A Seminar Paper on

MASTITIS IN DAIRY COWS & ITS IMPACT ON DAIRY INDUSTRIES IN BANGLADESH

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ABSTRACT

Mastitis is the most prevalent production disease in dairy herds and it is well documented as disease with a burden in many developed countries, while very limited information is available for developing countries. The small-scale dairy sector contributes significantly to alleviating poverty, particularly in rural areas, in addition to providing income source for the household and employment opportunities for poor farmers and animal attendants. There are some variations of the prevalence of mastitis from region to region. Clinical & Sub-clinical mastitis is associated with risk factors such as breed, quarters of animals, age, parity, herd organization, lactation duration and milk production. Mastitis can be caused by several species of bacteria, fungi, algae and mycoplasmas. Clinical mastitis can be diagnosed by physical examination of cow, visual inspection of milk and palpating udder while sub-clinical mastitis can be identified by California Mastitis Test. California Mastitis Test positive cows and their samples were used for bacteriological culture for isolation and identification of causal bacterial agents. The prevalence based on CMT results of quarters is higher in cross breeds (40.57%) than local cows (20.92%). Higher percentages of Sahiwal (47.4%) cows are affected with mastitis compared with Friesian (39.7%) and Local Zebu cows (37.6%). Highest prevalence found in cows in age group of 5 to 8 years and with milk yield 5 to 10 liters daily. Many techniques have been applied to estimate the losses from mastitis in dairy cows. None of the techniques is perfect, because it is not possible to estimate directly how much milk a cow would have produced if mastitis had not occurred during lactation. All of the techniques have a degree of inherent bias which in most cases, tends to underestimate the actual milk production loss that has occurred.

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CHAPTER I

INTRODUCTION

Mastitis is a multi-etiological and a very complex disease, which is defined as inflammation of parenchyma of mammary glands. It is characterized by physical, chemical changes in milk, and pathological changes in glandular tissues (Radostis et al., 2000). The occurrence of disease is an outcome of interplay between three important factors: infectious organisms, host resistance, and environmental factors (Gera and Guha, 2011).

Mastitis is a serious production problem worldwide as it adversely affects animal production, milk quality and the economics of milk production, affecting many countries, including developed countries and causes financial losses (Sharma, Maiti and Sharma, 2007). Mastitis is the most prevalent infectious disease of dairy cattle and from an economic aspect, it causes most damage to the production (Tiwari *et al.,* 2010; Sharma *et al.,* 2012; Elango *et al.,* 2010; Halasa *et al.,* 2007; Mostert *et al.,* 2004).

There are two major forms of the disease:

• Clinical mastitis causes alterations of milk composition, decreased production of milk, and the presence of the cardinals signs of inflammation (pain, swelling and redness, with or without heat in infected mammary quarters).

• In contrast, detection of sub-clinical mastitis is difficult because signs are not readily visible (Kivaria, 2006) and because of the lack of any overt manifestation, the diagnosis of the disease is a challenge in dairy industry and in veterinary practice.

Many different infectious agents will cause bovine mastitis. Pathogens are typically divided into two classes, contagious and environmental, that area unit accustomed describe the epidemiology of the first pathogens causing intra mammary infection. Contagious pathogens are ones that unfold from infected quarters to alternative quarters and alternative animals. Most of the cases of mastitis caused by *Streptococcus agalactiae*, *Staphylococcus aureus* and other *Streptococcus* species and Coliforms. It may also associated with *Actinomyces pyogenes*, *Pseudomonas aeroginosa*, *Nocardia asteroides*, *Clostridium perfringens* and others like *Mycobacterium*, *Mycoplasma*, *Pasteurella* and *Prototheca* species, and yeasts. Contagious infectious agent unfold occurs in the main throughout the milking method through contaminated milking instrumentality, milker's hands, or materials used to wash or dry the udders of multiple cows. The first reservoir for contagious pathogens is infected cattle commented that contagious mastitis is primarily related to cases of sub-clinical mastitis.The sub-clinical form of the disease is 15 to 40 times more prevalent than the clinical mastitis and usually precedes the clinical form and is of long duration (Seegers, Fourichon and Beaudeau, 2003). It is important to emphasise that the sub-clinically affected animals remain a continuing source of infection for herd mates (Islam *et al.*, 20

11). There are different levels for detection of mastitis: an individual cow level in the herd and a more large-scale testing for bulk milk (Kivaria, 2006). Regarding the individual cow level, the sub-clinical mastitis can be detected by bacteriological examination and somatic cell counts (SCC) (Muhammad *et al.,* 2010).

