



## Prevalence and risk factors of mastitis in cows at Gurudaspur upazila in Natore district

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### ABSTRACT

The study was conducted over a period of one year from October 2016 to October 2017 in different milk chilling centers of Aarong Dairy at Gurudaspur upazila in Natore District. A total of 245 milk samples were randomly collected for the study and the samples were tested by somatic cells count test. The overall prevalence of clinical mastitis in cows was 11.02%, of which 6.53% was significantly ( $P < 0.05$ ) higher severe clinical form of mastitis, 3.67% by moderate clinical form and 0.82% by mild clinical form of mastitis. Mastitis was significantly ( $P < 0.05$ ) higher in cross breed cows (15.2%) than the local breed (6.67%). On age basis mastitis was higher in above 7 years cows (16.92%), moderate in 5-7 years cows (9.47%) and lowest in below 4 years cows (8.23%). Prevalence of mastitis was highest in early lactation stage (17.89%) followed by mid lactation stage (7.5%) and lowest in late lactation stage (5.71%). On the basis of quarter infection in dairy cows about 55.56% affect single quarter followed by 25.95% in two quarters, 11.11% in three quarters and 7.40% was in four quarter respectively. There was significant relationship ( $P < 0.05$ ) between prevalence of clinical mastitis with general physical condition and periparturient diseases of mastitis indicating that poor physical condition cows and periparturient diseases favours in the occurrence of mastitis in dairy cows than the good physical condition. Treatment with Masticare plus® @100 gm (Square) was effective for the cureness of mild clinical form of mastitis, Inj.Gentaren @ 10 ml injection (Renata) and Inj.Kop-Vet® (Square) @100 ml was effective for the cureness of moderate clinical form of mastitis, Mastanil® @ 7.5 gm ointment (TECHNO), systemic antibiotic Inj. Amcox 2.5 gm @ Renata and anti-mastitis powder Masticare plus® @100 gm (square) was effective for the cureness of severe clinical form of mastitis respectively. The study revealed that mastitis may found in dairy cows in different forms in respect of their breed, age, lactation stage, and quarter variation, risk factors also plays important role in the occurrence of mastitis.

### INTRODUCTION

Mastitis is a disease of major economic importance in dairy industry worldwide Dairy farmers in Bangladesh are not always aware of the best practices to control mastitis (Rahman et al., 1997). The estimated numbers of dairy farms in Bangladesh is 1.4 million (Hemme, 2015). It is the part of the mixed farming systems (Saadullah, 2015) and a predominant source of income and nutrition and jobs. Milk is the major sources of money income from dairying. Annual milk production in Bangladesh is 16.2 lack metric tons and about 72.75% milk comes from cattle (FAO, 2008). However, Bangladesh has an acute shortage of milk. The produced milk can fulfill only

16.84% of the total requirement in Bangladesh (BLRI, 2015-16). Dairying in Bangladesh is growing faster but it also faces lot of problems of high input and low output prices. Disease, along with non-availability of feed resources and nutrition are the most important constraints to milk production.

Mastitis is a disease of the mammary gland caused by bacterial infection and the most common and costly health disorder of dairy cows (Ruegg, 2003). It has a negative economic impact on dairy farms in terms of disordered milk, lost production, reduced milk equality and treatment costs (Seegers et al., 2003). Furthermore, owing to transmissibility of devastating diseases like

tuberculosis, brucellosis, leptospirosis etc. through milk to human beings, the disease is also important from zoonotic standpoint.

Epidemiological study revealed that infectious agents of mastitis may be transmitted from infected animals from milker's hand (Philpot, 1975; Oliver, 1975), milking cans and in milk samples. All breeds of dairy cows are susceptible to mastitis. High yielding dairy cows are commonly affected than low yielders. Exotic and cross breed cows are more prone to mastitis than the zebu cows (Roy et al, 1989). Prevalence of infection increases in multiparous cows, within 2-3 months of lactation, abnormally large udder, unhygienic environment and means of milking, unclean milker's hand udder wound, and mismanagement of milking machine (Alom, 2001). Prevalence of clinical mastitis in Bangladesh is about 13.3% (Prodhan et al., 1996).

