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Subclinical Mastitis and Related Risk Factors of Dairy Cattle in Ejersa Lafo, West Showa, Oromia, Ethiopia

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Abstract: Mastitis is considered to be an important challenge in Ethiopia.A cross-sectional study was conducted in Ejersa Lafo districts west Shoa, Ethiopia, from November 2016 to January 2017 on dairy cows (lactating) to know the overall occurrence of cattle subclinical mastitis and detectconnected risk factors. A total of 384 lactating cows were surveyed for subclinical mastitis using California Mastitis Test reagent (CMT). From examined animal 28.9% prevalence of subclinical mastitis was documented at cow level. There was different prevalence in quarter levels and statistically significant association ($P<0.05$) between the infection of sub clinical mastitis, age group, parity, lactation stage, teat and barn hygiene, mammary gland cleaning and teat deep. In conclusion subclinical mastitis was a major reproductive disease of Cattle with Zoonotic implication.

Key words: Cattle · CMT · Ejersa · Mastitis · Subclinical · Prevalence

INTRODUCTION

In Africa Ethiopia embraces huge potential for dairy cattle expansion due to its large livestock population and the satisfactory climate for better-quality high yielding animal breeds [1]. Bearing in mind the potential if smallholder income and employment generation, development of dairy farming can make important contribution to the poverty lessening and nutritional improvement in the country [2].

Dairy cattle production is a biological efficient system that converts large quantities of roughage which is the most plentiful of fed to milk [3]. The quality of milk may be dropped by a number of factors such as debasement, uncleanness during and after milking and the presence of udder infections [4]. Bovine mastitis is a multifactorial disease and is one of the most difficult to control. Pathogenic organisms in milk can be derived from the cow itself, the human hand or the environment [5].

Subclinical mastitis (SCM) with major pathogens (predominantly *Strep. Uberis* [6] increases the individual somatic cell count (ISCC) of affected quarters and if untreated may become chronic [7] or spread infection to uninfected quarters of the same or other cows during the milking process [8]. A number of infectious diseases with worldwide distribution are responsible for major economic losses in dairy cattle [9] which suffers serious economic losses to dairy industry. Previous study from different part of the country indicated that mastitis is a serious problem in the dairy industry of Ethiopia [1].

Cattle subclinical mastitis can reduce milk yield, increase culling percentage, non-recovery treatment cost and occasionally result in death from severe infection [10]. Clinical signs differ with the severity of the disease and usually include pain, heat and swelling of the affected quarter or half of the gland and aberration of milk either as clots or flakes and wateriness of the liquid phase [11].

Cattle mastitis can be clinical with home-grown (in some cases general) clinical signs and milk aberrations or sub clinical with production losses and lowered milk quality. Hard work has only been concentrated on the handling of clinical cases. As with most infectious disease, generally mastitis risk factors depend on three components; exposure to microbes, cow defense mechanism, environmental and management factors [12]. Mostly, cattle mastitis often follows a number of major factors involving the cow, the pathogen and the environment [10].

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Mastitis is a management associated disease whose prevention and control depends among other factors on the type of management employed. As with most infectious disease, mastitis risk factors depends on three components i.e. exposure to the microbes, cow defense mechanism and environment and management factors [13].Survey of mastitis in dairy cattle herds of the Ethiopian highlands [14].Out of 10, 908 quarters examined from 2,681 cows, they found prevalence of clinical mastitis, non-functional or blocked quarters and subclinical mastitis to be 1.2%, 3.8% and 38.9% on cow basis [15].

Major diseases of crossbred dairy cows in Finfine milk shed; clinical mastitis was the second most frequent disease next to reproductive diseases, in which 171 cows out of 556 were found to be affected [16]. Reported mastitis prevalence rates were of 34.3% and 5.3% at cow level in Addis Ababa region, for subclinical and clinical mastitis respectively [1]. In the same study area, the reported overall prevalence was of 46.6% for subclinical mastitis at cow level and 27.8% at quarter level [17]. This great variation could result from differences in environment and management [18]. Bovine subclinical mastitis is among the problems hindering dairy productivity in Ethiopia and this requires additional research that can depict the current prevalence of the problem and the major pathogens involved for better implementation of control and prevention strategies.

Therefore, the general objective of this study was to estimate the occurrence of cattle subclinical mastitis and to assess the risk factors related subclinical mastitis.

MATERIALS AND METHODS

Study Area: The study was conducted in Ejersa Lafo district from June 2016 to January 2017. The study was conducted in and around Olonkomy town which is located 68 km away from Finfine in the south west direction, 9° 3' N and 38° 30' E, at an altitude of 2,400 m above sea level in central midlands. The area is known by mild subtropical climate with minimum and maximum temperature ranging from 2 to 9°C and 20 to 27°C, respectively. The area receives annual rainfall of 1060 mm [19].

