



Research Article

INTERDEPENDENCE AND DISTRIBUTION OF SUBCLINICAL MASTITIS AND INTRA-MAMMARY INFECTION AMONG UDDER QUARTERS IN JERSEY CROSSBRED COWS

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Abstract- The study was aimed to investigate the interdependence and distribution of subclinical mastitis (SCM) and intra-mammary infection (IMI) among udder quarters in Jersey crossbred cows reared in hot-humid environment. Total 366 quarter wise morning milk samples were collected aseptically after performing California mastitis test (CMT) at milking byre itself to evaluate the incidence of infection in experimental cows maintained at cattle yard, ICAR- National Dairy Research Institute, Eastern Regional Station, Kalyani, West Bengal and subjected to microscopic method of somatic cell count to estimate the level of intra-mammary infection. The overall quarter wise incidence rate of IMI and SCM in Jersey crossbred cows was 54.65% and overall arithmetical mean (\pm SE) of test day SCC (logarithmic) was 5.377 ± 0.039 . The percent incidence of SCM in different quarter was 51.14, 59.79, 48.94 and 58.70 in left fore (LF), left hind (LH), right fore (RF) and right hind (RH) quarters respectively. The higher incidence was observed in hind (59.23%) as comparison to fore (50%) quarters while incidence was found to be slightly more distributed in left (55.56%) than right side (53.76%) quarters. Further, the analysis of variance showed that there was no significant effect of quarter on the log₁₀SCC level. However, the mean Log₁₀SCC was found higher for hind and right quarters numerically only. The trend of subclinical mastitis incidence obtained in the current study point out that, the rate of incidence of SCM in different quarters was not similar and was higher in hind quarters and therefore, hind and right side quarter required attention during different udder health management programmes.

Keywords- Distribution, Subclinical mastitis, Udder quarters, Crossbred cows

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Introduction

Among the animal diseases mastitis still remains the most costly ailment in dairy cattle in spite of abundant scientific efforts to reduce it which is big hindrance in the profitability of dairy animal production. Mastitis refers to an inflammation of the mammary gland and udder tissue which can occur in clinical and Subclinical forms [1]. Subclinical mastitis (SCM) not only results into augmented expenses linked to different control approaches [2] but also into decreased milk production and detrimental effects on milk compositions [3,4] and so SCM is of marked importance to dairy farmers economically. According to previous report, most estimates show that on the average an affected quarter suffers a 30% reduction in productivity and an affected cow loss of 15% of its production for the lactation [5]. An additional imperative aspect is that the SCM is tough to detect grossly due to the absence of any visible symptoms in the mammary glands and in milk. So the infected animals act as a reservoir of microorganisms that can infect other herd mates due to its contagious nature. There are some diagnostic tests like White Side test, catalase test, California mastitis test (CMT), pH and Somatic cell count tests that can be used to indirectly diagnose subclinical mastitis. These tests are preferred for screening test for subclinical mastitis due to their ease of use and ability to yield quick and satisfactory results [6].

Two decade ago the incidence of clinical and subclinical mastitis in India was ranged from 1-10% and 1-50% respectively, in cows [7]. Incidence of subclinical mastitis has been found to vary animal wise and quarter wise in some previous studies where incidence of SCM was more in hind quarters [8,9]. Some researcher

determined the distribution of subclinical mastitis and intra-mammary infection (IMI) across udder quarters and found that substantial interdependence between quarters exists [10]. Though considerable information is available on incidence of SCM in different breed of cattle, however in Jersey crossbred cows particularly under hot-humid climate the information is limited and the literature on interdependence and distribution SCM among quarter is scanty. Therefore, keeping the aforesaid in view the present study was planned to study the interdependence and distribution of subclinical mastitis (SCM) and intra-mammary infection (IMI) among udder quarters in Jersey crossbred cows reared in hot-humid environment.

Material and Methods

Location and experimental animals

The present study was conducted on twenty four randomly selected lactating Jersey crossbred cows from the lactating herd of Eastern Regional Station, ICAR-National Dairy Research Institute located in Kalyani city of West Bengal. The weather of Kalyani is hot and humid as the maximum ambient temperature in summer goes up to 39 °C and minimum temperature in winter comes down to about 8 °C and average annual rainfall is 1000-2000 mm [20]. The altitude of Kalyani city is 9.75 meter above mean sea level, latitude and longitude position being 22°56'30"N and 88°32'04"E, respectively.

