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ANIMAL HUSBANDRY

Prevalence of Clinical and Subclinical Mastitis in Buffaloes of Jammu Region

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ABSTRACT

The current study was carried out with an aim to determine the prevalence of clinical and subclinical mastitis in dairy buffaloes in both organized and unorganized farms of Jammu and RS Pura region. Screening was done on 150 and 500 randomly selected animals from organized and unorganized farms respectively. Today it can be estimated that nearly half of the dairy buffalo population is suffering from clinical and subclinical mastitis so considering its high prevalence and its economic importance, study was made with the objectives to study the prevalence of mastitis along different regions of Jammu using Modified California Mastitis test (mCMT). Overall prevalence of SCM in buffaloes on animal basis was 23.85% in buffaloes. Subclinical mastitis (SCM) prevalence on animal basis was higher in buffaloes i.e. 26.40%, in unorganized farms and 15.33%, in organized farms than clinical mastitis (CM) 8.67%, in organized farms and 9.60%, in unorganized farms. Prevalence of SCM on quarter basis in buffaloes was higher at unorganized farms (18.95%) than organized farms. Quarter-wise prevalence of SCM in buffaloes at organized dairy farms was 16.27% and 18.95% at unorganized farms with highest prevalence in RH (28.08%) followed by LH, RF and LF in organized farm and highest in RH (29.69%) followed by LH, RF and LF in unorganized farm respectively. However on the basis of severity, large number of quarters (7.80%) had 1+ mCMT score followed by 2+ and 3+ in both organized and unorganized farms

Highlights

- The overall prevalence of mastitis in buffaloes was reported to be 23.85%.
- Sub-clinical form of mastitis is higher in buffaloes than clinical mastitis.

Keywords: Clinical mastitis, subclinical mastitis, buffaloes, Jammu

Mastitis is a global problem, denoting an inflammatory condition of the udder characterized by physical, chemical and microbiological changes in the milk and pathological changes in the glandular tissue of the udder. In crossbred cows, the udder has to undergo rapid changes in relation to size, position and adjustment due to rapid removal of large volume of milk and as such it is prone to injury and infection. The resulting inflammation is referred to as mastitis. It poses the risk for transmission of major zoonotic diseases like brucellosis, tuberculosis, streptococcal sore throat leptospirosis and gastroenteritis (Radostits e*t al.* 1994).

Mastitis is one of the important production diseases of dairy animals, which directly or indirectly hampers the economy of the farmers and ultimately affect the economy of the country. Mastitis continues as a problem in many dairy herds despite proper application of proven control methods of teat dipping and total dry cow therapy. In dairy cattle mastitis results in severe economic losses from

reduced milk production, treatment cost, increased labor, milk withheld following treatment and premature culling (Miller *et al.* 1993).

Livestock and its inputs are a growing economic sector. It's a major income source of the poor and especially of women in developing countries. The dairy industry in particular, plays a strong role for the livelihood of poor people because agriculture land is going to shrink as a result of which dependency of farmers is increasing towards dairy sector.

Since, the quality and quantity of the milk is influenced by mastitis, it is considered to be one of the most important causes of economic losses in the dairy industry worldwide. India is the second largest milk producer in the world with a milk production of around 112 million tons, which is worth more than ₹ 1,70,000 Crores. Buffalo milk accounts for approximately 57% of total milk production. In India, bovine mastitis in has become extremely complex and the costliest disease. It affects more than 50% of the herd population. It has been estimated that the mastitis alone can cause approximately 70% of all avoidable losses incurred during milk production.

The buffalo population in Asia has multiplied over the past half a century, by a factor of 2.5 rising by almost 2.2 billion in absolute numbers and at an average annual pace of over 1.8%. Over 3.9 billion, roughly 60% of the world population, reside in Asia (Cruz 2010). The 2008 buffalo milk production in Asia represents 96.78% of the total volumes of world's buffalo milk of 89.2 Million tons. Production in South and Southwest Asia primarily from India and Pakistan contributed a hefty 93.17% (FAO, 2010). Buffaloes are significant sources of milk in this sub-region contributing as high as 68.35% of the total milk yield in Pakistan, and 56.85% in total milk production in India.

