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Quarter type wise prevalence of subclinical mastitis on basis of diagnostic test and cultural examination

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Abstract
In this study, a total 198 forequarters and 196 hindquarters of 100 cows were screened for subclinical mastitis on the basis of milk pH test, modified California mastitis test, somatic cell count, electrical conductivity test and culture examination. The highest quarters wise prevalence of SCM was found in somatic cell count (28.42%). The prevalence of SCM in forequarters was 15.65 percent, 19.69 percent, 18.68 percent, 15 percent, 14.64 percent and in hind quarters was 33.67 percent, 37.24 percent, 34.69 percent, 33.67 percent and 32.65 percent in milk pH, somatic cell count, electrical conductivity, modified California mastitis test and culture examination, respectively. Right hind quarters were more affected than the left forequarters and hindquarters are more affected then forequarters in each mastitis detection tests.

Keywords: Cattle, prevalence, SCM (Subclinical mastitis)

Introduction
Mastitis is defined as inflammation of the parenchyma of mammary glands and is characterized by, chemical, physical, and usually bacteriological changes in milk and pathological changes in glandular tissues (Constable, 2017) [3]. Besides causing huge losses to milk production, the subclinically affected animals remain a constant source of infection to other herd mates and incidence of subclinical mastitis was also observed due to some risk factors, *viz*. age, lactation number, stage of lactation, method of milking and housing. (Swami *et al.*, 2017) [13]. Whereas in subclinical mastitis, visible changes are not observed in the udder and appearance of milk but milk production decreases with an increase in somatic cell count and secretion of pathogen in milk (Nithya *et al.*, 2017) [6]. Due to non-observable change in milk in subclinical mastitis it can be detected indirectly by several diagnostic methods including the somatic cell count (SCC), modified California mastitis test (MCMT), milk pH, electrical conductivity (EC) of milk and culture examination. So, the present study was undertaken with the aim to detect the prevalence of SCM in cattle in Bikaner area of Rajasthan.

Materials and Methods
Collection of milk samples
Collection of all the milk samples were done aseptically using proper antiseptic measures. Approximately about 30 ml of fore milk from each teat was collected in a sterilized vial from each quarter. The Modified California mastitis test (MCMT) of milk samples was conducted as per the method of Schalm and Noorlander (1957) [9]. The somatic cell count of milk samples was done using as described by Schalm *et al.* (1971) [10]. The electric conductivity (EC) is because of its soluble salt fraction. EC of milk samples was measured by Pen type EC035 (ATC) conductivity meter of ERMA instruments. The pH of milk shows status of udder health of the animal milk. The pH of milk was determined using single electrode Pen type digital pH meter PH-035 (ATC) of ERMA Instruments. The milk samples were collected aseptically. The milk sample was streaked on nutrient agar plate and MacConkey (MCA) agar plates in primary, secondary and tertiary pattern in order to obtain isolated colonies of bacteria. These petri dishes were incubated for 24 hours at 37 °C and identification of bacteria is done.