Collection of milk samples and detection of subclinical mastitis

Representative 30 ml. morning milk samples were collected aseptically from all the quarters of experimental lactating cows. For this purpose, quarters were assigned as left fore (LF), left hind (LH), right fore (RF) and right hind (RH). Few teats were found as blind or non-functional at the time of sampling and so a total of 366 milk samples were collected at monthly interval for consecutive four months of experimental period. Modified California Mastitis Test (MCMT) was performed in the milking byre itself during milking of cows as per procedure described by previous investigator 11 [8]. The collected samples were brought to the laboratory immediately to estimate somatic cell count (SCC) in milk by using the method described by 12 [9].

Statistical analysis: The data on SCC were transformed into log scale to minimize the heterogeneity of variance and then analysed with the help of SAS software package, version 9.3 [13].

Results and Discussion

In the present study overall quarter wise incidence rate of subclinical mastitis (SCM) was 54.65% and overall arithmetical mean (\pm SE) of test day SCC (logarithmic) was 5.377 ± 0.039 . The trend of incidence of SCM obtained in the current study pointed out that the rate of incidence of SCM in different quarters was not similar and was found highest for left hind quarter while being lowest for right fore quarter. The percent incidence of SCM in different quarter was 51.14, 59.79, 48.94 and 58.70 for left fore (LF), left hind (LH), right fore (RF) and right hind (RH) quarters respectively [Fig-1]. However, the analysis of variance (ANOVA) showed non-significant effect of quarter on SCC level and mean Log₁₀ SCC between different quarters was differ non-significantly that has been shown in [Table-1].

Table-1 Mean \pm SE of Log₁₀ SCC in different quarter and in combination of front-hind and left-right quarter Means within each column bearing a common superscript differ non-significantly at $p < 0.05$

Different quarter combinations		Number of observations	Mean \pm Std. Error
Overall		366	5.377 \pm 0.039
All four quarters	LF	88	5.367 \pm 0.082 ^a
	LH	92	5.353 \pm 0.075 ^a
	RF	94	5.327 \pm 0.076 ^a
	RH	92	5.462 \pm 0.079 ^a
Front and hind quarter	Front quarter	182	5.346 \pm 0.055 ^a
	Hind quarter	184	5.408 \pm 0.054 ^a
Right and left quarter	Left quarter	180	5.360 \pm 0.055 ^a
	Right quarter	186	5.394 \pm 0.055 ^a

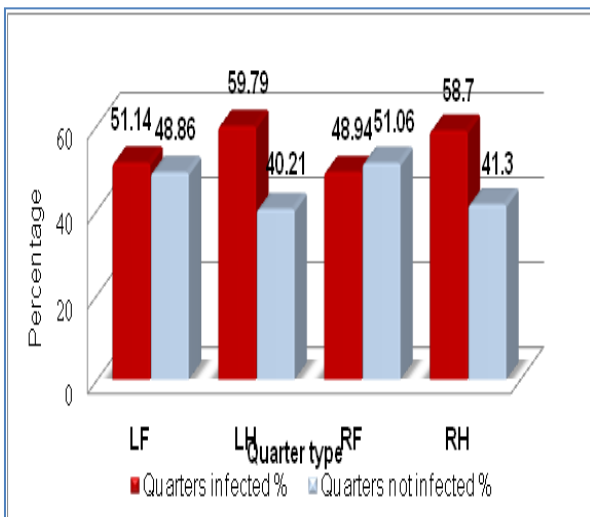


Fig-1 Per cent incidence of SCM in different quarters in Jersey crossbred cows

Similar to present study [14] reported the incidence of SCM as 53.03 and 52.43% respectively in Karan Swiss and Karan Fries cows whereas other in their findings observed 56.36% incidence of subclinical mastitis in Sahiwal [15]. Higher incidence of SCM than the current investigation has been accounted as 86.87, 75.00, 75.00 and 80.00% incidence in Jersey, HF, Sahiwal and Gir animals respectively [16]. In the context of somatic cell count nearly similar value for log₁₀ SCC which was 5.39 ± 0.30 has been reported [17]. However, higher mean log₁₀ SCC value (5.51 ± 0.01) in Jersey cow [18] while lesser SCC values than the present study with the mean \pm SE log₁₀ SCC of 4.804 ± 0.069 in Red Holstein cows has been reported [19]. The variation observed in the quarter wise infection rate as reported in different studies may be attributed to the different animal factors like breed, age, lactation stage of animals and environmental factors like climate and managing practices, followed at the particular farm.

