



## Field Investigation on Sub-clinical Mastitis in Cows in Different areas of Barisal district in Bangladesh

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### ABSTRACT

In every year, Subclinical mastitis (SCM) frequently occurs and results huge economic losses in livestock industry of Bangladesh. This study was redacted to estimate the present status of SCM in cow in selective area of Barisal district. For determining sub-clinical mastitis, a total of 152 milk samples of clinically suspected cows were subjected to White Side Test (WST) and Surf Field Mastitis Test (SFMT). Specifically, the milk samples of each individual cows which were positive to both WST and SFMT considered as SCM indicating 35.52% prevalence. Other than the local breed cows, the cross bred cows showed significantly higher prevalence, is 47.06%. In consideration to age variation, highest prevalence was observed at 5 to 7 years of age in both types where cross breed was 54.71% and 36.67% for local breed cows. Though highest prevalence was recorded as 34.78% in 2<sup>nd</sup> parity of local breed cows but the cross breed cows showed highest prevalence 54.55% in their 3<sup>rd</sup> parity. Afterward, non-pregnant cows showed the insignificantly higher prevalence (41.06%) than pregnant cows were 26.32%. Additionally, this study reported that the cross breed cows yielding more than 10 liters of milk (prevalence was 61.54%) were more prone to SCM than the others and also >5 to 10 liters milk producing local breed cows (prevalence was 31.03%) were more susceptible to SCM than others. In a short, this study revealed that high milk yielding cross breed cows are more likely to SCM after their 3<sup>rd</sup> calving.

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### Introduction

Mastitis is now one of the major threats for dairy industry due to huge economic losses from reduced milk production with increased treatment costs, labor cost and finally to death or premature culling (Miller et al., 1993). In Bangladesh, it has been estimated that around 122.6 million taka (US \$2.11 million) losses were occurred annually due to reduced milk production alone caused by subclinical mastitis (Kader et al., 2003). As was reported that the prevalence of SCM was 29% (Islam et al., 2011) to 51.8% (Tripura et al., 2014) in Bangladesh based on WST and SFMT. A lot of etiological agents have been involved in mastitis in dairy animal including bacteria, mycoplasma and yeast pathogens (Egwu et al., 1994). *Staphylococcus* sp. is the most frequent etiological agents that cause clinical and subclinical mastitis in cows whereas commonly isolated pathogens are *S aureus* and *Escherichia coli* (Contreras et al., 2003). Besides this, some predisposing factors such as pendulous udder with long teats, larger size of teat orifice in high yielding cows, traumatic injuries, poor management and hygiene, teat

injuries and faulty milking machines are known to hasten the entry of infectious agents and the course of the disease (Majic et al., 1993). Infection rate is more in successive lactation than the first lactation while exotic and crossbred cows are more prone to mastitis. Physico-chemical, pathological with bacteriological changes in milk and glandular tissue have been commonly implicated with clinical mastitis (CM) (Samad, 2008). Whereas, the Sub clinical mastitis as there were no clinical signs only instead there is an increase in somatic cell counts of the milk (Radostits et al., 2000). Singh (1988) reported, more than three times losses due to SCM as compared to clinical mastitis (CM). The CM can easily be detected by inspection of udder and or systemic signs. On the other hand, diagnosis of subclinical mastitis is problematic and can be done by various methods, based on physico-chemical changes of milk and cultural isolation of organisms (Emanuelson et al., 1987). However, indirect tests viz. California Mastitis Test (CMT), White Side Test (WST), Surf Field Mastitis Test (SFMT) etc. can be

considered as simple, easily applicable tests without requiring any sophisticated laboratory equipment. Maintaining hygiene with Proper milking procedure might be the easiest and most economical way to control of mastitis (Hutton et al., 1990). This test was undertaken to determine the prevalence of mastitis in Barisal district with antimicrobial efficacy.