The trend of milk production in some Asian countries is given in Fig. 1. In India, the dairy sector's growth depended in large part on the use of buffalo which, unlike high-yielding dairy cattle, are well adapted to tropical climes. Today, across India, more than half of all milk is produced from buffalo. Cross-bred cattle numbers are increasing but they still account for less than 14 per cent of the total cattle population (FAO 2009).

MATERIALS AND METHODS

Place of work

The present study was carried out in three blocks (Satwari, Bishnah, and R.S. Pura) of Jammu region, and those are covered by Pakistan border and a total of 25 villages were covered from all three blocks. In the present study, a questionnaire was framed to collect the relevant information about management practices at the farm and the data of randomly selected lactating animals. A total of 150 and 500 milk samples were collected from lactating buffaloes from organized and unorganized farm respectively in Jammu. Random sampling was done at the farm and questionnaire was completed. These animals were initially screened using the Modified California Mastitis Test (MCMT).

Sampling of animals

A total of 650 randomly selected lactating buffaloes in an organized and unorganised farm at RS Pura and Jammu were screened. Mastitis prevalence study was carried out in total 25 villages house holds and dairy farms in cities (Jammu and R.S Pura) at both organized and un-organized farms and on total 2600 quarters of 650 buffaloes were screened using Modified California Mastitis Test (mCMT).

Diagnosis of mastitis

MCMT was used for screening of lactating dairy buffaloes as side test on the spot. In brief, a plastic paddle with four chambers or shallow cups used to perform the test. About 3 ml of milk directly striped into the labeled cups as Left Fore (LF), Left Hind (LH), Right Fore (RF) and Right Hind (RH), from the respective four quarters. To ensure equal quantity of milk in each cup, the paddle should be tilted slightly at an angle of 45° to allow overflow of excess of the milk samples, if any in any cup. Then approximately equal quantity of the test reagent (CMT reagent, 3% Sodium lauryl sulphate) added to each cup. The mixture of the milk and reagent is shaken gently in a rotating manner of the paddle in the horizontal plane. For the interpretation of severity of mastitis, different scoring system for mCMT was considered during present study (Table 1). Based on the thickness of the gel formed by mCMT reagent-milk mixture, test results were

Table 1: The mCMT reaction graded on the basis intensity of gel formation

CMT score	Description	Interpretation
N (Negative)	No change	Healthy quarter
T (Trace)	Slime formed which disappeared with continuous movement of paddle	Sub-clinical mastitis
1 (Weak)	Distinct slime, but no gel formation.	Sub-clinical mastitis
2 (Distinct positive)	Viscous with gel formation, which adhered to the margin.	Serious mastitis infection
3 (Strong positive)	The gel formation with convex projection, the gel did not dislodge after swirling movement of the paddle	Serious mastitis infection

scored as 0 (negative / trace), 1+ (weak positive), 2+ (distinct positive), and 3+ (strong positive). Positive CMT-cows were defined as having at least one CMT-positive quarter.

The prevalence was expressed in percent positive by using the following formula:

$$\text{Prevalence (\%)} = \frac{\text{No. of animals positive}}{\text{No. of animals tested}}$$

Physical examination of the udder

The udder was examined for any evidences of atrophy, changes in size by manual palpation and teats were observed for any alterations such as injury, wounds and scars.

Physico-chemical examination of milk

Milk was examined for visible abnormalities/ alterations, including discoloration, clots, flakes, and pus, presence of blood or blood stains and consistency, if any, at the time of milking during the visit at the farms.

RESULTS AND DISCUSSION

Prevalence of sub-clinical mastitis (SCM) in buffaloes

Subclinical form of mastitis is the early stage of clinical mastitis and therapeutic interventions at subclinical stage can control development of clinical mastitis, which can significantly reduce the economic losses due to clinical mastitis. Overall prevalence of SCM in buffaloes on animal basis was 23.85% in buffaloes (Table 2). Subclinical mastitis (SCM) prevalence was higher in buffaloes i.e. 26.40%, in unorganized farms and 15.33%, in organized farms (Table 2) than clinical mastitis (CM) 8.67%, in organized farms and 9.60%, in unorganized farms (Table 5). The lower proportion of clinical mastitis in the present findings might be the result of better udder health in the sampled herds. However, wide variation in the prevalence of SCM and CM observed in this study can also be attributed to different and changing management practices and diagnostic tests which were used for detection. Most important concern is high rate of permanent loss of quarters (blind teats) i.e. 1.81% buffaloes. The results were in closed corroborated with Ahlner and Axelsson (2002), who reported 42.2 percent prevalence of subclinical mastitis at Uruguay. Our findings were not in agreement with (Karimuribo *et al.* 2008; Argaw and Tolosa 2008) who reported higher prevalence of subclinical mastitis which ranged from 75.9 to 89.54 percent, which was much higher than the current study in Tanzania and Ethiopia respectively.

