

Influence of Teat Position, Parity, Stage of Lactation and Season of Calving on Prevalence of Subclinical Mastitis in Jersey Crossbred Cows

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Abstract The objective of this study was to find out the influence of different factors on the prevalence of subclinical mastitis (SCM) in Jersey crossbred cows maintained in eastern regional station NDRI, Kalyani, West Bengal. The animals were housed in loose housing system with concrete floor. Monthly quarters wise screening for SCM, of all lactating animals of farm was done up to six month by using the modified California mastitis test, milk pH and somatic cell count (SCC). Based on above three tests about 49.26% of tests were found to be positive for SCM. Higher prevalence of SCM was observed in hind side (56.25%) and right side quarters (51.18%). Prevalence of SCM was increasing with parity up to fourth parity (69.57) and slightly decreases in fifth and above parity. Increasing trend of prevalence of SCM was also observed for early (31.68%), mid (51.70%) and late (66.67%) stages of lactation. Season of calving was considered as an important parameter that influences the prevalence of SCM as the high prevalence was

observed in stressful calving season i.e. summer (55.74) and rainy season (52.51).

Keywords Subclinical mastitis, Jersey crossbred cows, Parity, Stage of lactation, Season of calving.

Introduction

Current concerns about global environment changes, food security and the sustainability of agriculture have increased the importance of efficient dairy production and dairy herd health. Modern, Indian dairy production systems have brought about significant changes to meet this demand. These includes a shift from extensive subsistence to intensive commercial type system, use of high yielding exotic germplasm, and changes from primarily older rural participants to younger business oriented participants. These changes were supported by shift in composition of livestock population in favor of animals having high productivity i.e. exotic and crossbred milch cattle, as their numbers increased by 34.78% from year 2007 to 2012, while that of indigenous milch cattle increased marginally by 0.17% only [1]. However in spite of above remarkable changes and production of large volume of milk, productivity of animals is still very low and the quality aspects of milk have not received adequate attention. Therefore it has become major obstacle in realising the large export potential of milk and their related products. Among the several barriers in achieving the milk production targets, sub clinical mastitis (SCM) continues to remain the most chal-

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lenging impediment, since SCM is difficult to detect grossly due to the absence of any visible indications in the mammary glands and in milk. The infected animals also act as a reservoir of microorganisms that can infect other herd mates due to its contagious nature [2]. Bansal and Gupta [3], in their finding reported that the annual losses due to mastitis were Rs 7165.51 crores in India. The above discussion clearly indicates that the higher prevalence of mastitis is responsible for huge economic losses, specially the subclinical form, which is an alarming situation for the dairy sector in the country.

Apart from management, several host risk factors like parity, stage of lactation and season of calving were found associated with the prevalence of SCM. In-depth study and understanding of these factors may help to reduce the impact of SCM in future. Keeping the above points in view, the present study was undertaken to study the prevalence of subclinical mastitis and influence of different factors (teat position, parity, stage of lactation and season of calving) on prevalence of SCM in organised herd under hot humid environmental condition of West Bengal.

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Materials and Methods

The present study was conducted on Jersey cross-bred animals, maintained at Eastern Regional Station, National Dairy Research Institute (ERS-NDRI), Kalyani, West Bengal. The animals were housed under loose housing system with concrete floor. The housing space of the animals was as per the BIS standards. The nutrient requirement of the animals was met through *ad libitum* green fodder supplemented with concentrate mixture as per requirement. Machine milking was done two times a day. The cow milk from each quarter was tested monthly up to the six month by Modified California Mastitis Test (MCMT), pH and somatic cell count. All reagent used in this study were of analytical grade and obtained from Renkem

and Hi-media laboratories, India. All quarters samples were evaluated for SCM on the basis of results of above tests to get better accuracy. MCMT was conducted by using 3% sodium lauryl sulfate solution, just prior to milking of cows as per standard guidelines and results were confirmed by milk pH and somatic cell count. Representative morning milk samples were brought to the laboratory immediately for further analysis. The pH and smear for somatic cell count (SCC) were performed within one hour of collection. The pH of milk was determined by an electronic digital pH meter with glass electrode, calibrated against standard buffer solutions of known pH (pH 4, 7 and 10). The SCC in milk was done as per the slandered method. SCC above 200000 cells/ml of milk was considered as positive for SCM. The data were classified according to test position, parity, lactation stage and season of calving. The results were analyzed by using the SPSS software statistical package (16.0).

Results and Discussion

A total of 950 quarter wise milk samples were examined during 6 month of study period. About 49.26% samples were found positive for subclinical mastitis. The percentage of mild, moderate and severe infected quarters was 14.63, 21.26 and 13.37% respectively. The per cent prevalence of SCM was 40.73, 54.47, 44.54 and 58.08 in leaf fore (LF), left hind (LH), right fore (RF) and right hind (RH) quarters respectively. The trend indicated that, the rate of prevalence of SCM in different quarters was not similar. But when the data were classified on the basis of quarter side (fore – hind and left-right), higher prevalence was observed in hind (56.25) and right (51.18) quarters in comparison to fore (42.59) and left (47.41) quarters (Table 1). Similarly the percentage of mild, moderate and severe infection was higher in hind (17.24, 25.00 and 14.01%) quarters than fore quarters (12.14, 17.70 and 12.76%). The prevalence of mild, moderate and severe infection in right quarters was 14.78, 24.41 and 11.99% respectively. Whereas, in left quarter the prevalence of mild, moderate and severe infection were 14.49, 18.22 and 14.70%, respectively.