Mastitis remains the most costly infectious disease to the dairy industry and is the most frequent cause of antibiotic use on dairy farms (Erskine et al., 2003). Antibiotic therapy combined with supportive therapy resulted in less severe disease, higher clinical and bacteriological cure rates, and lower recurrence rates in cows with clinical mastitis, compared with supportive therapy only. Complete cessation of antibiotic usage for treatment of clinical mastitis may result in increased clinical mastitis incidence and increased expense in the long term. Antibiotics for treatment of clinical mastitis must be chosen rationally. Antimicrobial treatment of dairy cows creates residues in milk and residue avoidance is an important aspect of mastitis treatment (Wagner and Erskine, 2006). The activity of microlids tetracycline and trimethoprim-sulfonamide has been shown to be reduced in milk (Louhi et al., 1992). Supportive treatment, including the parenteral injection of large quantities of isotonic fluids, particularly those containing glucose, and antihistaminic drugs, is indicated in cases where extensive tissue damage and severe toxemia are present. The application of cold usually in the form of crushed ice in a canvas bag suspended around the udder may reduce absorption of toxins in such cases. If the infection can be eliminated from individual quarters by treatment, the disease is eradicable fairly simply and economically

(Frost, 1965). The purpose of the treatment is to destroy the irritant, repair the damaged tissue and return the udder to normal function. Identification of risk factors is important for the design of control programmes for mastitis in cows. The present study was undertaken to study the overall prevalence of mastitis in cows by somatic cells count test at Gurudaspur upazila in Natore district with observing the breed, age, lactation and quarter's wise prevalence of mastitis in cows. The risk factor and the therapeutic efficacy of different treatments against mastitis in cows were also evaluated.

## MATERIALS AND METHODS

The study was carried out in different dairy farms at Gurudashpur upazila in Natore district over a period of one year from October 2016 to October 2017. A total of 245 dairy cows were selected for diagnosis of mastitis in cattle. During the study period the data were analyzed on the basis of breed, age, lactation stage, quarter infection and risk factors of mastitis in cows. The cases were recorded during the physical visit of the farms; owner's statement. The clinical diagnosis of mastitis was made on the clinical signs, clinical history, and physical examination.

### Clinical examination of mastitis

The most obvious symptoms of clinical mastitis are depends on mild, moderate or severe form of mastitis. The udder such as swelling, heat, hardness, redness, or pain and the milk such as a watery appearance, flakes, clots or pus. Other symptoms depend upon the severity of the illness and a reduction in milk yield, an increase in body temperature, the lack of appetite and sunken eyes. In case of subclinical mastitis the casein and calcium levels in blood stream of mastitis affected cows are reduced and it affects the taste of milk. It also the normal  $P^H$  of milk 6.6 is increased into 6.8 to 6.9. Signs of diarrhoea and dehydration. a reduction of motility due to pain in udder or simply feeling unwell.

The severity of clinical mastitis can be interpreted as mild form (Flakes and clots in milk, slight swelling of infected quarter and absence of systemic reaction/fever); moderate form

(Generalized swelling of infected quarter, painful udder and abnormality in milk without systemic reaction) and severe form (The secretion was abnormal with hot and swollen quarter or udder, fever, rapid pulse, loss of appetite, stopped milking, dehydration and depression).