The data were also classified on the basis of quarter side to study the effect of fore-hind and left-right side combination of quarter. The higher SCM incidence was observed in hind (59.23%) in comparison to fore (50%) quarter while incidence was found to be distributed slightly more for left side (55.56%) than right side (53.76%) quarters [Fig-2 & Fig-3]. Further, the results of ANOVA revealed non-significant difference between the mean Log₁₀ SCC of front and hind quarter as well as in between the mean Log₁₀ SCC of left and right side quarter [Table-1].

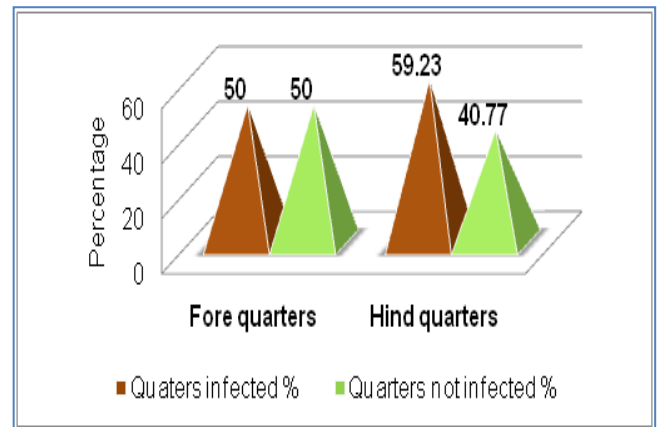


Fig-2 Percent incidence of SCM in fore and hind quarters in Jersey crossbred cow

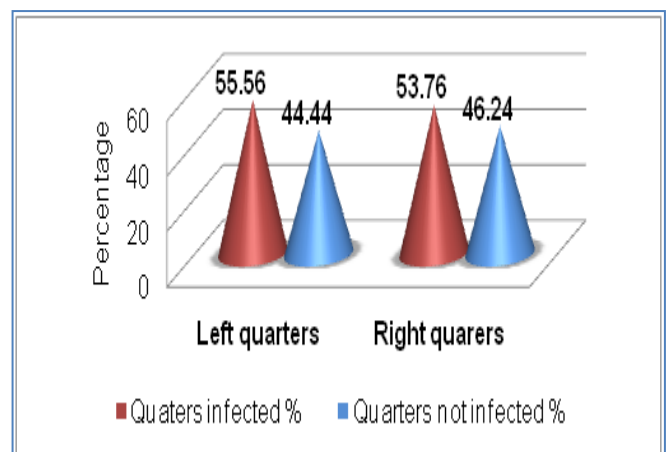


Fig-3 Percent incidence of SCM in fore and hind quarters in Jersey crossbred cow

In agreement with the present findings, previous investigations [5,6] have also depicted more incidence of SCM for left and hind side quarters which were comparable to the present study. In another study also higher SCM incidence in left hind quarter has been revealed with percent incidences of 20, 42.31, 32.61 and 28.57% in LF, LH, RF and RH quarters respectively [15]. They also reported non-significant effect of quarters on SCC, alike to the present study. Higher incidence of SCM and numerically higher SCC level in the hind quarters might be

due to slightly larger volume of hind quarters as compared to fore quarters due to which hind quarters get closer to ground which increases the chances of infections. Further, the left quarter faces more exposure to milker or operator during milking, who can act as a source of infection.

Conclusion

From the findings of the present study it can be concluded that the rate of incidence of subclinical mastitis among different quarters was not similar and SCM incidence was higher in hind quarters and SCC was numerically higher for right hind quarter and therefore, more attention should be given to hind and right side quarter during different udder health management activities and knowing the incidence and distribution pattern of subclinical mastitis among udder quarter may provide the livestock owner with information to improve facilities as needed to manage better udder health.

Conflict of Interest: None declared

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Author Contributions: 1st and 2nd author designed and conducted the study, 3rd author helped in analysing the data and 4th author helped in preparing manuscript.

Abbreviations: IMI = Intra-mammary Infection

SCM = Subclinical Mastitis

SCC = Somatic Cell Count

Ethical approval: This study was performed after taking approval from the institutional animal ethics committee.

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