

Prevalence of mastitis in cows as dairy and subsistence farming systems

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Abstract: This study was conducted on a total of 310 cows belonging to 40 farms at Baghabari, Sirajgonj and 130 cows of 40 farms at Mymensingh region were selected as representatives of dairy and subsistence type farms, respectively. Mastitis related information was collected by using a formal questionnaire. Clinical mastitis was diagnosed on the basis of clinical symptoms and confirmed by Strip Cup Test (SCT), while subclinical mastitis was detected by employing Modified White Side Test (MWST). The problems encountered at investigation with the prevalence of mastitis in both the farming systems were identified as factors relating to poor sanitary practices, faulty drainage system and waste disposal, unawareness of In udder health management, inadequate floor space and faulty treatment practices of mastitic udder either by owner themselves or by quack. In dairy and subsistence type farmings the clinical mastitis was 9.4% and 7.7% and the subclinical mastitis was 45.1% and 35.4%, respectively. In both farming system, the prevalence of mastitis increased in relation to the increase in lactation stage. Similar increasing trend was observed of the prevalence of mastitis in relation to the increase in parities. The highest prevalence of subclinical mastitis both in dairy and subsistence type farms were found in the cows of Sahiwal crosses (48.8% and 38.5%) followed by Friesian crosses (44.8% and 36.0%), and local cows (40.7% and 34.8%), respectively. In both farming systems, of the affected cows, a significantly ($p < 0.05$) higher number of the cows were suffering from subclinical mastitis only affecting 1 quarter rather than 2-, 3- or 4 quarters. Hind quarters were found more prone to mastitis than the fore quarters in cows in both types of farmings. It is suggested that the high prevalence of mastitis in the areas was mainly attributed to poor management and unhygienic milking practice. The farms owners are advised to give proper attention in improving the current status of management and supportive treatment. Mastitis, subsistence farming, parity, period of lactation.

Key words: Mastitis, subsistence farming, parity, period of lactation.

Introduction

The prevalence of mastitis in a herd is defined as the number of cows (or quarters) that are diagnosed as infected divided by the total number of cows (or quarters) currently at risk of infection (Erskine, 2001). Bacteriologic culture of milk samples collected from a herd is the preferred method to determine the prevalence of infection. Mastitis can occur in the mammary gland at all stages of the cow's life. Mastitis is usually caused by bacterial infection although many other microorganisms including fungi, algae, mycoplasmas and viruses can cause disease. At least 137 separate possible causes are known (Watts, 1988). The causative agents are ubiquitous in the environment and even persist in the udder in latent state (Roy *et al.*, 1988; Prabhakar *et al.*, 2000). The sub-clinical mastitis may continue to reduce milk production and under certain stress condition, the hidden organisms in the udder may flare up to produce clinical mastitis (Radostitis *et al.*, 1994). The incidence of subclinical mastitis in cows increases with increased milk production, unhygienic management practices and with increasing number of lactation (Pal and Verma, 1991).

Despite a variety of microorganisms involved in udder infection 85- 95% of bovine mastitis is caused by streptococci and staphylococci (Natzke, 1981; Dodd, 1983). It has been demonstrated that if good hygienic measure and efficient care are in general use, the morbidity rate in cattle population will be considerably low (Smith, 1983). Recently, about 20,582 mini dairy farms each with five or more high yielding cross-bred cows, have been established in private sector in Bangladesh (Faruq, 1996). Most of these dairy farms are confronted with problems of clinical and sub-clinical mastitis (Rahman *et al.*, 1997). Bangladesh has got remarkable cattle population and the country is now on the approach to boost up milk production, but mastitis has become the most important constraint hindering the development of dairy industry.

Reduction in milk production due to subclinical mastitis is not only responsible for great economic loss to the dairy industry but also acts as a carrier and source of infection for the healthy milch cows. Since, most udder infection is subclinical, it is obvious that the condition goes undetected by farmers. As a result the infection persists in udder and the subclinical mastitis develops progressively into clinical forms of mastitis. Dairy farmers are therefore concerned about the prevalence of [his infection potentially affecting the udder. The consequences of these infections vary greatly with the causal agents; hence an understanding of the prevalence of the malady is important in implementing the strategic control programme. But the information on the prevalence of mastitis in Bangladesh is meager. Therefore, the present study has been undertaken with the following objectives:

To identify the problems associated with the clinical and subclinical mastitis. to study the prevalence of clinical and sub-clinical mastitis in cows under dairy and subsistence farming system. To study the influence of various factors like breed, lactation stage and parity on the occurrence of mastitis in cows.