Bovine mastitis is categorized into clinical mastitis and sub-clinical mastitis. Clinical mastitis is characterized by signs of inflammation of the udder and changes in the milk, on the other hand in sub clinical mastitis the milk seems grossly normal, no visible signs of inflammation of the udder however the inflammatory reaction is detectable only by indirect tests like California Mastitis Test (CMT) by somatic cell count in milk and culturing milk of all quarters. Somatic cells contain lymphocytes, macrophages, polymorphonuclear cells and other epithelial cells, all of that replicate the inflammatory response in the udder to an intramammary infection. Somatic cell counts to observe for sub-clinical mastitis may be conducted at the quarter, cow, and herd levels. Physical changes to the mammary gland could also be present in clinical mastitis cases starting from warmth, diffuse swelling, and pain to gangrene in more severe cases. Chronic mastitis may result in local fibrosis and mammary tissue atrophy. When solely local signs are unit evident a case of mastitis is taken into mild or moderate form.

Mastitis is a very complex disease, and thus there is no easy solution for its control, so understanding its occurrence, the associated risk factors, and the pathogens involved are fundamental elements in developing a control programe. Predisposing factors like poor management and hygiene, udder injuries and faulty milking machines are notable to hasten the entry of infectious agents and therefore the course of the disease.
Once a cow suffers from mastitis it will never come to its traditional milk production. Early diagnosing of mastitis is crucial as a result of changes within the mammary gland tissue happen abundant prior to they become apparent.
The clinical mastitis will simply be detected by appearance of and or general signs of inflammation, whereas diagnosis of sub clinical mastitis is a lot of problematic since the milk seems traditional however sometimes has an elevated somatic cell count. Various strategies, based on physical and chemical changes of milk and cultural isolation of organisms are used for diagnosing of mastitis.
Keeping these considerations in view, the present study has aimed with the following objectives

- To find out the impact of bovine mastitis in small scale dairy production.
- To identify the risk factors and their association with sub-clinical and clinical mastitis in Bangladesh

CHAPTER II

MATERIALS AND METHODS

This seminar paper is completely a review paper. Therefore, all the information was collected from secondary sources with a view to prepare this paper. The key information was collected from various relevant books, journals, articles and thesis paper which were available in the library of Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU). For collecting recent information internet browsing was also done. Good suggestions, valuable information and kind consideration from my honorable major professor, research supervisor, course instructors and other resource personnel from Bangabandhu Sheikh Mujibur Rahman Agricultural University were taken to enrich this paper. After collecting necessary information, it has compiled and arranged chronologically for better understanding and clarification.

CHAPTER III

REVIEW OF FINDINGS

Mastitis is a burden for the dairy sector worldwide. It is a very costly disease due to direct losses & expenditure (additional inputs to reduce the level of mastitis), both with negative implications for milk hygiene and quality (Hogeveen, Huijps and Lam, 2011; Coulon *et al.*, 2002). Its negative impact can be a huge constraint on the development of dairy industry and this is particularly relevant in the developing world, in which the dairy industry has a vital role in the income source of poor people (von Braun, 2010).

Livestock systems in developing countries are highly diversed, ranging from extensive pastoral systems to large-scale commercially oriented industrial production systems. A classification has been given in SOFA 2009 (FAO, 2009), where the production systems are categorized as:

1. Grazing systems (intensive & extensive)
2. Mixed farming systems
3. Industrial systems.

Small-scale farming has been defined in terms of numbers of cattle per producer. Small-scale farming systems usually have several animal species within the farm and these different types of animals have different purposes in the system: provision of food for the family, cash from product sales, capital assets (walking banks), provision of manure for crops, traction for ploughing and transport (Herrero *et al.*, 2007).

4.1. Occurrence of clinical and sub-clinical mastitis in Bangladesh

From an Asian perspective, the prevalence of mastitis is increasing in parallel with the development of high milk-producing breeds of cows and buffaloes. Some factors have been identified that contribute to increased spread of the disease, including: lack of awareness, delay in disease detection, unhygienic milking practices and incomplete treatment of clinical and chronic mastitis (Sharma *et al.*, 2012).

In Bangladesh, milk production takes place in millions of small and very small units, in terms of both land and animals, that are scattered throughout the country. Hence, it is relevant to estimate what is the real occurrence of mastitis in the small-scale producer sector in different parts of Indian subcontinent. There is need to quantify the economic impact of the disease in developing countries on a scientific basis, aware that mastitis is a heavy economic burden in the dairy sector of developed countries and with its high occurrence in developing countries it can be a serious constraint on the development of the dairy sector in resource-poor environments. The subclinical mastitis is a lot of severe and is liable for much bigger loss to the dairy industry in Bangladesh. Mastitis in cows is very common in both clinical and sub clinical form. There are some variations of the prevalence of sub clinical mastitis from region to region. The prevalence based on CMT results of quarters is higher in cross breeds (40.57%) than local cows (20.92%). Highest prevalence found in cows in age group of 5 to 8 years and with milk yield 5 to 10 liters daily.

4.2. Prevalence of Subclinical mastitis in relation to small, medium & large scale hard size

Biswas and Sarkar, 2017 observed the prevalence of sub clinical mastitis was relatively higher in large scale farm (75%) than medium (40%) and small (44.18%) sized farm. Certain herd factors will increase the chance of sub clinical mastitis due to specific mastitis pathogens. In case of huge herd size the infectious agents are spread rapidly than little herd size.