### Laboratory examination of mastitis

Somatic cell count (SCC) test was applied to identify the milk quality as well as counting the bacterial presence for mastitis disease in per ml of milk. In this methods 1.5 gm mastoprim reagent (Kiev Company Labtajm LTD. Ukraine) mixed with 100 ml distilled water and prepared the working solution. Then 5 ml reagent mixed solution kept into SCC flask and pressed enter to ready to receive the milk sample. Then 10 ml milk (30-35°C) also kept by another pipette and pressed the enter button. Finally the flasks were rotated 10 times automatically and give the result of samples into Somatic cell count machines. Two types of values like C value and N value indicates milk quality mastitis pregnancy with somatic cell respectively. Multiplication of N value with 1000 provided the somatic cells numbers present in per ml of milk. Presence of about  $\leq 100000$  number of somatic cells per ml milk indicate subclinical (mild) form of mastitis, about  $\geq 200000$  indicates moderate infection of udder (moderate type mastitis) and about  $\geq 300000$  of somatic cells indicated severe clinical form of mastitis.

### Treatments

A total of 30 cows were selected for antibiotic treatment and the animals were divided into 3 equal groups depending on the severity of mastitis. Group A (mild form) was treated with antimastitis powder (Masticare plus®) @ 100 gm per cow orally for 5 days. Group B (moderate form) was treated with gentamycin (Gentaren® Renata) @ 1ml/ 10kg body weight, intramuscularly for 1<sup>st</sup> day at 12 hours interval and then at 24 hours interval for 5 days and anti-inflammatory agents injection (Kop-Vet® Square ltd.) intramuscularly @ 3mg/kg body weight daily for 5 days. Group C (severe form) was treated with intramammary antibiotics syringe (Mastanil 7.5 gm ointment TECHNO) @ 1 syringe (Gentamicin Sulphate

100mg) per affected quarter at every 12 hours daily 1 times for 5 days; injection amoxicillin Na and Cloxacillin Na 1.25 1.25 gm (Amcox Renata 2.5 gm) @ 10 ml per 100 kg body weight cow 1 time daily for 5 days and anti mastitis power (Masticare plus ®100 gm) 30 gm two times orally for 5 days.

### Data analysis

The prevalence of clinical mastitis was the dependent variable while age, breed,, lactation stage, quarter involvement, risk factors like as general physical condition, Frequency of dung removal, effect of reproductive diseases were independent variables considered at cow level. The independent variables at herd level include barn floor status and hygienic strategy. The association between dependent and independent variables were tasted by logistic regression. For analysis of data IBM SPSS Statistics 20.0 software package and the chart was created by Microsoft Excel 2007 software was used.

## RESULTS AND DISCUSSION

### Frequency and distribution of mastitis

The data demonstrated that the overall prevalence of clinical mastitis was 11.02 % and mild clinical mastitis ( $N \geq 1,00,000$ ) was 6.53 %, moderate type of clinical mastitis ( $N \geq 2,00,000$ ) was 3.62% and severe form of clinical mastitis ( $N \geq 3,00,000$ ) was 70.42 % (Table 1). The lowest level (mild clinical) of mastitis ( $N \leq 1,00,000$ ) was 0.82% and highest clinical mastitis ( $N \geq 3,00,000$ ) severe form was 6.53% in this study. This result is similar to the report of McDougall (1999), who reported overall prevalence of mastitis is 12.4% and lowest clinical and highest clinical mastitis was 0.19% and 21.45% respectively. However, the severe clinical or highest clinical mastitis prevalence rate reported by McDougall (1999) was higher that the results of this study. It may differ due to different geographical location, age or breed variation or methodology. However the result of this study is in accordance with the report of Pankey et al. (1996) who reported 12.2% overall mastitis with lowest and highest clinical mastitis was 2.8% and 8.1% respectively.

Table 1  
Overall prevalence of mastitis by somatic cells count test in dairy cows.

Forms of mastitis	Total sample	No. of positive test	Percentage %	% of Category	P value
Mild clinical $N \leq 1,00,000$	245	16	6.53		
Moderate clinical ( $N \geq 200,000$ )	245	9	3.67	11.02	0.014*
Severe clinical ( $N \geq 300,000$ )	245	2	0.82		

P<0.05, significant at 5% level.

