



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2018; 6(5): 334-337

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Received: 22-07-2018

Accepted: 23-08-2018

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Prevalence of subclinical mastitis in lactating cows in Varanasi

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Abstract

This experiment was conducted to determine the prevalence of mastitis in 80 lactating dairy crossbred cows during May to June, 2018. The study showed that a total of 80 cows (296 quarters) were screened against subclinical mastitis. Out of that 30 (37.5%) cows were affected by subclinical mastitis. Out of 296 quarters, 63 quarters showed positive reaction tested by Modified California Mastitis Test (MCMT). The prevalence of Subclinical Mastitis was found 37.50% in cows at dairy farm, Banaras Hindu University, Varanasi.

Keywords: Cow, milk, mastitis, California mastitis test, quarters

1. Introduction

Mastitis can be caused by physical or chemical agents but the majority of cases are infectious and usually caused by bacteria. Over 135 microorganisms have been isolated from bovine inflammatory infections and bacteria are one of the major etiological agents of mastitis [4]. Mastitis is caused when pathogenic bacteria enter the sterile environment of the mammary gland, often as a result of disruption of physical barriers such as the teat, requiring prompt and appropriate host defenses to prevent colonization and subsequent disease pathology. In many countries the most common bacterial species causing mastitis are *Staphylococcus aureus*, *Streptococcus dysgalactiae* and *Streptococcus uberis* [1]. *Staphylococcus aureus*, *Streptococci* and members of the *Enterobacteriaceae* are among the most common etiological agents in cows and in other animal species.

Mastitis is caused when pathogenic bacteria enter the sterile environment of the mammary gland, often as a result of disruption of physical barriers such as the teat, requiring prompt and appropriate host defenses to prevent colonization and subsequent disease pathology. Mastitis has direct public health significance. Some of the mastitis causing organisms which are excreted in the milk has been reported to be pathogenic to human being. The presence of different pathogenic bacteria in the milk renders it unsuitable for human consumption and may result in spread of diseases like streptococcal sore throat, scarlet fever, gastroenteritis, tuberculosis, brucellosis etc. A number of food poisoning outbreaks occur through consumption of milk of cows with infected udder.

Under Indian conditions, crossbred cows are supposed to be more susceptible to mastitis. The number of crossbred cow farms in the milk pockets of India is very large. Farmers, due to low level of literacy cannot recognize tremendous loss caused by mastitis. They should be made aware of both forms of mastitis. There should be curative measures against clinical form to avoid further loss. Moreover, one should check mastitis at early stage i.e. at subclinical level because, it is well known that, 'Prevention is better than cure'. There should be dynamic study of subclinical form and its association with different factors in the life of animal.

The various diagnostic tests for detection of subclinical mastitis are CMT, WST, SFMT, electrical conductivity of milk, CI- estimation in milk, Modified Aulendorfer Mastitis Probe (MAMP) test, somatic cell count and culture [3]. The diagnosis of mastitis according to the International Dairy Federation (IDF) recommendations is based on the somatic cell counts (SCC) and microbiological status of the quarter. Though bacteriological culture of milk samples is the standard method for identifying mastitis, the logistic and financial considerations involved with sampling all fresh cows have precluded this technique from being widely adopted [4].

California Mastitis Test (CMT) is a simple, inexpensive, rapid and highly sensitive test that accurately predicts the inflammatory cell counts in milk from individual quarters or pooled milk samples [7]. The SCC is account used to screen epithelial cells that have been shed from the lining of the gland and white blood cells (leucocytes) that have entered the mammary glands in response to injury or infection [2]. SCC is a useful predictor of subclinical udder infection, therefore, it is considered as an important component for assessing the quality and milk hygiene for mastitis control protocols [14]. The leucocyte count is the basis for most indirect tests employed for diagnosis. Over 135 different microorganisms have been isolated from bovine intra mammary infections (IMI), but the majority of infections are caused by *Staphylococcus* spp, *Streptococcus* spp. and gram negative bacteria [19].