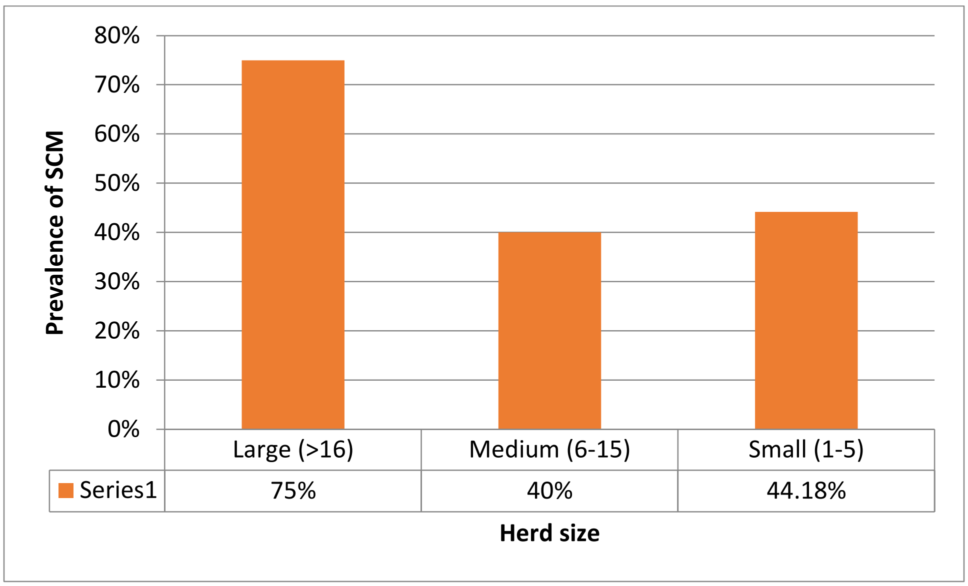


Figure 01: Prevalence of sub clinical mastitis in relation to herd size.

(**Source**: Biswas and Sarkar, 2017)

4.3. The economic dimension of mastitis

Starting from the basic conceptual model developed by McInerney (1987), the economic analysis includes three major components: people, resources & products.

• It is people who want things and make decisions, providing the driving force for economic activity.

• Resources are the physical factors that are the basis for generating the products and as such are the starting point of economic activity.

• Products are services and goods that are regarded as the outcome of the economic activity.

Animal disease can be considered an influence affecting the transformation process of resources into products and causes extra resource use or reduces production. The effects may or may not be immediately visible. To express the physical effects in economic terms, the ‘value’ of products and ‘cost’ of resources are needed. The idea of value is not intrinsic in any product or service but is determined by people’s request for the products and is relative to its availability (supply and demand) (McInerney, 1987).

There have been many articles published worldwide on the economics of mastitis. Firstly, it is important to clarify the terminology of different terms commonly used when conducting economic analysis of animal diseases. Petrovski, Trajcev and Buneski (2006) made an effort to define these terms and here the following terms will be used as defined:

• Loss (L) implies a benefit that is taken away (e.g. the production loss experienced because contaminated milk must be discarded) or it represents a potential benefit that is not realized (decrease in the milk yield).

• Expenditures (E) represent some economic effects of disease that are manifested as extra inputs into livestock production development (such as treatment and prevention of mastitis).

• Economic cost (C) is the monetary value of all economic effects, both losses and expenditures, consequent upon the occurrence of the disease.

Figure 02: Costs are the sum of losses and expenditures.

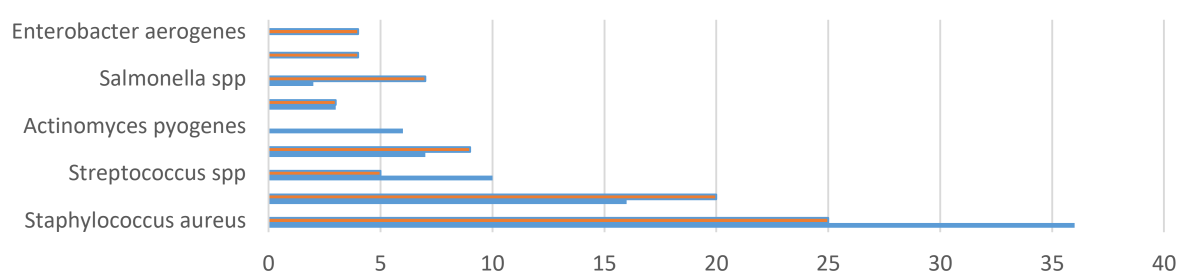
(**Source:** Petrovaki et al, 2006)

4.4. Major causative agents (contagious and environmental pathogens) for mastitis

Mastitis is caused by several species of bacteria, fungi, mycoplasmas and algae (Batavani, Asri and Naebzadeh, 2007). Most of the mastitis case is of bacterial origin, with just a few of species of bacteria accounting for most cases. Contagious pathogens live and multiply on and in the cow's mammary gland and are spread from cow to cow, primarily during milking.