Quarter-wise prevalence of SCM in buffaloes at organized dairy farms was 16.27% with highest prevalence in RH (28.08%) followed by LH, RF and LF (Table 3). However, on the basis of severity, large number of quarters (7.80%) had 1+ mCMT score followed by 2+ and 3+ (Table 3). Whereas, at unorganized farms, prevalence of SCM in buffaloes was higher (18.95%) than organized farms (Table 4). While at unorganized quarter wise prevalence was highest in RH (29.69%) followed by LH, RF and LF (Table 4). The higher prevalence of SCM in hind quarters may be due to higher chances of contamination of hind quarters with feces, urine and uterine discharges. Moreover, 1+ mCMT score was present in more number of quarters (7.80%) than 2+ and 3+ score (Table 4). The higher incidence of quarter wise subclinical mastitis may due to poor

Table 2: Animal wise overall prevalence of sub-clinical mastitis in buffaloes by mCMT

Species	Prevalence of subclinical mastitis								
	Organized farms			Unorganized farms			Total		
	No. of animals screened	No. of animals positive	Percent	No. of animals screened	No. of animals positive	Percent	Total number of animals screened	Total number of animals positive	Percent
Buffaloes	150	23	15.33	500	132	26.40	650	155	23.85

Table 3: Quarter-wise prevalence of sub-clinical mastitis (SCM) with severity by mCMT score in dairy buffaloes at organized farms

Quarters	Number of quarters screened	Number of functional quarters	mCMT score							
			N	T*	Total negative (N + T)	+	++	+++	Total positive	Blind quarters
LF	150	149	125 (83.89%)	16 (10.74%)	141 (94.63%)	4 (2.68%)	2 (1.44%)	2 (1.34%)	8 (5.37%)	1 (0.67%)
LH	150	147	82 (55.78%)	32 (21.77%)	114 (77.55%)	15 (10.20%)	12 (8.16%)	6 (4.08%)	33 (22.45%)	3 (2.00%)
RF	150	148	116 (78.38%)	18 (12.16%)	134 (90.54%)	7 (4.73%)	4 (2.70%)	3 (2.03%)	14 (9.46%)	2 (1.33%)
RH	150	146	78 (53.42%)	27 (18.49%)	105 (71.92%)	20 (13.70%)	10 (6.85%)	11 (7.53%)	41 (28.08%)	4 (2.67%)
Total	**600**	**590**	**401 (67.97%)**	**93 (15.76%)**	**494 (83.73)**	**46 (7.80%)**	**28 (4.74%)**	**22 (3.73%)**	**96 (16.27%)**	**10 (1.67%)**

**mCMT Trace score was considered as negative. N= Negative; T = Trace.*

Table 4: Quarter-wise prevalence of sub-clinical mastitis (SCM) with severity by mCMT score in dairy buffaloes at un-organized farms

Quarters	Number of quarters screened	Number of functional quarters	mCMT score							
			N	T*	Total negative (N + T)	+	++	+++	Total positive	Blind quarters
LF	500	496	417 (84.07%)	47 (9.48%)	464 (93.55%)	14 (2.68%)	9 (1.81%)	9 (1.81%)	32 (6.45%)	4 (0.80%)
LH	500	489	274 (56.03%)	93 (19.02%)	367 (75.05%)	59 (12.07%)	44 (8.99%)	19 (3.89%)	122 (24.95%)	11 (2.20%)
RF	500	493	331 (67.13%)	88 (17.85%)	419 (90.54%)	38 (7.71%)	21 (4.26%)	15 (3.04%)	74 (15.01%)	7 (1.40%)
RH	500	485	259 (53.40%)	82 (16.90%)	341 (71.92%)	74 (15.26%)	33 (6.80%)	37 (7.63%)	144 (29.69%)	15 (2.67%)
Total	**2000**	**1963**	**1281 (65.23%)**	**310 (15.79%)**	**1591 (81.05)**	**46 (7.80%)**	**28 (4.74%)**	**22 (3.73%)**	**372 (18.95%)**	**37 (1.85%)**

**mCMT Trace score was considered as negative. N= Negative; T = Trace.*

management practices in the dairy farm, lack of awareness of the dairymen towards timely and appropriate treatment of the animals at the time of need. Sub-clinical mastitis is 3-40 times more common than the clinical mastitis and causes the greatest overall losses in most dairy herds (Schultz *et al.* 1978). Sub-clinical form frequently goes unnoticed and is associated with significant economic losses that include increased clinical diseases risks, reduced reproductive performance, impaired milk production and culling losses. (Sharma 2010).

