

Comparative Efficacy of Indirect Tests for The Detection of Subclinical Mastitis in Cross Bred Cows

Abstract

Mastitis is one of the major economic disease of dairy animals in India. The preventive practices and early detection can improve the productive life of animals. The present study compares the efficacy of various tests available for detection of sub clinical mastitis. The tests included Modified California Mastitis Test, Mastitis Detection Strip, Somatic Cell Count, MWT and Culture examination. The MCMT is considered most efficient under field conditions for detection of sub clinical mastitis in cross bred cows.

Keywords: Mastitis, MCMT, Somatic Cell Count, Dairy, Mastitis Detection Strip.

Introduction

Mastitis is a major constraint to dairy industry due to very high prevalence, reduced milk production and cost implication in the treatment of affected cows. The prevalence of subclinical mastitis in dairy animals is a daunting task for farmers. Apart from this, the sub-clinical mastitis can flare up to clinical mastitis. In case of sub clinical mastitis, there is no significant change in the appearance of milk and udder but milk production is reduced.

Objective of the Study

To compare the efficacy of Indirect Tests for The Detection of Subclinical Mastitis in Cross Bred Cows

Review of Literature

Early detection of mastitis in animals is important for farmers to reduce production losses and to enhance prospects of recovery (Pandit and Mehta, 1969). Sub Clinical Mastitis (SCM) is difficult to diagnose due to normal appearance of milk and udder and in apparent clinical signs. An early detection of SCM is of paramount importance to adopt prompt therapeutic measure and reduce loss of milk production of valuable dairy cows (Chandra et al., 1989). Presently, several indirect tests have been used which are based on physical examination of the udder and milk (palpation and strip cup), chemical (change in milk composition related to capillary permeability, tissue damage, increase in catalase content) and microscopic examination (pH, chloride and somatic cell count) of milk and culture for pathogenic bacteria. Present investigation was carried out to evaluate the efficacy of mastitis detection strip, modified white side test, Modified California Mastitis Test, and Somatic Cell Count taking the culture examination as standard. Article published in Bangladesh Journal of Veterinary Medicine · July 2011 entitled "Prevalence of subclinical mastitis in dairy cows in selected areas of Bangladesh" is relevant to the paper. And also article published in (2017) International Journal of Livestock Research, 7 (7), 98-103, "Univariable Risk Factors Analysis of Subclinical Mastitis in Holstein Friesian Cross Bred Cows" is relevant.

Materials and Method

A total of 168 milk samples from 30 lactating apparently healthy cross bred cows were collected for the present study. The udder of each cow was thoroughly washed initially with potassium permanganate solution and wiped with clean cloth to allow drying. The mid stream milk sample was collected for testing with different indirect tests. The different tests applied during the trial include Mastitis Detection Strip (MDS), and Somatic Cell Count (SCC).

For Mastitis Detection Strip (MDS) test, bromothymolblue treated cellulose based strips impregnated with stabilized ion-sensitive indicator were used. For Somatic Cell Count (SCC) test, total number of cells counted in 50 fields were multiplied by the working factor of microscope



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(10,000). Finally the SCC was expressed as multiple of 10^6 cells/ml of milk. On the basis of results of SCC, milk samples were divided in to three categories, viz samples with more than 3×10^5 , 4×10^5 and 5×10^5 cells/ml of milk. Modified California Mastitis Test was used to detect the change in pH of milk, if any. The culturally positive samples were considered absolute positive and results of indirect tests were compared on this basis. Finally the percentage accuracy, false positive and false negative percentage for each test was derived from the following formula:

Asian Resonance

$$\text{Percent accuracy} = \frac{\text{No. of true positive} + \text{No. of true negative}}{\text{Total no. of samples examined}} \times 100$$

$$\text{Percent false positive} = \frac{\text{No. of false positive samples}}{\text{Total no. of samples positive}} \times 100$$

$$\text{Percent negative} = \frac{\text{No. of false negative samples}}{\text{Total no. of samples negative by test}} \times 100$$

Results

Table 1: Showing Percent Accuracy of Various Diagnostic Tests Taking Culture Test as Standard

Name of test	Total samples examined	Test positive samples	Test reaction as compared to culture examination				
			True positive	False positive	True negative	False negative	Percent accuracy
MDS	168	54	43 (79.63%)	11 (20.37%)	94 (82.46%)	20 (17.54%)	81.56%
MWT	168	51	34 (66.67%)	17 (33.33%)	88 (75.21%)	29 (24.79%)	72.62%
SCC (>3 X 10 ⁵ cells/ml)	168	48	37 (77.08%)	11 (22.92%)	94 (78.33%)	26 (21.67%)	77.98%
SCC (>4 X 10 ⁵ cells/ml)	168	32	30 (93.75%)	2 (6.25%)	103 (75.74%)	33 (24.26%)	79.17%
SCC (>5 X 10 ⁵ cells/ml)	168	18	18 (100%)	0	105 (70.0%)	45 (30.0%)	73.21%
MCMT	168	30	26 (86.67%)	2 (6%)	112 (75%)	28 (22.5%)	80%
Culture examination	168	63	63 (100%)	-	105 (100%)	-	100%

Summary and Conclusion

The percent accuracy, false positive and false negative reaction of MDS, MWT and SCC to detect SCM was assessed taking cultural examination as standard. The accuracy of all the three tests varied negligibly and all tests were fairly in good agreement. The percent accuracy of MDS was higher as compared to MWT. The false positive and false negative reaction was more in MWT as compared to MDS. The modified California Mastitis Test (MCMT) was found to be around 80% accurate. The threshold SCC values of 3×10^5 cell/ml was found to be more reliable for consideration of milk samples of culture examination as compared to threshold SCC with threshold value of 5×10^5 cell/ml, followed by threshold SCC value at 4×10^5 cell/ml and 5×10^5 cells/ml. MCMT is best under field conditions for diagnosis of subclinical mastitis.

Research Duration

The research was done during post graduate studies of author.

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