Contagious pathogens include: *Staphylococcus aureus*, *Streptococcus agalactiae*, *Mycoplasma* spp. and *Corynebacterium bovis* (Radostis *et al.*, 2000). Environmental mastitis can be defined broadly as those intra-mammary infections (IMI) caused by pathogens whose primary reservoir is the environment in which the cow lives (Smith, Todhunter and Schoenberger, 1985). The most frequently isolated environmental pathogens are Streptococci, other than *S. agalactiae*, commonly referred to as environmental streptococci and gram-negative bacteria such as *Escherichia coli*, *Klebsiella* spp. and *Enterobacter* spp. (Hogan *et al.*, 1999).

Mycotic infections are another important cause of mastitis. Many available studies in developing countries had the aim of conducting microbiological investigations to understand each pathogens role in causing mastitis in different areas. Data analyses limited to a few hundred samples from small areas or regions cannot be extrapolated to national level because there could be substantial geographical variation in the distribution of mastitis-causing bacteria (Riekerink *et al.*, 2008).



	Staphylococcus aureus	Coagulase negative staphylococci	Streptococcus spp	Escherichia coli	Actinomyces pyogenes	Bacillus spp	Salmonella spp	Klebsiella spp	Enterobacter aerogenes
Column1									
Cows without Mastitis;N=154(%)	25	20	5	9	0	3	7	4	4
Cows with Mastitis; N=104(%)	36	16	10	7	6	3	2	0	0

Column1 Cows without Mastitis;N=154(%) Cows with Mastitis; N=104(%)

Figure 03: Frequency of various types of bacteria isolated from mastitic and apparently normal milk. **(Source:** Ameh *et al*, 1999)

4.5. Clinical diagnosis of mastitis

Mastitis was diagnosed by physical examination of the cows, visual examination of milk and palpation of the udder, and examination of milk by CMT to confirm the disease. Findings of udder palpation were scored into one, two, three & four for no swelling or pain in the udder, swollen ventral quarter, generalized swollen quarter and swollen and painful udder respectively. Milk was scored as 1 = normal, 2 = flacks / clots otherwise normal milk, 3 = little / no milk, moderately abnormal color and 4 = no normal milk, watery, serum or blood present in milk. CMT scores were 1, 2, 3 and 4 (Table 1). Positive cases of mastitis were expressed as mild, moderate and severe on the basis of examination findings (Table 1).

Table 01: Classification of mastitis based on milk, udder and cow examination

Mastitis category	CMT score	Udder Score	Cows
Mild	2	1-2	Normal
Moderate	3	3	Normal
Severe	3-4	2-4	2 or more abnormal physical examination parameters

(**Source:** Thrusfield , 2005)

4.6. Reagent preparation, conducting CMT and screening of the udder quarter for mastitis

The entire CMT concentrate bottle (Original schalm CMT, California Mastitis Test, Techni Vet, USA.) content was added to 10 bottles of water for making one gallon of working solution according to manufacturer's instruction. All quarters of udders from 389 cows were screened for mastitis using CMT and interpretation was performed according to the method (Quinn *et al.*, 1999). For performing CMT, two ml of milk was collected in individual cups by hand milking when the paddle held by horizontal position. An equal amount of the CMT reagent was mixed with the milk. The paddle was then rotated in a circular motion to mix the contents. The mixture was scored within 10 seconds while rotating the paddle (Figure 4).

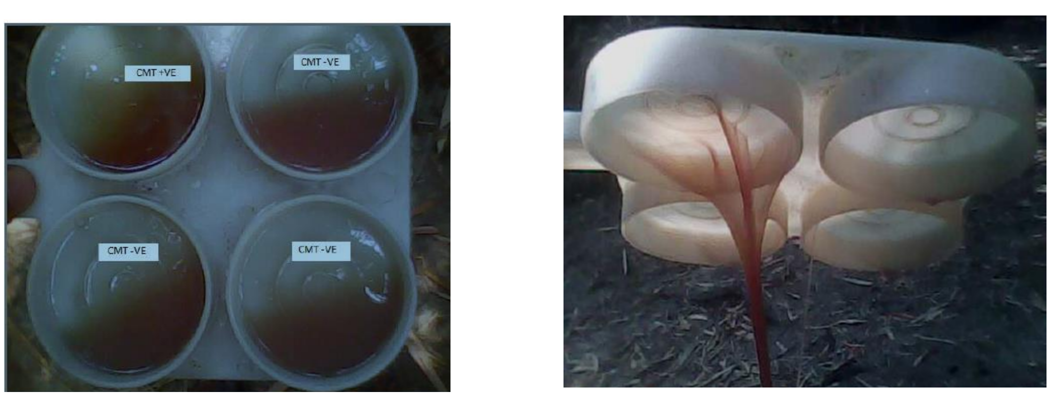


Figure04: CMT negative and positive cases are found during CMT test.