In view of the research projection cited above in relation to prevalence of subclinical mastitis in lactating cows was undertaken

2. Materials and Methods

The present investigation entitled "Prevalence of Mastitis in Lactating Cows at BHU Dairy Farm Varanasi" was carried out at Dairy Farm and Laboratory, Department of Animal Husbandry and Dairying, Banaras Hindu University, Varanasi during the year, 2018.

2.1 Methods adopted; Collection of animals

Lactating cows were selected for the present series of investigations. All animals were kept on uniform pattern for feeding and management throughout of the experimental period.

2.2 Housing and management:

All the experimental animals were housed in well ventilated cattle shed of Dairy farm, Banaras Hindu University, Varanasi on the pattern of tail to tail system. Proper sanitation of the cattle shed was maintained by cleaning it twice a day. The animals were left out for grazing and exercising during the day for few hours.

2.3 Feeding of animals:

Well balanced ration as per their requirement and fresh drinking water was regularly provided to all the animals each day during experimental period.

2.4 Milking of animals:

Just after calving the cows were hand and machine mulched twice a day both morning and evening at regular intervals throughout the lactation period. The amount of milk produced by each cow was individually recorded every day in the milk record register. The lactation yield was considered as the milk produced by a cow in 305 days. The service and birth records were also maintained at B.H.U. Dairy Farm.

2.5 Sampling of milk:

For analysis 100 ml, freshly drawn milk from each quarter of the cows was collected separately in clean, well sterilized and previously dried sample bottle. The samples were taken from morning and evening milking at regular interval for laboratory analysis. Before withdrawing portion for chemical analysis milk samples were brought to the temperature of 68°F (room temperature) and mixed thoroughly into a clean receptacle in order to get homogenous samples.

2.6 Tests used for detection of subclinical mastitis

Modified California Mastitis Test (MCMT) was used to detect subclinical mastitis. MCMT was performed by [8]. Milk affected with subclinical mastitis shows higher number of polymorph nuclear leucocytes which get degenerated due to chemicals present in MCMT reagent and milk sample shows increase in viscosity. This is the basic principle used in MCMT.

2.7 Preparation of Modified California Mastitis Test

2.7.1 Reagent

The standard reagent was prepared as per following procedure. 30gm of sodium lauryl sulphate powder was taken in 1000ml volumetric flask. Approximately 900 ml of distilled water was added into volumetric flask.

The volumetric flask was then kept in water bath at 50°C temperature so as to obtain a clear solution. After cooling the solution 0.1gm of Bromocresol purple indicator was added to a final concentration of 1:1000, turning the color of solution to dark purple. Then the final volume of solution was made-up to 1000ml by adding distilled water. The pH of solution was adjusted to 8.0 using pH meter. The solution was stored in dark colored bottles [8].

2.7.2 Procedure

The MCMT was conducted in milking shed at the start of milking of each cow. A plastic paddle with four shallow cups marked as left-fore (LF), left-hind (LH), right -fore (RF) and right-hind (RH) was used to detect the individual quarter's incidence of subclinical mastitis. Approximately 2-3ml of first stripping of milk (foremilk) was taken from individual quarter in the respective cup of paddle. Then equal amount (2-3ml) of MCMT reagent was added to each cup of paddle.

The contents were mixed by gentle circular motion of paddle in the horizontal plane. Then they were observed for precipitation or gel formation. If gel like substance was formed MCMT was said to be positive and quarter was noted as affected with subclinical mastitis. But if the solution remains watery the MCMT was negative, indicating the quarter was not infected with SCM. The data regarding subclinical mastitis so each individual quarter were recorded on a data sheet.

Description of the visible reaction interpretation

1. No change in mixture (-) Normal
2. A slime which disappears after continuous Swirling (t) Trace
3. Distinct slime with no tendency towards gel formation (+) Weak positive
4. Mixture thickness immediately with gel (++) Distinct positive
5. A gel forms with a convex surface (+++) strong positive

2.8 Collection of data

The data regarding subclinical mastitis of each individual quarter were recorded on a data sheet. At the same time information regarding type of animal, stage of lactation and method of milking of each animal was recorded to see the effect of these factors on the incidence of subclinical mastitis.