Study Design: Cross-sectional study that involves simple random sampling technique were conducted from November 2017 to January 2018 to determine the prevalence of subclinical mastitis, from selected cows which came in the clinic in Ejersa Lafo town, West, Shoa, Ethiopia.

Study Animal: Generally total of 384 dairy cows were examined in different peasant association of Ejersa Lafo district. The dairy cows were distributed according to breed (local cows, Holstein Friesian breed, Jersey and Holstein × Borena cross breed cows), age (cows aged less than 7 years young and cow aged greater than or equal to 8 years old). We were examined all dairy cows with no clinical symptoms. All animals were subjected to clinical and physical examinations, with special interest towards the udder and teats. At the time of each examination, the breed of the cow, age of the cow, health status of the mammary glands and the respective kebele was recorded.

Sample Size Determination: For estimation of the prevalence of subclinical mastitis, since there was work done in the study area, the sample size was determined by assuming the expected prevalence to be 30% with the 95% confidence interval level and desired precision of 5% using the formula described by Thrusifiled [20].

Study Methodology

Data Collection: Data on each sample of cow was collected in proper design format. Data was collected form lactating cows which come's the clinic for the different cases. Clinical examination of the udder and screening was performed using the California mastitis test (CMT). Also, the owner interviews aimed at generating basic information on livestock management system, nutrition, hygienic practices, disease detection, housing, prevention and control measures.

California Mastitis Test: The California mastitis test (CMT) was conducted to diagnose the presence of subclinical mastitis and it was carried out according to the procedures given (Quinn *et al.*, 1999). The udder of the cows to be tested was cleaned with antiseptics and dried with clean towel. Then the first few drops were discarded from each quarter. Following this squirt of milk from each quarter of udder, milk samples were poured in to four shallow cups in the CMT paddle and equal amount of CMT reagent was added to each cup and gentle circular motion was applied to the mixture on the horizontal plane. Based on the thickness of the gel formed by CMT reagent and milk mixture, test results [10].

Data Management and Analysis: Descriptive statistics were used to summarize the generated data on the rate which was collected through, clinical inspection, CMT, result was enter into data base management software Microsoft Excel computer program 2003. The data collected was then analyzed with Chi-square and P- value using SPSS version 20.

RESULTS

Severity of Subclinical Mastitis on CMT Test: The CMT screening test indicates that Out of 384 examined (9 Borana; 45 cross breeds and 330 local breed). 111 cows were found to be affected with subclinical mastitis with prevalence of 28.9%. Based on the CMT result 70(63.3%) cows had weak infection, 17 (15.3%) had distinct positive and 24 (21.6) cows had strong positive (Table 1).

Prevalence According to Teat Quarter: Out of the examined quarters no teat was found to be blind. The quarter level prevalence of sub clinical mastitis from the highest to lowest rate of infection were right front teats (RF) 47.7% (53), left hind teat (LH) 25.2% (28), left front (LF) 22.5% (25) and hind right teats (HR) 8.1% (9) respectively (Table 2).

Prevalence in Different Kebeles: From the seven kebeles S/debisa had the highest prevalent sub clinical mastitis case with number of animal positive of 47(42.3%) and Enaftu kebele did not have sub clinical mastitis animal from examined (Table 3).

Different Risk Factors: According to different risk factors categories the highest prevalence was recorded in local breed, old age group, sixth parity and first lactation stage (Table 4).

Table 1: Degree of severity of subclinical mastitis

CMT result	Number positive	Percent
Weak Positive (1)	70	63.1
Distinct Positive (2)	17	15.3
Strong Positive (3)	24	21.6

Table 2: Prevalence of sub clinical mastitis at quarter levels

Quarter infected	Number positive	Percent
FR	53	47.7
FL	25	22.5
HR	9	8.1
HL	28	25.2

Table 3: Prevalence in different kebeles

Kebele	Number examined	Number positive	Percent
B/E/Lafo	116	30	27
Enaftu	2	0	0
G/Dilbat	69	16	14.4
G/Kora	13	6	5.4
K/lmbort	13	7	6.3
Koriso	17	5	4.5
S/Debisa	154	47	42.3