The paddle was rinsed properly with water before being used for the next operation. The CMT test results were classified as either negative (-) or positive (+) depending on the intensity of reaction. The result of CMT was scored and recorded on the basis of gel formation. Samples with a CMT score of one considered as negative, while those with CMT scores of 2, 3 and 4 were considered as positive (Table 2).

Table 02: Description and interpretation of CMT scores

Description of visible change	Interpretation	Results
Mixture remains liquid, no slime or gel formation	Negative	01
Mixture becomes slimy or gel like. It seems to best advantage by tipping the paddle back and forth, while observing mixture as it flows over the bottom of the cup	Suspicious (mild)	02
Mixture distinctly forms a gel.	Positive (moderate)	03
Mixture thickens immediately tends to form jelly. Swirling the cup moves the mixture in towards the centre exposing the outer edges of the cup	Positive (severe)	04

(**Source**: Thrusfield , 2005)

4.7. Quarter wise prevalence of bovine subclinical mastitis

Quarter-wise study of SCM and clinical mastitis showed that highest prevalence was in single and two quarters, respectively, and in most of the animals two quarters were affected followed by one quarter. The distinction in quarter-wise prevalence of mastitis is probably due to the fact that predisposing factors like accidental injury, defective sphincters, and so forth could vary from quarter to quarter. Kayesh *et al*, 2014 reported that about 28.50% were positive to California Mastitis Test (CMT) and of 800 active quarters, 209 (26.13%) were positive to California Mastitis Test (CMT) (Table 2). There was a variation of California Mastitis Test (CMT) score even in numerous quarters of particular lactating cow.

Table 03: Cattle and quarter-wise prevalence of subclinical mastitis in lactating cows in Bangladesh detected by CMT

Types	Sample tested	Positive cases	Prevalence
Cattle	200	57	28.50%
Quarters	800	209	26.13%

(**Source:** Kayesh *et al*, 2014)

Table 04: Quarter-wise prevalence of subclinical mastitis in lactating cows (total quarters =632)

	LF	LH	RF	RH	Total
Affected teat	51	38	40	31	160
Prevalence	32.3%	24.1%	25.3%	19.6%	25.3%
Not affected teat	107	120	118	127	468

(**Source:** Siddiquee *et al*, 2013)

LF = Left Front, LH = Left Hind, RF = Right Front and RH = Right Hind

Siddiquee *et al*, 2013 examined 632 quarters and they found 160 were affected teat and 468 were not affected with sub clinical mastitis. The total prevalence was 25.3% and 32.3%, 24.1%, 25.3% and 19.6% in left front, left hind, right front and right hind respectively.

Taking into consideration CMT, the overall prevalence of mastitis in cows was 28.50%. The findings also revealed that the overall prevalence of mild (score value 1+), moderate (score value 2+) and severe (score value 3+) clinical mastitis in cows was 33.57%, 15.78% & 26.32%, respectively.

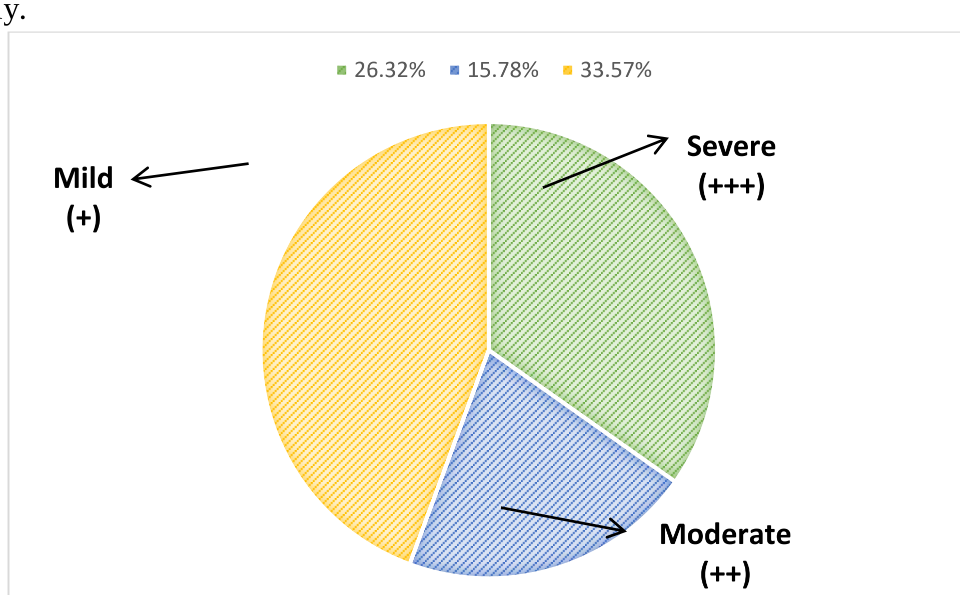


Figure 5: Prevalence of different types of mastitis.