3. Results

The present investigation was carried out to investigate the "Prevalence of Mastitis in Lactating Cows at BHU Dairy Farm Varanasi" during the year 2018 by using Modified California Mastitis Test (MCMT). The experimental findings as influenced by incidence of subclinical mastitis are discussed below.

3.1 Prevalence of subclinical mastitis

Table 1: Incidence of subclinical mastitis in relation to distribution among quarters Percent.

Cows		Quarters					
Tested	Positive	Tested	Positive	RF	RH	LF	LH
80	30	296	63	19	15	13	16
Percentage	37.5%	----	21.28%	30.15%	23.80%	20.63%	25.39%

From the data presented in Table 1 total 80 cows (296 quarters) were screened against subclinical mastitis. Out of that 30 (37.5%) cows were affected by subclinical mastitis. Out of 296 quarters, 63 quarters (21.28%) showed positive reaction tested by Modified California Mastitis Test (MCMT). The prevalence of Subclinical Mastitis detected by Modified

California Mastitis Test (MCMT) was regarded as standard test being simple, inexpensive and rapid screening test [3]. In present study, total 296 quarters were examined, out of that 19 (30.15%) right fore, 15 (23.80%) right hind, 13(20.63%) left fore and 16 (25.39%) left hind quarters were found positive for subclinical mastitis.

Table 2: Prevalence of subclinical mastitis in cows. (Quarter wise).

No. of quarters tested	No. of normal quarters	No. of affected quarters	Prevalence percentage quarter wise
296	233 (78.71%)	63 (21.28%)	21.28%

In Table 2, total 296 quarters were examined out of that 63 (21.28%) quarters were found positive i.e. affected quarters and remaining 233 (78.71%) shown negative test i.e. normal

quarters. The prevalence of Subclinical Mastitis was found in 30 (37.50%) cows out of 80 cows.

Table 3: Prevalence of subclinical mastitis in cows at BHU dairy farm, Varanasi

Place	No. of cows tested	No. of cows found positive for SCM	No. of quarters tested	No. of quarters found positive for SCM	% of SCM Cow wise	% of SCM quarter wise
BHU dairy farm	80	30	296	63	37.50	21.28

Data presented in Table 3, showed the prevalence of subclinical mastitis in crossbred cows at BHU dairy farm, Varanasi. Total 80 cows were tested. Out of that 30(37.50%) cows were found positive for subclinical mastitis at BHU dairy farm. Total 296 quarters were tested, out of which 63 (21.28%) were found positive test for SCM at BHU dairy farm, Varanasi.

4. Discussion

The incidence rate of subclinical mastitis almost similar with the findings of [13] who reported that out of 423 quarters of 109 lactating crossbred cows, 40 (36.69%) cows and 71(16.78%) quarters were found culturally positive [15]. revealed that the incidence of subclinical mastitis in cow was 29.34 per cent [17]. Stated overall incidence of subclinical mastitis among crossbred cows was 15.62 per cent. Similarly [5, 6, 11] observed higher incidence in hind quarters which were according to the present study [10]. also reported similar results which were in agreement with above that hind quarters were more frequently exposed to the infection than fore quarters.

The results obtained during present investigation were similar to [9, 6, 16, 13] reported 36.69 per cent animal and 16.78 per cent quarters were found positive for SCM. However [20] reported the higher incidence of subclinical mastitis i.e. 78.10 per cent in animals and 42.20 per cent in quarters and [11] observed the lower incidence of SCM in animal (17.33%) and quarters (4.87%).

5. Conclusion

It is concluded that a total of 80 cows (296 quarters) were screened against subclinical mastitis out of them 30 (37.5%) cows were found affected by subclinical mastitis.

6. Acknowledgements

The realization of this experiment is thanks to all our research colleagues and faculty and technical staff, Department of Animal Husbandry and Dairying, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi. All the authors whose works are consulted are equally acknowledged.

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