### Materials and Methods

The study was carried out during the period of November, 2016 to April, 2017 (for 06 months) in different area of Barisal district of Bangladesh. In this study, most of the suspected lactating ones were considered to take milk samples. All the instruments were sterilized that used for sample collection and separate set of instruments were used for each individual case in a day. Cross and local breeds are available among dairy animals. Extensive management system with ground muddy floor including little amount of concentrate feed were frequently practiced in study areas.

#### Physical Examination of Animal and Milk Sample

Physical condition of udder, body temperature, pulse rate, appetite and posture etc. were observed by visual examination of the cows. Different body parts and systems of suspected cows were examined by different methods described by Kelly (1979) and Samad (1988). Udders of the suspected animals were examined by different ways which were described by Islam et al. (2010). Besides this, all the milk samples were considered for physical examination with naked eyes and organoleptic tests immediately after collection.

#### Collection of Clinical Data

All the clinical data from the owners and persons exclusively related with the affected animals were collected by using a questionnaire which was formulated with considering the criteria described by Thrusfield (2005).

#### Indirect Tests for Detection of Mastitis

All the tests were performed at field condition immediately after collection of milk.

**White Side Test (WST):** For detection of subclinical mastitis the WST was practiced according to the procedure which was narrated by Kahir (2006). In this test well mixed five drops of suspected milk samples were placed on a glass slide bearing a dark background and then 20 µl of 4% NaOH solution were mixed. And the mixture was stirred frequently with a sterile toothpick for 20-25 seconds. The result and grading of WST was determined as well as Kahir (2006).

**Surf Field Mastitis Test (SFMT):** In this test, 2 ml milk was drawn into a black paddle cup and 2 ml surf solution (4% solution of Surf Excel®, Uniliver, Bangladesh) was properly mixed by gentle circular motion of the paddle for few seconds. The reaction developed almost within 30 seconds and immediately result was scored as 1+, 2+ and 3+ like WST. This test was performed and scored following the method described by (Muhammad et al., 1995).

### Results and Discussion

In this study, a total of 152 cases were faced and all were sick dairy species. Among them 83 samples were showed positive to both or not WST and SFMT. The samples which were showed positive to both WST and SFMT are considered as mastitis positive sample. The prevalence of SCM in lactating cows were 35.52%. This finding was closely associated with Islam et al. (2010) who reported 36.46% prevalence in lactating cow. Moreover, Kader et al. (2002) reported 46.6% SCM in cross-bred lactating cows in Bangladesh whereas Prodhan et al. (1996) reported a lower prevalence (15.8%) in Baghabari milk shed area of Bangladesh. Subsequently, Islam et al. (2011) found 29% and Tripura et al. (2014) reported 51.8% prevalence in Bangladesh. Some causes likewise, breed variation, management systems and tests used for screening of milk samples were responsible for these dissimilarities on prevalence rates of SCM. Furthermore, prevalence of SCM was significantly ( $P < 0.01$ ) higher in cross breed (47.06%) than in local breed cow, 26.19% (Table 1). In this study, prevalence of cross breed cow was higher than the finding of Islam et al. (2011) that is 36.36% but in local breed cow, this is almost similar calculating as 24.61% at rural area of Tangail in Bangladesh. On the other hand, this result is similar with the findings of Rahman et al. (1997) who observed higher frequency of sub-clinical mastitis in cross breeds. Cross breed cows produce more milk than the local zebus. Having large size, long, and pendulous udder in cross breed cow might have picked up more infection resulting higher rate of infection (Roy et al., 1993). But the result may vary due to improper hygienic condition and ignorance of the farmer and also the limited stock of cross breed.

In the aspects of age variation, the highest prevalence rate was recorded as 54.17% and 36.67% respectively in cross breed and local breed cows having the age between >5 to 7 years which was not significant ( $P > 0.05$ ) (Table 2). It indicates that during this age, the dairy cows are in their optimum milk production which acts as an important factor for occurring SCM. These observations partially support with the findings of Rahman et al. (2009) and the result may have a little bit of variation with others observations may be due to different management system.