(**Source:** Kayesh *et al*, 2014)

4.8. Prevalence of mastitis in different breeds of cow

Community based Dairy Veterinary Foundation (CDVF) of the Department of Surgery and Obstetrics, Bangladesh Agricultural University, Mymensingh during the period from January 2011 to May 2011 examined 389 lactating cows to collect mastitis related information by using a formal questionnaire. Here, the prevalence of mastitis in different breeds viz; Sahiwal cross, Friesian cross and Local zebu are shown in Table 5. There was significant difference among the breeds of cows affected with mastitis ($P<0.01$). Higher percentages of Sahiwal (47.4%) cows were affected with mastitis compared with Friesian (39.7%) and Local Zebu cows (37.6%). High prevalence of mastitis in this study can be related to large number of lactating cows in the farm, dirty floor condition, cow bathed by pouring water, dirty udder, poor management and wrong treatment that does not cure mastitis but lead to chronic infections.

Prevalence of mastitis in this study varied depending on the age and more affection was observed with advancing of age. Several studies were found in agreement with the present findings of increased mastitis in advancing age (Slettbakk *et al*., 1995, Radostits *et al*., 2000, Quaderi, 2005). Husain, (2007) Showed that older cows with about 14 years of age had 61% sub-clinical mastitis which correlates with the present findings. Increased age predispose the cow to more susceptible to infection and decreasing potency of the teat sphincter (Pankey *et al.*, 1991). On the contrary, younger cows may have decreased susceptibility of mastitis because they possess more effective host defense mechanism (Dulin *et al*., 1988).

Table 05: Prevalence of mastitis in different breeds of cow

Types of breed	No. of cow examined	No. of affected	% infected
Sahiwal cross	175	83	47.4
Friesian cross	121	48	39.7
Local zebu	93	35	37.6
Total	389	166	42.3

(**Source:** Husain, 2007)

4.9. Effect of parity on prevalence of mastitis

Parity plays a very important role in inflicting sub-clinical mastitis. The percent incidence of mastitis in different parities is shown in (Figure 6). The prevalence was observed to be highest in third parity (29.55%), followed by fourth (26.66%), sixth (23.52%), second (22.22%) and first (18.75%), and least in fifth (18.18%) in local breed cows. The parity wise prevalence of sub clinical mastitis were 28.57%, 36.84%, 47.05%, 36.36%, 33.33% and 33.33% during the parity numbers 1, 2, 3, 4, 5 and 6, respectively in cross breed cows.

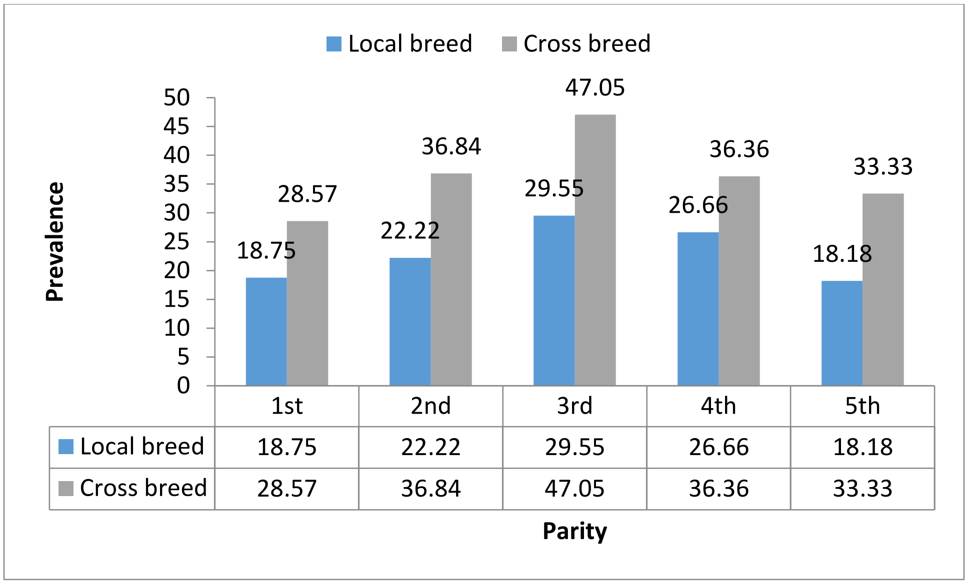


Figure06: Effect of parity on the prevalence of clinical mastitis.

(**Source:** Islam *et al*, 2011)

4.10. Factors influencing mastitis cost at farm level

The economic damage from mastitis, either clinical or sub-clinical, can be condensed to a few categories, as listed in Figure 0 8. The arrow is a graphic schematization of the logic path that leads to the assessment of the economic impact.