Ghosh et al. [4] reported 30.6% of quarter infection with 20, 42.31, 32.61 and 28.57% prevalence in LF, LH, RF and RH quarters respectively. Sharma et al. [5]

Table 1. Percent prevalence of SCM in different quarters in Jersey crossbred cows. Values in parentheses indicate number of observations in respective category.

Quarter	Number of observations	Quarters not infected (%)	Quarters infected (%)			Total
			Mild	Moderate	Severe	
LF	248	59.27 (147)	12.10 (30)	14.52 (36)	14.11 (35)	40.73 (101)
LH	235	45.53 (107)	17.02 (40)	22.13 (52)	15.32 (36)	54.47 (128)
RF	238	55.46 (132)	12.18 (29)	21.01 (50)	11.34 (27)	44.54 (106)
RH	229	41.92 (96)	17.47 (40)	27.95 (64)	12.66 (29)	58.08 (133)
Fore quarter	486	57.41 (279)	12.14 (59)	17.70 (86)	12.76 (62)	42.59 (207)
Hind quarter	464	43.75 (203)	17.24 (80)	25.00 (116)	14.01 (65)	56.25 (261)
Left quarter	483	52.59 (254)	14.49 (70)	18.22 (88)	14.70 (71)	47.41 (229)
Right quarter	467	48.82 (228)	14.78 (69)	24.41 (114)	11.99 (56)	51.18 (239)
Cumulative	950	50.74 (482)	14.63 (139)	21.26 (202)	13.37 (127)	49.26 (468)

found more prevalence for left and hind side quarter with overall prevalence of 45%. Pankaj et al. [6] also reported lower prevalence of SCM than the present study.

This variation in the quarter infection rate as reported in different studies may be attributed to the breed, environmental conditions and managerial practices, followed at the farm level. Higher prevalence of SCM in the hind quarters may be due to higher chance of injury to hind quarters as compared to fore quarters. Hind quarters are also exposed to urine and dung more frequently, which may further increase the chances of infections.

The percent prevalence of SCM in different parities was presented in Table 2. The perusal of data showed that prevalence of SCM was increased with increase in number of lactation and highest in 4th parity, there after slight decrease in prevalence was observed. Similar observations were reported by Ghosh et al. [4], Sharma et al. [5] and Houda et al. [7]. The higher prevalence of SCM in later lactation in comparison to primiparous animals may be due to the fact that animals resistance to mastitis might have lowered with advancement of lactation number. With the advancement of age, the udders become more pendulous and more prone to environmental or conta-

gious infection. Constant exposure of animals to the pathogens and looseness of sphincters helps the easy entry of organism through streak canal.

The prevalence of SCM was lower in early stage and highest in the stage of lactation (Table 2). The prevalence of SCM in Jersey crossbred cows was 31.68, 51.70 and 66.67% in early, mid and late stages of lactation, respectively. Similar trends as in present study were found by Samanta et al. [8] and Kamboj et al. [9]. Whereas Ghosh et al. [4], Sharma et al. [6], found higher prevalence of SCM in early and late stage of lactation, respectively.

The per cent quarter wise prevalence of SCM in Jersey crossbred was highest in summer calvers (55.74%) as compared to rainy (52.51%) and winter (42.55%) season of calving (Table 2). Wicks and Leaver, [10] reported that the season of calving significantly affect the udder health, where as Rekik et al. [11] stated that calving season did not affect the udder health significantly. Higher prevalence of SCM and SCC in summer and rainy season of calving as compared to the winter season of calving can be better explained by the environmental condition of the particular season. Environmental conditions of lower Gangetic plains (West Bengal) are hot and humid

Table 2. Per cent quarter wise prevalence of SCM in different traits of Jersey crossbred cows. Values in parentheses indicate number of observations in respective category.

Traits		Number of observations	Quarters not infected (%)	Quarters infected (%)			Total
				Mild	Moderate	Severe	
Parity	1	97	83.51 (81)	8.25 (8)	6.19 (6)	2.06 (2)	16.49 (16)
	2	404	55.96 (226)	14.36 (58)	19.31 (78)	10.40 (42)	44.06 (178)
	3	47	46.81 (22)	14.89 (7)	19.15 (9)	19.15 (9)	53.19 (25)
	4	69	30.43 (21)	13.04 (9)	26.09 (18)	30.43 (21)	69.57 (48)
	5 and above	333	39.64 (132)	17.12 (57)	27.33 (91)	15.92 (53)	60.36 (201)
Stage of lactation	Early	322	68.32 (220)	10.25 (33)	16.15 (52)	5.28 (17)	31.68 (102)
	Mid	352	48.30 (170)	18.18 (64)	22.44 (79)	11.08 (39)	51.70 (182)
	Late	276	33.33 (92)	15.22 (42)	25.72 (71)	25.72 (71)	66.67 (184)
Season of calving	Summer	183	44.26 (81)	13.66 (25)	23.50 (43)	18.58 (34)	55.74 (182)
	Rainy	398	47.49 (189)	18.09 (72)	22.11 (88)	12.31 (49)	52.51 (209)
	Winter	369	57.45 (212)	11.38 (42)	19.24 (71)	11.92 (44)	42.55 (157)

during the summer and rainy season that is responsible for higher number of pathogens. Animals calved during summer and rainy season are under stress, as well as high temperatures and excess moisture make them more susceptible to infections.

In conclusion there was no distinct trend of SCM when considered all quarters, whereas, hind side and right side quarters were more infected as compared to fore and left side quarters. Prevalence of SCM was also influenced by the parity (increase in higher parity) and stage of lactation (increase as stage advances). Calving season was an important factor that influences the prevalence of SCM. The results of this study will help in better identification and management of the animals suffering from SCM which not only effects the milk production but also spread the disease to other herd mates.

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