Materials and Methods

Study area: The investigation of mastitis was conducted in two selected agroecological zones of Bangladesh. One study covers farms of Mymensingh district and represents the subsistence dairying; and the other includes Baghabari milk-shed area of Sirajgonj district where potential dairying prevails.

Selection of dairy herds, animals and their management: A total of 80 farms, 40 from each area, were randomly selected to perform the study. All the lactating cows of the farm were included in this investigation. A total of 440 cows of different ages and parities and of different lactation stages were subjected to examinations. Out of these lactating cows, 310 belonged to Baghabari, Milkshed area situated at Sirajgonj, and 130

were in Mymensingh area. The breeds of cows were local zebu, crosses of Friesian and Sahiwal in Mymensingh, while those in Baghabari milk-shed area, Sirajgonj were Friesian crosses, Sahiwal crosses and Pabna locals. In subsistence farming system, cows were housed at night and tethered during the day. Shifting the tethering site provided access to fresh grazing. In dairy farming system, both tie stall and loose barn housing systems were adopted.

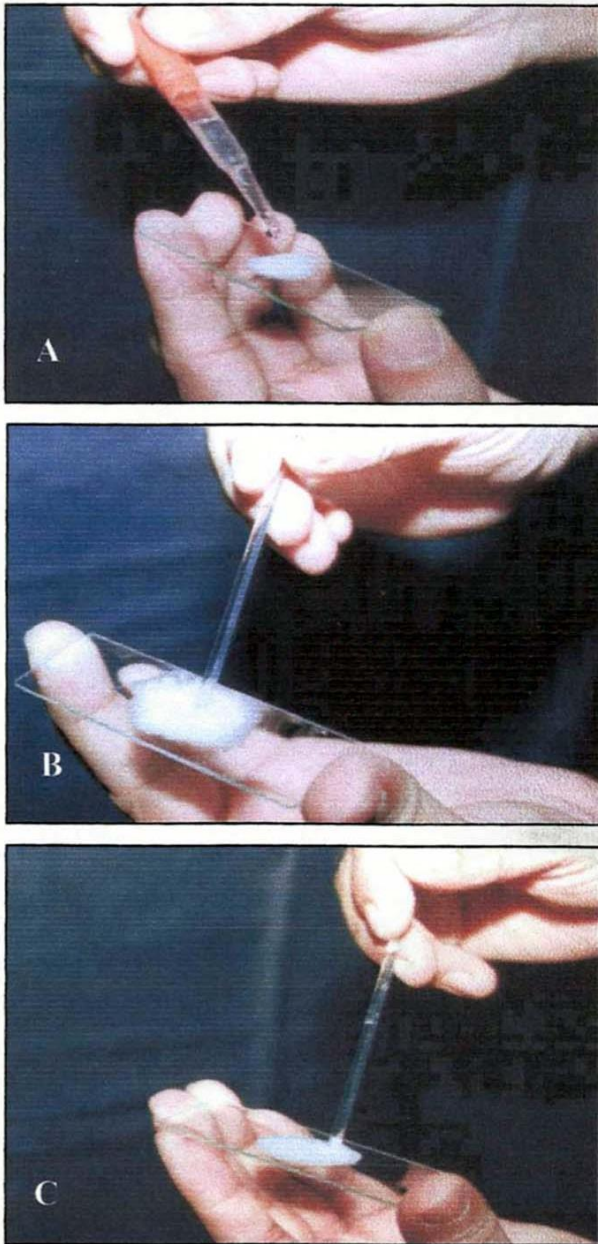


Fig.1. Performing Modified White Side Test for subclinical mastitis diagnosis; (A) Reagent (4% NaOH) added in the milk sample, (B) Positive reaction showing thickening and fine particle of coagulated material, (C) Negative reaction showing milky, opaque and entirely free of precipitation.

Farm visit: A survey was carried out to identify the problems associated with the occurrence of mastitis in the farms of the selected study areas. A door-to-door visit was made and questionnaire was prepared to obtain

information on farm management practices, knowledge of mastitis and mastitis control measures. The informations obtained from questionnaire were recorded carefully at the site of interview.

Diagnosis of mastitis

Detection of clinical mastitis: Clinical mastitis was detected by palpation of the udder or by visualization if turned hard, red or hot to the touch was noted. Palpation of the udder sometimes might be painful.

On the basis of degree of infections, clinical mastitis was detected by strip cup test. By this method the physical examination of milk was performed. According to the Shpigel (2001), the milk of all four quarters was drawn and spreaded on a piece of black cloth. After waiting for 10 to 15 minutes the presence of any fibrous flakes, wateriness, bloodstains on the cloth considered as indication of mastitis.