Milk yield losses

Intra mammary infection, even if restricted to sub-clinical levels, has been considered to affect milk production negatively. The reduction in milk production is largely due to physical damage to the mammary parenchyma tissue of the affected mammary gland (Zhao and Lacasse, 2008).

Histological analyses have been widely applied in the past and are still used today for assessing damage to secretory tissue in the bovine mammary gland caused by various mastitis pathogens. Benites *et al.* (2002) examined the mammary parenchyma of dairy cows from which micro-organism were isolated, and recorded that 96.9% of samples showed an inflammatory response (oedema, mammary epithelial cell damage, and polymorphonuclear neutrophil infiltration), tissue repair process, or both. At the same time, in mammary glands without evidence of micro-organisms or pathogens, there were no histological changes. These results clearly indicate that the presence of micro-organisms is associated with severe tissue damage. At the same time, it must be remembered that the occurrence of an inflammation can cause decreased appetite due to pain and decreased movement, which will have a negative impact on milk production.

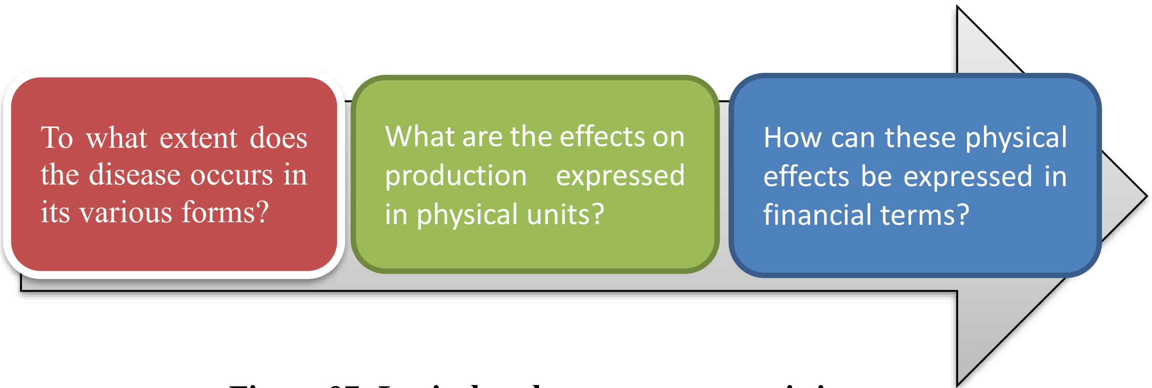


Figure 07: Logical path to assess economic impact.

(Source: Zhao and Lacasse, 2008)

Many techniques have been applied to estimate production losses from mastitis in dairy cattle. None of the techniques is perfect, because it is impossible to measure directly how much milk a cow would have produced if mastitis had not occurred during lactation. All of the techniques have a degree of inherent bias which in most cases, tends to underestimate the real milk production loss that has occurred (de Graves and Featrow, 1993).

Discarded milk

Because of treatment of a clinical case, milk has to be discarded during the treatment period and waiting time. In general, it is assumed that milk had to be discarded for six days: 3 days treatment and 3 days withholding period (Huijps, Lam and Hogeveen, 2008). Milk production become decrease by causing tissue damage, reduce lactose production & scar tissue formation in the udder. Somatic cell counts also increases.

Table 06: Effect of Somatic Cells (SC) on Milk Composition

Measurements	Normal(%)	High Cell Count(%)	% of normal
Total Solids	13.1	12.0	92
Lactose	4.7	4.0	85
Fat	4.2	3.7	88
Chloride	0.091	0.147	161
Total protein	3.6	3.6	100
Caesins	2.8	2.3	82
Whey proteins	0.8	1.3	162

(Source: John C. Bruhn, Extension Food Technologist, U. C., Davis , 1983)

Table 07: Effect of Somatic Cells (SC) on Cheese Yield

Average Somatic Cell Count cells/ml	**Cheddar Cheese Yield lbs. cheese/100 lbs milk**
240,000	9.748
496,000	9.686
640,000	9.403

(Source: John C. Bruhn, Extension Food Technologist, U. C., Davis , 1983)

Treatment costs

Mainly, there are two elements of the treatment cost: veterinarian fees and the cost of drugs. Obviously these two costs vary between countries.

Labour costs

Costs of labour are very difficult to analyse. Opportunity costs of labour may vary from farm to farm. If the labour is external, then the labour cost for the time that has been used to prevent mastitis is quite easy to calculate (hours × hourly wage). In contrast, if the labour comes from the farmer it is important to note that farmers could spend less time on other management tasks because of mastitis, so the opportunity costs are the reduced in income due to skipping these tasks (Halasa *et al.*, 2007).