Prevalence of clinical mastitis (CM) in buffaloes

Clinical mastitis caused visible changes in the udder as well as in milk of affected animals, if clinical cases do not treated well in time then it may cause permanent loss of quarter(s) and heavy economic losses to dairy farmers. Clinical mastitis cases required exhaustive treatment with most effective antibiotics and supportive therapy.

Overall prevalence of clinical mastitis was 9.38% in both organized and unorganized farm. Out of total 650 animals, 13 out of 150 animals (8.67%) had clinical mastitis in organized farm and 48 out of 500 animals (9.60%) had clinical mastitis in unorganized farm (Table 5). hence this prevalence was higher at unorganized dairy farm in buffaloes i.e. 9.60% compared to organized farm. (Table 5). The udders were found affected in clinical mastitis with abnormality in milk. The results in the present study were in agreement with (Schalm *et al.* 1971, Radostits *et al.* 2000) who observed similar findings. These findings in the present study are lower than previous findings i.e. 33.6% by Getahun, *et al*. 2008, 34.9% by Biffa *et al.* 2005, 40.4% by Kerro et *al.* 2003 and 59.7 % by Workineh, *et al.* 2002. The prevalence report of both clinical and subclinical mastitis is also lower than the findings of Workineh, *et al.* 2002 who reported 38.2% subclinical and 21.5% clinical mastitis. The difference of mastitic prevalence in breeds may be due to habit as well as due to more development of udder and teats in cows (Pitkala *et al.* 2004). The local buffalo breed of Jammu region is significantly more resistant to the mastitis, comparatively to the other breeds as different breeds of buffaloes are known to differ in their susceptibility to mastitis. Variation in prevalence of mastitis might be due to the different regions, breeds, therapeutic practices, differences in management conditions, especially milking management, hygienic condition,

Table 5: Animal-wise overall prevalence of clinical mastitis in buffaloes

Species	Prevalence of clinical mastitis								
	Organized farms			Unorganized farms			Total		
	No. of animals screened	No. of animals positive	Percent	No. of animals screened	No. of animals positive	Percent	Total number of animals screened	Total number of animals positive	Percent
Buffaloes	150	13	8.67	500	48	9.60	650	61	9.38

Table 6: Quarter wise prevalence of clinical mastitis in dairy buffaloes

Farm type	Quarters	Number of quarters screened	Number of functional quarters	Number of quarters positive	Percent
Organized	LF	150	149	4	2.68
	LH	150	147	9	6.12
	RF	150	148	5	3.38
	RH	150	146	11	7.53
	Total	600	590	29	4.92
Unorganized	LF	500	496	21	4.23
	LH	500	489	50	10.22
	RF	500	493	33	6.69
	RH	500	485	63	12.99
	Total	2000	1963	167	8.51

care of teat injuries, presence of microorganisms in environment and adaptation of mastitis control programmes.

Pattern of clinical mastitis occurrence in buffaloes was similar to SCM. At organized it was 4.92% with highest involvement of RH quarters (7.53%) and then followed by LH, RF and LF. Whereas, the prevalence of clinical mastitis in buffaloes at unorganized farms was about double (8.51%) than the organized farms. However, quarter-wise distribution pattern was similar to organized farms, as LH quarters had highest prevalence (12.99%).

However, the incidence of mastitis in dairy buffaloes was greater during rainy period in the present findings in this study which almost corroborated with findings of (Kaur *et al*. 2015), where incidence of mastitis was maximum during rainy season.

The results indicate that the major problem among the herds is subclinical mastitis and screening with the tests like mCMT along with other tests can help in preventing the economically important disease. Further, there is a need of preventive and control measures which should be enforced more strictly in management practices to prevent the disease.

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