Results and Discussion

Data of quarter wise prevalence of subclinical mastitis by various indirect diagnostic tests on has been presented in Table 1 and 2. Milk pH test quarter wise prevalence of SCM was recorded as 21.31 percent in left side quarters, 27.91 percent in right side quarters, 15.65 percent in forequarters and 33.67 percent in hindquarters. The prevalence of subclinical mastitis was found 11.11 percent, 31.63 percent, 20.21 percent and 35.71 percent in left fore, left hind, right fore and right hindquarters, respectively on the basis of milk pH test. Highest prevalence of SCM was recorded in right hindquarters (35.71%) followed by left hind quarters (31.63%), right forequarters (20.21%) and least in left fore quarters (11.11%) on the basis of milk pH test. On Somatic cell count (SCC), quarter wise 25.38 percent prevalence of SCM was recorded in left side quarters, 31.47 percent in right side quarters, 19.69 percent in forequarters and 37.24 percent in hindquarters. The prevalence of subclinical mastitis was found as 18.18 percent, 32.65 percent, 21.21 percent and 41.83 percent in left fore, left hind, right fore and right hindquarters, respectively on the basis of somatic cell count. Highest prevalence of SCM was recorded in right hindquarters (41.83%) followed by left hindquarters (32.65%), right forequarters (21.21%) and least in left fore quarters (18.18%) on the basis of somatic cell count. Electrical conductivity (EC), quarter wise prevalence of SCM was recorded 22.33 percent in left side quarters, 30.96 percent in right side quarters, 18.68 percent in forequarters and 34.69 percent in hind quarters based on electrical conductivity. The prevalence of subclinical mastitis was found 16.16 percent, 28.57 percent, 21.21 percent and 40.81 percent in left fore, left hind, right fore and right hindquarters, respectively on the basis of electrical conductivity. Based on electrical conductivity test, highest prevalence of SCM was recorded in right hindquarters (40.81%) followed by left hindquarters (28.57%), right fore quarters (21.21%) and least in left forequarters (16.16%). MCMT, recorded to be 21.31 percent in left side quarters, 30.45 percent in right side quarters, 15 percent in forequarters and 33.67 percent in hindquarters. The prevalence of subclinical mastitis was found to be 15.15 percent, 27.55 percent, 21.21 percent and 39.79 percent in left fore, left hind, right fore and right hindquarters, respectively on the basis of modified California mastitis test. Highest prevalence of SCM was recorded in right hindquarters (39.79%) followed by left hind quarters (27.55%), right fore quarters (21.21%) and least in left forequarters (15.15%) on the basis of modified California mastitis test. On Culture examination, was recorded to be 20.30 percent in left side quarters, 26.90 percent in right side quarters, 14.64 percent in forequarters and 32.65 percent in hindquarters. The prevalence of subclinical mastitis was found to be 11.11 percent, 29.59 percent, 18.18 percent and 35.71 percent in left fore, left hind, right fore and right hindquarters, respectively on the basis of culture examination. Highest prevalence of SCM was recorded in right hindquarters (35.71%) followed by left hindquarters (29.59%), right fore quarters (18.18%) and least in left forequarters (11.11%) on the basis of culture examination. The prevalence of subclinical mastitis in hindquarters was found higher as compared to forequarters were also reported by Sharma *et al*. (2012) [11], Badiuzzaman *et al*. (2015) [1], Patel and Trivedi (2015) [7], Swami *et al*. (2017) [13], Kachhawa (2018) [5], Choudhary (2018) [2], Solanki (2021) [12], Gupta (2021) [4] and Sain (2022) [8]. In the present investigation, it was found that prevalence of subclinical mastitis was higher in hind quarters as compared to forequarters. It was also found that highest prevalence of SCM was recorded in right hindquarters, followed by left hindquarters, right forequarters and least in left forequarters.

Table 1: Overall quarter wise prevalence of subclinical mastitis in cattle

S. No	Quarters	Quarter (s) screened	Diagnostic tests									
			Milk pH		Somatic cell count		Electrical conductivity (mS/cm)		Modified California mastitis test (MCMT)		Culture examination	
			Quarters positive	Prevalence (%)	Quarters positive	Prevalence (%)	Quarters positive	Prevalence (%)	Quarters positive	Prevalence (%)	Quarters positive	Prevalence (%)
1	Left side quarter	197	42	21.31	104	25.38	97	22.33	42	21.31	40	20.30
2	Right side quarters	197	55	27.91	62	31.47	61	30.96	60	30.45	53	26.90
3	Fore quarters	198	31	15.65	39	19.69	37	18.68	36	15	29	14.64
4	Hind quarters	196	66	33.67	73	37.24	68	34.69	66	33.67	64	32.65
5	Total quarters	394	97	24.61	112	28.42	105	26.64	102	25.88	93	23.60

Table 2: Quarter type wise prevalence of subclinical mastitis in cattle

S. No	Type of Quarters	No of	Diagnostic tests									
			Milk pH		Somatic cell count		Electrical conductivity (mS/cm)		Modified California mastitis test (MCMT)		Culture examination	
			Quarters positive	Prevalence (%)	Quarters positive	Prevalence (%)	Quarters positive	Prevalence (%)	Quarters positive	Prevalence (%)	Quarters positive	Prevalence (%)
1	LF	99	11	11.11	18	18.18	16	16.16	15	15.15	11	11.11
2	RF	99	20	20.21	21	21.21	21	21.21	21	21.21	18	18.18
3	LH	98	31	31.63	32	32.65	28	28.57	27	27.55	29	29.59
4	RH	98	35	35.71	41	41.83	40	40.81	39	39.79	35	35.71

Conclusion

In the present investigation, it was concluded that prevalence of subclinical mastitis was higher in hind quarters as compared to forequarters. It was also found that highest prevalence of SCM was recorded in right hind quarters,

followed by left hind quarters, right forequarters and least in left fore quarters.

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