Premature culling and replacement

Culling is a decision of the dairy farmer or the owner. Generally, a cow is culled when replacement is the optimal decision. Cows with mastitis have a higher risk of being culled, and the cost of premature replacement of animals due to mastitis is one of the largest areas of economic loss (Halasa *et al.*, 2007; Petrovski, Trajcev and Buneski, 2006; de Graves and Featrow, 1993; Hortet and Seegers, 1998). The direct costs are the cost of rearing or buying a replacement animal. At the same time, there are returns from culling a cow, mostly the price of the meat. Indirect costs could be decreased efficiency of production by the replacement animal, as usually a multiparous dairy cow is more productive than a primiparous one (Halasa *et al.*, 2007).

4.11. Economic effects of mastitis along the value chain

Access to market is one of the pre-conditions for livestock development, and economic growth among resource-poor livestock keepers will depend on their level of access to markets for their livestock produce (IFAD, 2004). Analysis of mastitis disease impact along the dairy value chain must be addressed to avoid underestimating the impact of the disease, through analysis of the disease at different levels, not only farm level but possibly also at the milk collecting points, or at milk processor level.

It is scientifically proven that mastitis disease causes alterations, that affect milk quality directly through changes in technical and hygienic milk quality, resulting in less efficient processing of milk, which might causes in products with less favourable properties. When mastitic milk is used for manufacturing, common product defects include increased coagulation times and reduced cheese yields, extended churning times for butter, altered heat stability of powders, and reduced shelf life and/or organoleptic properties of many products (Auldist, 2011).

CHAPTER IV

SUMMARY

The study was conducted to find out the impact of bovine mastitis in small scale dairy production and to identify the risk factors and their association with sub-clinical and clinical mastitis in Bangladesh.

Mastitis not only negatively affects milk yield production but has a negative impact also on milk composition and its physico-chemical characteristics. These alterations are attributed to changes in vascular permeability due to the inflammatory process and the damage of epithelial tissues that are responsible for the synthesis of milk components, as well as changes in the enzymatic action of somatic cells or micro-organisms in the infected mammary gland. Mastitis disease causes alterations, that affect milk quality directly through changes in technical and hygienic milk quality, resulting in less efficient processing of milk, which might causes in products with less favourable properties. In case of the prevalence of sub-clinical was observed according to parity was highest in third parity (29.55%), followed by fourth (26.66%), sixth (23.52%), second (22.22%) and first (18.75%), and least in fifth (18.18%) in local breed cows. The parity wise prevalence of sub clinical mastitis were 28.57%, 36.84%, 47.05%, 36.36%, 33.33% and 33.33% during the parity numbers 1, 2, 3, 4, 5 and 6 respectively in cross breed cows.

This paper reviews the topic of mastitis to help in the analysis of its occurrence in many developing countries, focusing on small & large scale farming systems and to provide information on the economic dimension of the disease in resource-poor environments.

Another issue highlighted is the lack of awareness among farmers of the subclinical form of the mastitis and this aspect is of fundamental importance because of the possibility of spreading infectious agents or microbes through the herd. The lack of medical treatment means, as demonstrated, an increase in the occurrence of mastitis cases on the farm, a consistent decrease in milk yield (up to 33% per quarter infected), a public health risk due to consumption of unsafe milk, and less efficient processing of milk.

The collected data can be used as a starting point to concentrate future efforts on the study and control the clinical & sub-clinical form of mastitis and its impact in many developing countries, with a focus on its relevance for vulnerable large & small-scale farmer households.

CHAPTER V

CONCLUSION

From the review paper, it can be concluded that knowledge and awareness of risk factors and characteristics of mastitis causing pathogens involved are essential to control the wide spread of the disease at farm level.

Mastitis reduces milk production in affected cattle as compared to normal one. The epithelial tissues of the udder is grossly damaged resulting in the loss of one or more quarter and the market value of the animal is seriously reduced and it is completely lost when all the four quarters are permanently damaged. Younger cows may have decreased susceptibility of mastitis because they possess more effective host defense mechanism. Prevalence of mastitis varies depending on the age and more affection was observed with advancing of age. Older cows with about 14 years of age has higher possibility of sub-clinical mastitis. Higher percentages of Sahiwal (47.4%) cows are affected with mastitis compared with Friesian (39.7%) and Local Zebu cows (37.6%). Proper diagnosis and treatment procedure in time helps to reduce economic losses. But the method of diagnosis should be exactly correct, economic, easy and time saving.

Physical examinations including observing teat and udder condition at first, organoleptic test of milk like color, odor and consistency of milk then examination of physiological parameters of animals and lastly test of milk by the help of different chemicals. Among the chemical tests CMT is the most appropriate, cost effective and easy to perform. A nation-wide prevention and control programme, able to reach marginal geographical areas, is required to control in an efficient way the disease at national level. Knowledge and awareness of risk factors and characteristics of clinical & sub-clinical mastitis causing pathogens involved are essential to control the wide spread of the disease at farm level. Lastly, mastitis is an endemic disease and so it needs broad-based effort to control and decrease its occurrence.

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