Detection of sub-clinical mastitis: Modified White Side Test (MWST): The MWST was performed according to Coles (1986) using 4 percent sodium hydroxide solution as the reagent. The test was conducted as follows:

Five drops of milk was placed on a glass slide. Then one-drop of reagent was added and stirred for 20 seconds with a glass rod. Mastitis positive sample exhibited various degrees of flaking and thickening. Normal udder milk samples were free from flaking and thickening. The result was interpreted in naked eye (Fig. 1). According to opacity, thickness, particle size of coagulated materials the degree of MWST reactions were scored as follows:

Negative, Trace (\pm), Moderate (+), Distinct (++) , Strong (+++)

Statistical analysis: Data obtained from the questionnaire and clinical and sub-clinical mastitis tests were entered into Microsoft Excel® work sheet. Prevalence was defined as the number of positive cases of mastitis per 100 cows tested. F-test was conducted to draw the interferences of the prevalence of mastitis of the cows in two different farming systems (MINITAB® 2000).

Results

In dairy and subsistence systems of farming, housing usually comprises of either an enclosed shed in front or separated from the house. The sheds were made of either tin or straws. Most of the shed walls were made of bamboo fence. The floors of the cow shed in dairy farming system at Baghabari Milk shed zone were made of concrete, brick soling and clay in percentage of 5, 75 or 20, respectively, while in subsistence farming system at Mymensingh zone the percentages were 0, 40, 60, respectively. Animals were housed overcrowded at night in most of the dairy farms (80%) at Baghabari zone while in subsistence farming system provided proper space for cows.

In both the areas, most of the farmers did not take hygienic measure before and after milking. Some milkers about 5% cleaned their hands with tube well water prior to milking. None of the farmers maintained milking schedule, teat dipping and teat spray. In both farming systems the farmers milked cows by hand.

The average number of lactating cows in dairy and subsistence type farming system were, 7.8 and 3.3,

respectively (Table 1). The clinical and sub-clinical form of mastitis were higher in the cows of dairy type farming system (9.4% and 45.2%) than that of the subsistence types farming system (7.7% and 35.4%). However, these differences of clinical and sub-clinical mastitis between farming systems did not differ significantly ($p>0.05$).

Table 2 shows 20.1% and 14.4% of the quarters affected with subclinical mastitis in the dairy and subsistence type farming systems, respectively. The difference in the prevalence of subclinical mastitis between the farming systems were not significant ($p>0.05$). Depending on the degree of reaction exhibited by Modified White Side Test (MWST), the trace, moderate, distinct and strong type reactions were found in 15.7%, 27.7%, 30.1%, and 26.5%,

Table 2. Percentage of the quarters affected with subclinical mastitis and the degree of MWST test reactions at different farming systems

Types of farm management	No. of quarter tested	% of quarters positive to MWST	Degree of reaction	Percentage
Cows in dairy farms (n=310)	1240	201 (n=249)	Trace (±)	15.7 (n=39)
			Moderate (+)	27.7 (n=69)
			Distinct (++)	30.1 (n=75)
			Strong (+++)	26.5 (n=66)
Cows in subsistence type farms (n=130)	520	14.4 (n=75)	Trace (±)	20.0 (n=15)
			Moderate (+)	28.0 (n=21)
			Distinct (++)	32.0 (n=24)
			Strong (+++)	20.0 (n=15)

($F=1.294$, $p=0.256$)

Depending on the time period of lactation, the occurrence of subclinical form of mastitis at 1st, 2nd, 3rd, 4th, 5th, and 6th and greater lactations were 31.1%, 36.4%, 48.9%, 51.7%, 59.0% and 64.3% and 26.7%, 32.0%, 31.6%, 37.0%, 47.1% and 50.0%, respectively, in the cows belonging to dairy and subsistence type farming systems (Fig. 2). This increasing trend of percentage of the subclinical mastitis within farming systems were not differ significantly ($p>0.05$).

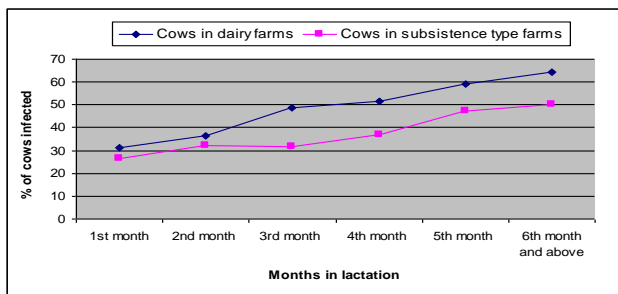


Fig. 2. Prevalence of subclinical mastitis depending on the lactation stages of cows in different farming systems.