Table 2  
Prevalence of mastitis in dairy cows based on the characteristics.

Characteristics	No. of Cows Examined	Mastitis Prevalence %	Chi-square test (p-value)
Breed	Indigenous	6.67	0.033*
	Crossbred	15.2	
	Total	11.02	
Age(Years)	< 4 yrs	8.23	0.20(NS)**
	5-7 yrs	9.47	
	> 7 yrs	16.92	
Lactation stage	Early (60-90) days	17.89	0.034*
	Mid 91-180) days	7.5	
	Late >181 days	5.71	
Affected quarter	1 <sup>st</sup>	55.56	0.0012**
	2 <sup>nd</sup>	25.95	
	3 <sup>rd</sup>	11.11	
	4 <sup>th</sup>	7.40	

P<0.05, significant at 5% level; \* = Significant (P < 0.05)

\*\* Means statistically highly significant at 1% level of significant.

### Animal characteristics

The prevalence of mastitis in indigenous cow was 6.67% and in cross breed was 15.2%. The result indicated that the prevalence of mastitis was higher (15.2%) in cross breed cows than indigenous cow (6.67%) (Table 2).

The prevalence of mastitis for the age of cows of < 4 yrs, 5-7 yrs and > 7 yrs were 8.23%, 9.43%, and 16.97 % respectively (Table 2). This result is supported by the result of Lidet et al. (2013). Kathiriya et al. (2014) reported slightly higher prevalence of mastitis in dairy cows of < 4 years 22.22%, in 5-7 years 27.94% and > 7 years 21.21% respectively. The prevalence of mastitis is higher in aged cows than the young cows (Sarba and Tola, 2017) which support the present study.

The prevalence of mastitis in early lactation stage was 17.89%, mild lactation stage was 7.5%, and late stage was 5.71% (Table 2) which is supported by the study of Hogan et al. (1990) who reported that the prevalence rate in early lactation, mid lactation and late lactation stage were 15.38%, 8.80% and 5.36% respectively.

The prevalence of mastitis in single quarter was 55.56%, in two quarters 25.95%, in three quarters 11.11% and in four quarters 7.40% with overall 4.08% (Table 2). This result is in accordance with the results of Radostits et al. (2000) where the prevalence of quarter wise mastitis was overall 3.16% with 57.89%, 26.32%, 10.53%, and 5.26 % for one to four number of quarters by turns.

## Risk factors of mastitis

### Physical condition

The prevalence of clinical mastitis was 15.85% and 3.68% in poor and good physical condition respectively (Table 3). The present findings revealed a significant association between the general physical condition and mastitis prevalence in cows. The poor healthy cows are more

susceptible than good healthy cows. This report is supported by the report of Rehman et al. (1997), where 20.13% mastitis was found in poor condition and 3.68% in good health cows. The result of this study is slightly higher than the result of Rehman et al. (1997) who reported that increased milk production by an animal of good health might be one of the risk factors. It was suggested that high milk yield might predispose animals to udder infections.

Table 3  
Prevalence of mastitis in dairy cows according to risk factors.

Risk factors		No. of Examined	Cows Mastitis Prevalence %	P value
Physical condition	Poor	138	15.94	0.004*
	Good	107	4.67	
Dung removal (Times/day)	1	70	12.86	0.74 (NS)
	2	85	9.41	
	3	90	11.11	
Floor Type	Concrete or brick-block	160	12.5	0.31 (NS)
	Soiled	85	8.24	
	Total	245	Overall 11.02	
Reproductive diseases	Cows without a history of periparturient diseases	185	3.78	0.00** (S)
	Cows with a history of periparturient diseases	60	33.33	

Poor = Cachectic condition; Good = slightly emaciated condition.