Table 1 Prevalence of mastitis in different types of cow

Types of cow	No. of sample tested	No. of positive sample	Prevalence (%)	P-value
Cross breed	68	32	47.06	0.007
Local breed	84	22	26.19	
Total	152	54	35.53	

Highly significant at 1% level ( $P < 0.01$ )

Table 2 Age wise prevalence of SCM in dairy cows

Age (Year)	Cross breed				Local breed			
	NST	NPS	PP (%)	P	NST	NPS	PP (%)	P
2 to 3	11	5	45.45		21	5	23.81	
>3 to 5	23	12	52.17		21	4	19.05	
>5 to 7	24	13	54.17	0.298	30	11	36.67	0.410
>7 to ≥8	10	2	20		12	2	16.67	
Total	68	32	47.06		84	22	26.19	

NST: No. of sample tested, NPS: No. of positive sample, PP: Percentage (%) of prevalence, P: P- value, Significant at 5% level (P<0.05).

Table 3 Parity wise prevalence of SCM in cows.

Parity (Lactation)	Cross breed				Local breed			
	NST	NPS	PP (%)	P	NST	NPS	PP (%)	P
1 <sup>st</sup>	17	7	41.18		18	4	22.22	
2 <sup>nd</sup>	15	7	46.67		23	8	34.78	
3 <sup>rd</sup>	22	12	54.55	0.84	19	5	26.32	0.709
4 <sup>th</sup>	14	6	42.86		24	5	20.83	
Total	68	32	47.06		84	22	26.19	

NST: No. of sample tested, NPS: No. of positive sample, PP: Percentage (%) of prevalence, P: P- value, Significant at 5% level (P<0.05).

Table 4 Occurrence of mastitis on different reproductive stage.

Pregnancy status	No. of sample tested	No. of positive sample	Percentage	P-value.
Non Pregnant and lactating	95	39	41.06	
Pregnant and lactating	57	15	26.32	0.066
Total	152	54	35.53	

Significant at 5% level (P<0.05)

In consideration to parity, SCM occurs in different stages of lactation. Parity plays an important role in causing mastitis. In cross breed cows of 3<sup>rd</sup> parity, prevalence was 54.55% insignificantly (P>0.05) higher than other parity where lowest prevalence (41.18%) was in 1<sup>st</sup> parity (Table 3.). This result agrees with the findings of Rasool et al. (1985) who reported an upsurge prevalence of SCM associated with progressive stage of parity. However, in local breed cows, the highest prevalence (34.78%) was recorded in 2<sup>nd</sup> parity but the lowest was 20.83% (Table 3.) in 4<sup>th</sup> parity that was insignificant (P>0.05) than other parity. This finding is very much close to Sing et al. (1988) where he stated that the highest prevalence rate of SCM was in 2<sup>nd</sup> parity than others. The highest prevalence (41.06%) of SCM was found in non-pregnant cows and was insignificantly (P>0.05) higher than pregnant cows where prevalence was 26.32% (Table 4). These findings are almost close to Biswas et al. (2017) where he stated that the non-pregnant cows (55.55%) are more prone to infection than pregnant cows (46.43%). In pregnant and lactating animals, the amount of milk production is reduced due to lower amount of prolactin release and lower nutritional level because fetus takes a great part on nutrition. Low milk production is less prone to mastitis (Nulin et al., 1989). For determining the prevalence of SCM related to milk yield the cross breed and local breed cows were grouped into three (Table 5). Though, the highest prevalence was 61.54% in cross breed cows yielding more than 10 liters of milk but the local breed cows having milk yield between >5 to 10 liters showed insignificantly (P>0.05) highest prevalence (31.03%) than other groups. This observation is considerably similar with the report of Islam et al. (2011) and Tripura et al. (2014).

## Conclusion

All over the Bangladesh, mastitis outbreak is very common and it dramatically increases the production cost in livestock. Especially high yielding cross breed cows of 5 to 7 years ages with 3<sup>rd</sup> parity are more susceptible which may leads to threat for our emerging dairy industry. Early detection and improve management system can reduce its prevalence. A well research on determining the antimicrobial properties and genetic analysis of the causative agents may contrive to subdue the mastitis in near future.

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