

PREVALENCE OF SUB-CLINICAL MASTITIS IN HIGH YIELDING CROSSBRED COWS USING DRAMINSKI MASTITIS DETECTOR

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ABSTRACT

The subclinical mastitis (SCM) causes great economical loss in dairy farms due to reduction in milk production. The objectives of the study were to know the prevalence of subclinical mastitis in lactating cows using Draminski mastitis detector and to evaluate the efficacy of intramammary infusion against SCM in lactating dairy cows. The study was conducted in cross-bred dairy cattle in peri-urban dairy production system within seven kilometers around the artificial insemination Centre, Bangladesh Agricultural University, Mymensingh during April, 2011 to May, 2012. The overall prevalence of SCM in lactating cows was 55.1%. The highest prevalence of SCM was 84.4% in more than 7 years old cows. The prevalence of SCM was significantly ($p < 0.001$) increasing with the advancement of the age. The prevalence of SCM was significantly ($p < 0.05$) higher (73.7%) in cows producing more than 15 liters of milk. Cows with 75% Holstein Friesian genotype experienced more SCM (63.0%) than other genotypes. An increased prevalence of SCM with increased number of parity in cows was also observed. The prevalence of SCM was significantly ($p < 0.001$) higher in cows with parity more than five. The highest prevalence of SCM was recorded in left hind quarter (32.3%) but the difference was not significant ($p > 0.05$) statistically. The efficacy of Neomastipra-JR5[®] as intra mammary infusion against SCM in lactating cows was 78.2%. Draminski mastitis detector could be a potential candidate for the diagnosis of SCM in dairy animals in Bangladesh context. But before introducing this machine in the field it should be validated either by comparing with a gold standard test like somatic cell counter or by using latent class evaluation in a multi-test approach.

Key words: Sub-clinical mastitis (SCM), cross-bred cows, Draminski detector, peri-urban dairying, treatment

INTRODUCTION

Milk is one of the most important foods of human beings. It is universally recognized as a complete diet due to its essential component (Javaid *et al.*, 2009). Its quality heavily deteriorates by mastitis. Mastitis is an inflammatory condition of the mammary gland, characterized by the changes in the physical characteristics of the udder or milk (Nazifi *et al.*, 2011). Mastitis is the most important and expensive disease of dairy industry (Radostits *et al.*, 2007). The sub-clinical mastitis (SCM) is more serious and is responsible for much greater loss to the dairy industry in Bangladesh (Kader *et al.*, 2003). Sub-clinical mastitis is 15 to 40 times more prevalent than the clinical form, is of long duration and difficult to detect. The SCM adversely affects milk quality and production of dairy animals and constitutes a reservoir of microorganisms that can affect other animals within the herd due to its contagious nature (Schultz *et al.*, 1978). SCM is usually detected by California Mastitis Test and Whiteside Tests (Kahir *et al.*, 2008; Sarker *et al.*, 2013). Detection of SCM based on electrical conductivity (EC) of the milk is easier, faster than other field tests and does not require any reagents (Norberg *et al.*, 2004). The EC of the milk increases (i.e. electrical resistance decreases) due to an increased concentration of Na⁺ and Cl⁻ in the milk when a cow is exposed to an intramammary infection (Kitchen *et al.*, 1980). Draminski Mastitis detector measures the electrical resistance of the milk to detect subclinical mastitis. The objectives of this study were to know the prevalence of subclinical mastitis in lactating cows using Draminski mastitis detector and to evaluate the efficacy of intramammary infusion against SCM in lactating dairy cows.

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MATERIALS & METHODS

Study sites and duration

The study was conducted in crossbred dairy cattle in peri-urban dairy production system within seven kilometers around the Artificial Insemination Centre, Bangladesh Agricultural University, Mymensingh. Lactating dairy cows of the 78 registered farmers of an on-going project with title “Production of HYV vis-à-vis Indigenous Seed Bulls to Support Smallholder Dairying in Bangladesh” were included in this study. The study was carried out during the period from April 2011 to May 2012.

Study design and data collection

A total of 158 registered cows from 78 herd of the said area were ear tagged to identify them individually. Milk samples were collected from all of the registered cows and cow-level data on age, milk yield, genotype and parity were recorded by using a pretested questionnaire.

Sub-clinical Mastitis test with Draminski mastitis detector

One hundred fifty eight (158) registered cows were tested with the Draminski machine (Figure 1) to detect sub clinical mastitis (SCM) in 4 quarters of the udder. The test was performed according to the instructions of the manufacturer. In brief, a minimum of 15 ml of the first portion of milk was poured directly from the teat to measuring cup. Then the switch on button was pressed to read the result in unit. The result recorded and milk poured out and the steps repeated for other quarters. The electrodes needed to be cleaned with methylated spirits on a clean cloth or tissue, or similarly with kitchen detergent and rinse off after each quarter. A reading below 250 units was considered as the cut-off value for the subclinical mastitis using Draminski mastitis detector.

Treatment of SCM with intra mammary infusion using Neomastipra JR5 in lactating cows

All of the 87 SCM infected cows were treated with Neomastipra JR5 at 12 hours interval for 3 days in intra mammary route.

Statistical analysis

The association of subclinical mastitis with age, milk yield, genotype and parity was determined by chi-square test using SPSS-11.5 computer package program.

