in the research result of (Baul *et al*.,2012).Incase of parity, no significant relation between milk yield and 4th gives the highest production. (Dhumal *et al*.,1989) found no relation between milk yield and parity. In our study the significant relationship between mastitis and milk production in 2nd and 3rd lactation. In our study the highest milk production in 2nd lactation that have highest risk of mastitis(figure 1). Similarly 4th parity was detected was highest production by (Bajwa *et al*.,2004). Increasing the parity number was alone one of the predictors noted to associated with presence of mastitis. In our study we observed that mastitis are more occure in 3rd parity. The likelihood of mastitis was 24.8 times higher in multiparous cows having four or more calvings compared with primiparous cows(Seegers *et al*.,2003). In the current study it was noticed that all of the older cows particularly those with four or more parities had pendulous udder and previous history mastitis. It also been stated that cows with the most pendulous quarters appear to be most susceptible to mammary infectious (Khan *et al*.,2006).Cows in the early lactation were significantly less likely to have to have mastitis than cows in the mid lactation stage(Figure 2). (Frank *et al*.,2011) Suggested that forage estrogens may influence incidence of mastitis, but this contention never was substantiated. (Ishak *et al*.,2016)reported no significant effected of selenium and vitamins A, D, and E supplementation on incidence of clinical mastitis. The major thirst was reproduction, not mastitis, and mastitis data dealt with clinical cage only. In our study we observed that the cows is who intake 21 or 30 kg roughage that have risk of more occurring mastitis (Figure 3). There is significant effect between concentrated feeding and mastitis. (Table

2) the cows who intake 9.1 to 15 kg concentrated that have more occurring in mastitis.

60% mastitis case from all disease prevalence was diagnosed in cows (Table 2). Mastitis is the most

important and expensive disease of dairy industry (Alert, 1995). This finding is not similar with the finding of (Karim *et al*.,2014) where the prevalence were reported(1.1%). (Rahman *et al*.,2012) and (Samad 2001a) accumulated the clinical mastitis in cows as 0.89% and 0.9% respectively. Mastitis is one of the economic disease in our country. In dairy cattle it results in severe economic losses from reduced milk production, treatment cost, increase labor. This finding is similar with finding of (Miller et al., 1993). It is recognized that if the disease is diagnosed in early stages, the greater portion of this loss can be avoided. Globally the loses due to mastitis amount to about 53 billon dollars annually (Ratafia, 1987).

Milk fever was recorded as (96%) in cattle (Table 2). (Bar and Ezra 2005) observed clinical hypocalcemia before, during or after calving caused by milk fever. (Thirunavukkarasu *et al*. 2010) reported that (13.67%) were affected in milk fever. (Hutjens 2003) studied on Israeli holestein cows and reported that 8% of the pretentious animals died and culled were 12% of them due to milk fever. Acidosis was documented 72% in cattle (Table 2). (Duffield 2000) worked on acidosis and declared that the acidosis is produced when oxygen levels in the body was fallen. In dairy cattle it result in severe economic losses from reduced milk production, treatment cost, increased labor, milk whit held following treatment and premature culling (Miller *et al*.,1993). The mostly used (36%) antibiotics gentamycin for treating of disease (Table 2). Specially gentamycin are used for treating mastitis (Ahmed *et al*., 2013). It was observed that the strong relationship between milk production and body weight.

Chapter- 5
Conclusion

In Savar Dairy Farm,cross breed with good BCS found mainly. Here, acidosis commonly occurred in cows. Gentamycin mostly used here for treatment of diseases in cows. Significant realtion present in body weight and roughage intake with milk yield.The more roughage intake and high milk yield results more prone to mastitis

Chapter- 6
Limitation

1. The time period was short and sample size also limited in number
2. The data collection from farm stuff sometimes difficult due to lack of technical knowledge.

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BIOGRAPHY

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