\* = Significant (P<0.05); \*\* = Statistically Highly significant.(P<0.05)

### Frequency of dung removal

Prevalence of mastitis in dairy cows with frequency of dung removal 1 times/day was 12.86%, for 2 times/ day 9.41% and 3 times/ day was 11.11% respectively (Table 3). Similar results have been documented by Carroll (1977) where the prevalence was 8.70% and 6.31% in case of dung removal by one time and two times per day. Environmental mastitis pathogens with reservoirs in dung, floor, bedding etc. are only occasionally associated with mastitis. Therefore, mastitis control practices directed against environmental mastitis pathogens are not likely to be as potentially rewarding as practices aimed at controlling contagious pathogens.

### Floor condition

The prevalence of mastitis was significantly affected by floor conditions. The prevalence of mastitis was 12.5% with concrete or brick-block floor and 8.24% in farms with soil floor respectively (Table 3). This can be explained by the fact that farms with soil floor would dry more quickly than the brick floor (Hogan et al., 1990). Kivaria et al. (2004) showed scarcity of water as one of the potential risk factors for the prevalence of mastitis. This is true for the area where the present investigation is done. Moreover, soiled floor cleaning and disinfection is difficult than concrete floor.

### Reproductive diseases

Cows without a history of periparturient diseases were 3.78% mastitis and with a history of periparturient diseases was 33.33%. This result strongly is supported by the report of Bari et al. (2014) where without a history Cows of periparturient disease had a prevalence of 3.73% mastitis, in contrast, 33.67% of cows with a history of periparturient disease had mastitis. Once a cow is infected or diseased during the periparturient period, it becomes more susceptible

to udder infection due to lowered immunity (Nickerson, 1994).

### Efficacy of treatment

Cure rate of 70%, 60% and 40% was observed when treated with intramammary antibiotic, systemic antibiotic + anti-inflammatory and combined of both treatment strategies respectively for treatment of mild clinical mastitis, moderate clinical and severe clinical mastitis (Table 4).

Table 4  
Efficacy of treatment regimens on clinical mastitis in cows.

Type of mastitis	Treatment regimens	Treatment Outcome			Cured duration	P value
		Total cases	Cured case	% Cured		
Mild clinical	Intramammary Antibiotic/powder	10	7	70	3-5 days	0.39 (NS)
Moderate clinical	Systemic Antibiotic+ Anti-inflammatory	10	6	60	7-10 days	
Severe clinical	Intramammary Antibiotic+ Systemic Antibiotic+ Anti-inflammatory	10	4	40	15-21 days	

NS = statistically nonsignificant.(P> 0.05)

It is observed that when treatment was given after conformation of stage of mastitis (rational treatment), it gives better result than those treating with any cases of mastitis in field condition by systemic antibiotics (Conventional treatment). The response to treatment in the present study is less than the report given by Bari et al. (2014) by using intramammary antibiotic, systemic antibiotic + anti-inflammatory and combined of both treatment strategies with the cure rate of 80%, 71.4% and 66.67% respectively.

### CONCLUSION

The prevalence of mild clinical mastitis was highest level than the other form of mastitis in the study area. Cross breeds cows are more susceptible to mastitis than the indigenous cows. Adult cows (>7 years) are more affected with mastitis than the younger cows. Early lactation staged of cows are more prevalent to mastitis than the other lactation staged of cows. Mastitis affects single quarter than multiple quarters. Poor physical condition cows and periparturient diseases favours in the occurrence of mastitis in dairy cows than the good physical condition. Treatment with

Masticare plus® @100 gm (square) was effective for mild clinical form of mastitis, Inj.Gentaren @ 10 ml injection (Renata) and Inj.Kop-Vet® @100 ml (Square pharmaceutical ltd) was effective for the moderate clinical form of mastitis, Mastanil® @ 7.5 gm ointment (TECHNO drug ltd), systemic antibiotic Inj. Amcox 2.5 gm (Renata) @ and anti- mastitis powder Masticare plus® @100 gm (Square pharmaceutical ltd) was effective for the severe clinical form of mastitis respectively.

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