Prevalence of subclinical mastitis with the parity has been recorded. The subclinical cases of mastitis were 31.1%, 34.8%, 41.7%, 52.0%, 55.6%, 70.6%, 77.8%, and 30.8%, 29.4%, 31.9%, 34.6%, 45.5%, 57.1% and 75.0% in cows at 1st, 2nd, 3rd, 4th, 5th, and $\geq 6^{\text{th}}$ parity status in dairy- and subsistence type farming systems, respectively (Fig. 3). This increasing trend of percentage of the subclinical mastitis within farming systems were not differ significantly ($p>0.05$).

of the cows at dairy type farms and in 20.0%, 28.0%, 32.0% and 20.0% of the cows at subsistence farms.

Table 1. Prevalence of clinical and sub-clinical mastitis in different farming systems

Types of farm management	% of cows affected with clinical mastitis	Percent of cows affected with subclinical mastitis
Cows in dairy farms (n=310)	9.4% (n=29)	45.2% (n=140)
Cows in subsistence type farms (n=130)	7.7% (n=10)	35.4% (n=46)

($F=0.963$, $p=0.328$)

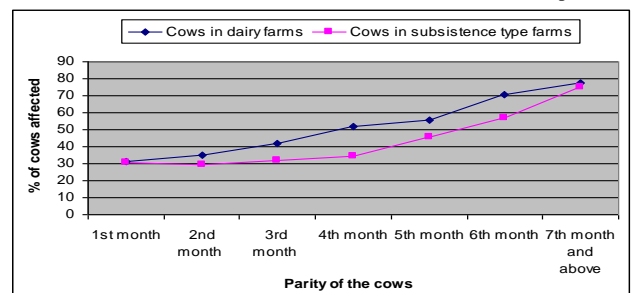


Fig. 3. Prevalence of subclinical mastitis with the parities of cows in dairy and subsistence type farming systems.

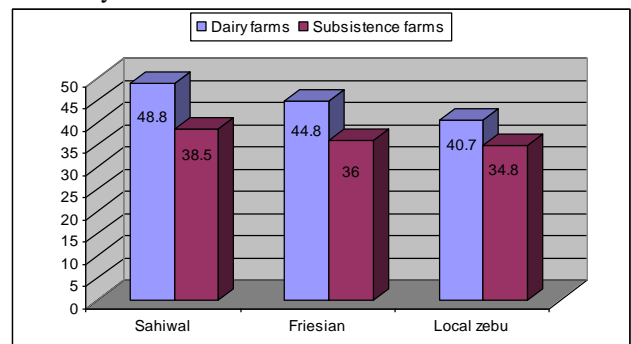


Fig. 4. Prevalence of sub-clinical mastitis in different breeds at dairy and subsistence type farming systems.

The percentages of subclinical mastitis were (48.8% and 38.5%) in Sahiwal cross and (40.7% and 34.8%) in the local zebu irrespective of the farming systems (Fig. 4).

The difference between breeds with regard to the prevalence of subclinical mastitis was not significant.

Table 3. Percentage of cows with subclinical mastitis affecting different quarters

Types of farm management	Number of cows affected	Total infected quarters	% of cows affecting different quarters			
			Single quarter	Double quarters	Triple quarters	Quadruple quarters
Cows in dairy farms (n=310)	140	249 (20.9%)	47.1 ^a (n=66)	34.3 ^b (n=48)	12.1 ^b (n=17)	6.4 ^b (n=9)
Cows in subsistence type farms (n=130)	46	75 (14.4%)	50.0 ^a (n=23)	41.3 ^b (n=19)	4.3 ^b (n=2)	4.3 ^b (n=2)

^{a, b} Values in same row with different superscripts differ significantly (p<0.05)

Affection with subclinical mastitis was highest in single quarter 47.1% and 50.0% followed by double quarters 34.3% and 41.3%, triple quarters 12.1% and 4.3% and the least in quadruple quarters 6.4% and 4.3%. No significant (p>0.05) difference was found with the percent of quarters affected between the farming systems (Table 3). However, within the farming system, number of cows affected with only one quarters which differ significantly (p<0.05) with 2-, 3- or 4 quarters.

Discussion

According to our study the predisposing risk factors that could be associated with the occurrence of mastitis were identified in the study areas. Management practices, such as poor housing and sanitary systems, faulty drainage, and waste disposal, ignorance or lack of knowledge in udder health management, unhygienic milking practices, inadequate floor spaces and overcrowding of the animals were the important predisposing factors of the two farming systems. These findings are in agreement with Bartlet *et al.* (1992) and Faye *et al.* (1994).