RESULTS AND DISCUSSION

Prevalence of SCM

The study was carried out on 78 smallholder dairy farms. A total 632 quarter milk samples from 158 lactating cows were examined by Draminski mastitis detector. The overall prevalence of SCM in lactating cows was 55%. The reported prevalence of SCM varied from 15.8% to 53.1% in crossbred cows in Bangladesh (Prodhan *et al.*, 1996; Kader *et al.*, 2002; Rahman *et al.*, 2009; Rabbani and Samad, 2010; Rahman *et al.*, 2010). The variation in reported prevalence of SCM might be due to difference of breed, management systems and test used for the diagnosis of this disease. All lactating cows in our study were HF cross and the result was slightly higher than other studies.

The highest prevalence of SCM was 84.4% in more than 7 years old cows. The prevalence of SCM was significantly ($p<0.001$) increasing with the advancement of the age (Table 1). This finding corroborates with Neelesh *et al.* (2012). Higher prevalence of SCM in older cows may be due to the fact that the teat canal in older animals is more dilated or it remains partially open permanently due to years of repeated milking (Madut *et al.*, 2009). It also encourages the introduction of environmental and skin-associated microorganisms into the teat canal, leading to SCM in cows (Karimuribo *et al.*, 2008).

The prevalence of SCM was also significantly ($p<0.05$) higher (73.7%) in cows producing more than 15 liters of milk (Table 1). Islam *et al.* (2010) also reported similar findings. The Prevalence of SCM varied with the genotype. Cows with 75% HF genotype experienced more SCM (63.0%) than other genotypes (Table 1). Although statistically insignificant, an increasing trend of SCM was noted with the increased percentage of genotype. Biffa *et al.* (2005) reported that Holstein-Friesian cows are more frequently affected (56.5%) than local zebu (30.9%) and Jersey cows (28.9%). Sharma and Maiti (2010) also found that Holstein-Jersey crossbred cows are at higher risk (94.54%) for mastitis than local zebu cows (31.25%).

An increased prevalence of SCM with increased number of parity in cows was also observed. The prevalence of SCM was significantly ($p<0.001$) higher (78.4%) in cows with parity more than five (Table 1). Similar findings were also reported by other authors (Sharma *et al.*, 2007; Sharma and Maiti, 2010)

Quarter-wise Prevalence of Subclinical Mastitis in lactating cows

The quarter-wise prevalence of SCM was 32.3% in left front, 24.1% in left hind, 25.3 % in right front and 19.6% in right hind quarters (Table 2). The prevalence of SCM among the quarters did not differ significantly ($p>0.05$). The highest prevalence of SCM as recorded in left hind quarter was comparable with Sudhan *et al.* (2005) and Sharma *et al.* (2007). This could be explained by the fact that the hind quarters are more exposed to dung and urine (Chakrabarti, 2007).



Figure 1. Draminski mastitis detector

Table 1. Prevalence of subclinical mastitis in lactating cows based on age, milk yield, genotype and parity

| Variables | No. of cows tested | No. of positive cows | Prevalence (%) | Chi-square value | P-value | |
|--------------------|--------------------|----------------------|----------------|------------------|---------|--------------|
| Age (year) | Up to 5 yrs | 35 | 8 | 22.9 | 45.008 | 0.00*** |
| | 6-7 yrs | 59 | 25 | 42.4 | | |
| | >7 yrs | 64 | 54 | 84.4 | | |
| Milk yield (liter) | Up to 15 | 139 | 73 | 52.5 | 4.854 | 0.028* |
| | >15 | 19 | 14 | 73.7 | | |
| Genotype | 50% HF | 49 | 23 | 46.9 | 1.693 | 0.429 |
| | 62.5% HF | 36 | 18 | 50.0 | | |
| | 75% HF | 73 | 46 | 63.0 | | |
| Parity | Up to 5 | 121 | 58 | 47.9 | 11.746 | 0.001** * |
| | More than >5 | 37 | 29 | 78.4 | | |
| Overall | | 158 | 87 | 55.1 | | |

*Significant at 0.05 level ($p<0.05$); **Significant at 0.01 level ($p<0.01$); ***Significant at 0.001 level ($p<0.001$)

Efficacy of Intra Mammary Infusion in lactating cows

The efficacy of IMI in lactating cows was 78.2% by using Neomastipra-JR5[®] in this study (Table 3). Oliver *et al.* (2004) reported 36-86% recovery of SCM in lactating cows using different antibiotic in the same route and for long duration (8 days). It would be better if organisms from SCM infected could be isolated and appropriate antibiotics used for the treatment.

Table 2. Quarter-wise prevalence of subclinical mastitis in lactating cows (total quarters=632)

| | LF | LH | RF | RH | Total | x ² value | P-value |
|-------------------|-------|-------|-------|-------|-------|----------------------|---------|
| Affected teat | 51 | 38 | 40 | 31 | 160 | | |
| Prevalence | 32.3% | 24.1% | 25.3% | 19.6% | 25.3% | 0.213 | 0.09 |
| Not affected teat | 107 | 120 | 118 | 127 | 468 | | |

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

Table 3. Efficacy of intra mammary infusion with Neomastipra-JR5[®] in lactating cows affected with sub clinical mastitis (SCM)

| No. of cows Tested | No. of cows affected with SCM | No. of cows recovered (%) |
|--------------------|-------------------------------|---------------------------|
| 158 | 87 | 68 (78.2) |

Dramiski mastitis detector could be a potential candidate for the diagnosis of SCM in dairy animals in Bangladesh context. But before introducing this machine in the field it should be validated either by comparing with a gold standard test like somatic cell counter or by using latent class evaluation in a multi-test approach (Rahman *et al.*, 2012).

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