Table 4: Prevalence of subclinical mastitis according risk factors

Breed	Animal Examined	Positive Animal	Percent
Borena	9	4	3.6
Cross	45	15	13.5
Local	330	92	82.9
Age			
Young (4-7)	253	18	16.2
Old (>8)	131	93	83.7
Parity			
First	98	4	3.6
Second	135	11	9.9
Third	24	6	5.4
Fourth	45	28	25.2
Fifth	25	16	14.4
Sixth	48	40	36
Lactation stage			
First	159	41	36.9
Second	102	37	33.3
Third	123	33	29.7

Logistic Regression of Different Risk Factor:

Table 5: Logistic regression analysis of the prevalence of subclinical mastitis against the associated variable

Breed	Number examined	Number positive	Percent	X^2 value	P-value
Borena	9	4	44.4	1.656	0.428
Cross	45	15	33.3		
Local	330	92	27.9		
Age					
Young (4-7)	253	18	34.2	183.845	0.000
Old (>8)	131	93	65.9		
Parity					
First	98	4	4.1	175.028	0.000
Second	135	11	8.1		
Third	24	6	25.0		
Fourth	45	28	62.2		
Fifth	25	16	64.0		
Sixth	48	40	83.3		
Lactation stage					
First	159	41	25.8	3.704	0.0157
Second	102	37	36.3		
Third	123	33	26.8		
Teat hygiene					
Good	250	20	8	3.704	0.0157
Mild	100	63	63		
Poor	34	28	82		
Barn hygiene					
Good	232	15	6.5	151.716	0.000
Mild	108	61	56.3		
Poor	44	35	79.5		
Teat deep					
After	1	1	100	12.759	0.001
Before	319	81			
Non	64	29	45.3		
Mammary gland cleaning					
Before	340	108	28.4	4.197	0.041
After	0	0	0		
Non	4	3	75		

DISCUSSION

In Ethiopia, subclinical mastitis is considered to be an important challenge for the dairy development. This study also indicates subclinical mastitis to be the major problem in the study area. The result of this study showed the prevalence of subclinical mastitis in seven peasant association in Ejersa lafo District to be 28.9% at cows' level which is nearly in agreement with the report of Fekadu [21] in Caffa valley in Northern Ethiopia (39.65%), Biffa *et al.* [22] in Southern Ethiopia (34.9%). Current result but lower than the report of Kerro Dego and Tareke [18] in Southern Ethiopia (40.40%), Tolla [23] in South Wollo (61.11%), of Biru [24]in Ethiopia (63%), Workineh *et al*. [25] in two major Ethiopian dairies (59.7%), Mekibib *et al*. [26] in Holeta town in Central Ethiopia (71.05%) and Birhanu *et al*. [26] 66.6% in Assella Dairy Farm in Oromia Region.

The present study from selected potential risk factors age, period of lactation and parity had statistically important effect on the occurrence of mastitis which agrees with the Zeryehun *et al.* [28]. Similarly, the environment risk factors considered for this study were teat and barn hygiene, mammary gland cleaning and teat deep. The occurrence of mastitis based on these risk factors displayed statistically significant effect with the occurrence of sub clinical mastitis. This was also reported by several investigators to have association with the occurrence of sub clinical mastitis [22, 26, 29, 30].

Also reports could suggest the complexity of the disease which involve interaction of several factors, mainly management practice, husbandry System, environment and factors related to causative agent and variation in veterinary service coverage. Management of the herd and hygienic milking are considered important risk factors for Sub-clinical mastitis [31, 32]. The prevalence ofdairy cattle subclinical mastitis and udder clean less was insignificantly (P>0.05) associated. The present study agrees with Lakew *et al.* [33] and Sori *et al.* [34] who reported that the cows at farmers with poor milking hygiene standard are severely affected than those with good milking hygiene practices.

CONCLUSIONS AND RECOMMENDATIONS

Subclinical mastitis is one of the chronic diseases of dairy cows which include an interaction between management practice and infectious agent occurring worldwide. The problem has also been stated in different parts of Ethiopia with variable prevalence. But subclinical mastitis in the country has not been studied like that of prevalence and the spreading of mastitis among cows was not determined. Insufficient hygienic state of dairy cow's stalls, poor milking practice, poor animal health service and lack of appropriateconsideration to the health of the mammary gland were important for the high prevalence of subclinical mastitis in the study area. Currentfinding showed that the occurrence of mastitis at cow and quarter level ismedium, which can inhibit with effectiveness of milk production and has high economic importance. Based on this finding, the following recommendations are forwarded:

- ✓ Isolating subclinical mastitis for early finding and treatment and rejecting of chronically infected cows should be experienced.
- ✓ Farmers in the study area need be aware about the importance of hygienic milk production and hygienic milk handling practices.
- ✓ Awareness creation need to be given to farmers in order to avoid immediate milking of drug treated cow and milking of sick cow.

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