According to our best of knowledge no national survey data on clinical mastitis are available. The present study revealed 9.35% cows of Baghabari and 7.69% cows of Mymensingh affected with clinical mastitis. Various results are reported in clinical mastitis by different researchers. Hoblet *et al.* (1991) after having controlled mastitis effectively found the prevalence of clinical mastitis affecting 16 to 64% of cows. The range difference occurrence of clinical mastitis has been thought to be due to different management systems.

The prevalence of mastitis was diagnosed by using Modified White Side Test (MWST). In the present study, the prevalence of subclinical mastitis was found 45.16% and 35.38% in dairy cows at Baghabari and subsistence farming cows at Mymensingh respectively. These results are supported by Kabir (2003) who observed 43.33% and 40.00% prevalence of subclinical mastitis at Bangladesh Agricultural University Dairy Farm and Local Area of Mymensingh with White Side Test. While Prodhan *et al.* (19%) reported 16.52%, Sen *et al.* (1996) observed 11.46%, Nooruddin *et al.* (1997) reported 21.2%, Rahman *et al.* (1997) identified 18.5% of subclinical mastitis by using MWST. Kader *et al.* (2002) reported 41.98% and 56.76% of subclinical mastitis at savar dairy farm, Dhaka and BAU dairy farm, Mymensingh respectively. In India, Misra *et al.* (1973) reported 25%, Singh *et al.* (1982) reported 17%, Pal and Verma, (1989) reported 23.08% and

Parai *et al.* (1992) reported 19.34% and Dhote *et al.* (1999) reported 20.72% incidence of subclinical mastitis indirect tests. In view of the result obtained by the researchers it could be assumed that the MWST would provide an easy, economic and rapid test for the diagnosis of subclinical mastitis. This information should be made known to farmers who could utilize this test in the farm management practices.

Although the prevalence of sub-clinical mastitis was found at all stage (months) of lactation in much cows but higher percentage was recorded at Baghabari 64.28% and at Mymensingh 50.00% during the 6th month of lactation and above in comparison to 1 to 5th months of lactation, Kabir (2003) supported this finding. The high rate of subclinical mastitis during the 6th month of lactation might be due to cow-to-cow transmission of contagious organisms. Our observation agreed with the report of Pal and Verma (1988a, b; 1991) who also found an increase in prevalence of mastitis in cows at the 6th month of lactation.

The effect of parity on prevalence of sub-clinical mastitis as recorded in cows in this study showed an increasing trend that the parity is directly proportional to affections of udder. Ramachandriah *et al.* (1990) observed similar findings. These observations are supported by Rasool *et al.* (1985) and Devi *et al.* (1997) who reported an increasing incidence of sub-clinical mastitis with advancing age (parity) and lactation. Younger cows possess decreased susceptibility to mastitis because they may have more effective host defense mechanism. Dulin *et al.* (1988) demonstrated significantly better polymorphonuclear leukocyte function in uniparous cows than multiparous cows.

In regards to breeds of cows affected with sub-clinical mastitis in this study the Sahiwal crosses evidenced highest percentages while local zebu has got the lowest prevalence of sub-clinical mastitis in both farming systems. The higher percentage prevalence of mastitis in Sahiwal cows might be due to pendulous udder. It is interesting to note that the exotic breed cows are more susceptible mastitis infection. This might probably be due to the high yielding nature of the exotic and their crosses. This observation is in agreement with Roy *et al.* (1989), Parai *et al.* (1992) and Devi *et al.* (1997). However, Saharia *et al.* (1997) were of the opinion that the variation of susceptibility or difference might be due to the differing managerial practices adapted at different times at the farm. Valid comparisons between breeds have not been reported.

Quarter wise testing in this study revealed highest prevalence in the right hind quarters and lowest prevalence in the left fore quarters at Baghabari and Mymensingh zones. Similar findings have been obtained by Singh and Baxi (1980), and Devi *et al.* (1997).

This study showed that prevalence of mastitis is quite high in both dairy and subsistence farming system. Farmers have lack of knowledge on the control measures, hygiene and sanitation in relation to mastitis. Prevalence of subclinical mastitis is high in Sahiwal crosses in both farming systems. The prevalence of subclinical mastitis increases along with the advancement of parity and lactation. This study suggests that the prevalence of mastitis in dairy herds should be minimized or prevented by providing good environment, management and sanitation practices. Farmer's awareness should be created about subclinical mastitis through extension education. Proper control strategies should be taken against subclinical mastitis. Chronically infected cows should be called from a herd to reduce source of infections. Overcrowding of the cows must be avoided. Cows must have adequate lounging area and the passage ways must be wide enough to avoid that crushing.

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