Cow Mastitis in Urban and Pri-urban Small Holder Dairy Farms in Ethiopia

Haftom Yemane   Amanuel Teklehaymanot   Awet Estifanos   Esayas Meresa
tigray Agricultural Research Institute

Abstract
The study was conducted to determine the prevalence of clinical and sub clinical mastitis and to identify the risk factor associated with mastitis in Tigrayn Ethiopia. Clinical examination, CMT and Questioner survey were used for data collection. The overall prevalence of clinical mastitis were 64 (19.5%) out of 382 cows randomly selected from 82 small holder dairy farms. From 264 tested lactating cows for CMT 101 (30.8%) was respond positive for sub clinical mastitis test. From the clinical mastitis positive cows 42 (65.61%) were from urban and 22 (34.38%) were from pri urban. Age and parity as a risk factor for mastitis revealed that, cows with an age range from 5-7 years old were 10 (15.6%) for clinical mastitis range from 8-10 were 16 (23.43%) and cows with an age of more than 10 years old 38 (59.43%) were positive for mastitis. The correlation between age and cow with positive clinical mastitis were 0.946 so this indicates that there is a strong correlation these, as age increases the incidence of mastitis will increase. In relation to parity with mastitis correlation is 0.949 which has highly positive correlation these, as parity increase the occurrence of mastitis is increase. So considering the significant economic losses that could be incurred by both clinical and subclinical mastitis, attention should be paid for further investigation of the cause of the disease.
Keywords: California Mastitis Test, Mastitis, Prevalence, Risk Factor

IIntroduction

Ethiopia has the largest population in African, Cows represent the largest population of cattle production of the country. Milk produced from these animals provides an important dietary source for the majority of rural as well as considerable number of the urban and pri-urban population. However; milk production often does not satisfy the countries requirement. ([1]). The total annual national milk production in Ethiopia ranges from 797, 9000 to 1,197,500 metric tons of raw milk. Out of the total national milk production, between 85 and 89 percent is contributed from cattle. However, this amount is by far below the national demand for milk and milk products in the country, given the considerable potential for smallholder income and employment generation from high value dairy products ([2]). Cows represent the largest proportion of cattle population of Ethiopia in which 55.5% of the total cattle heads for the private holdings are milking cows ([3]). However, competed to other country in Africa, Africa, Ethiopia consumes less dairy cattle products. Per capital consumption of milk in Ethiopia is as low as 17 Kg per head while the average figure for Africa is 26 Kg per head. Having considerable potential for smallholder income and employment from high value dairy products, development of the dairy sector in Ethiopia can contribute significantly to poverty alleviation and nutrition in the country ([4]).

Milk which is a very nutritional food i.e. rich in carbohydrate, proteins, fats, vitamins and minerals, provides an important dietary source for the majority of rural as well as considerable number of the urban and peri-urban population ([5]). However, its reduced production, quality deterioration is a great concern in association association with health risk to consumers due to the presence of zoonotic pathogens and antimicrobial drug residues. The quality of milk may be lowered by a number of factors such as adulteration, contamination during and after milking and the presence of udder infections. Pathogenic organisms in milk can be derived from the cow itself, the human hand and utensils or the environment ([6]). Mastitis is one of the most complex diseases of dairy cows that generally involve interplay between management practices and infectious agents, having various

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causes and degrees of intensity ([1])

In Ethiopia, especially in the northern part the disease is insufficiently investigated and has less attention. Information relating to mastitis magnitude, distribution, negative effect on milk quality and risk factors associated to consumers is very much limited. Such information is important to envisage when optimizing prevention and control options in different dairy farms of the country that would help reduce its prevalence and negative effects on dairy products. So it is believed that determining the prevalence and identification of risk factors, its negative effect on milk productivity will help to optimize prevention and control options of the disease.

II Material and method

A.Study area:

The study area is located in northern Ethiopia, Tigray region around 800 km far from the capital city of the country. The latitude of the regional state is in between 12o15'N and 14o57'N and longitude 36o27'E and 39o59'E and also the land coverage is 53,000 square kilometer (Solomon, 2005). The regional state has 34 districts/weredas from this five weredas were selected for the study four as pri urban and one as urban in Mekelle milk shade area. The study weredas were Mekelle as urban city capital city of Tigray region and the pri urban found 45 km radius of the city namely Wikro (Kilte Awilaelo), Adigudem (Hintalo Wejerat), Hagere Selam (DeguaTembien), Quha (Enderta). All districts shad milk to Mekelle city.
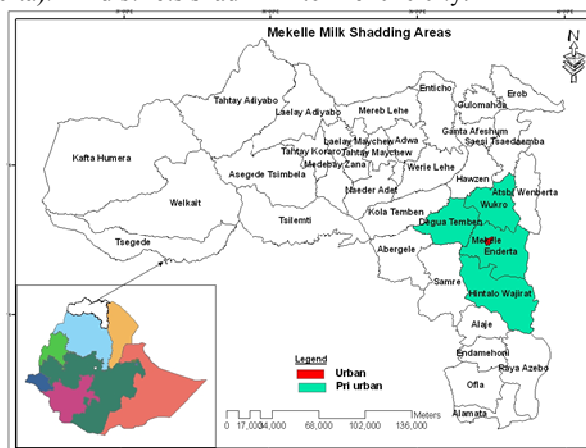
B.Study Animals

The study animals were lactating cows that had been randomly selected for testing clinical mastitis through inspection followed by palpation and sub clinical mastitis using California Mastitis test (CMT) method. The selected cows were from Zebu and Holstein frieze breed, with different level of parity. The average herd size was four and the maximum herd size was eight minimum herd two lactating cows. A total of 328 lactating cows were examined for clinical mastitis and 264 for sub clinical mastitis.

C.Clinical examination

Cows were examined clinically for any abnormalities at udder, quarters and secretion level according to (Quinn et al., 1994). Through visualization and palpation, visible abnormalities, symmetry of teats, size of teat, consistence of the udder, presence of lesion, respond to touch (pain), swelling, redness and heat of the udder were considered for the examination of clinical mastitis. To check for sub clinical form of mastitis, milk from each quarter were taken using a strip cup and examined any change in color, odor and consistency were recorded.

D.California Mastitis Test (CMT)

The California mastitis test was conducted to diagnose the presence of subclinical mastitis and it was carried out according to procedures given by (Quinn et al., 1994). CMT reagent were prepared. Milk samples from each quarter of each cow were collected in a clean CMT Paddle. The CMT paddle has four shallow cups marked A, B, C, and D to help identify the individual quarter from which the milk was obtained. The milk sample of each one teat was about 1 teaspoon (2 cc) milk from each quarter. An equal amount of CMT solution was added to each cup in the paddle. And then the CMT Paddle rotated in a circular motion to thoroughly mix the contents for 10 seconds. The result were scored based on the gel formation and categorized as negative, trace or positive (weak, distinct, strong positive). If one quarter was positive of CMT then the cow was considered as positive for subclinical mastitis and the same with four quarter positive for CMT respond.

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E. Data Management and Statistical Analysis

The data collected during the study periods were entered into computer using SPSS version 17 software. The statistical analysis was done using descriptive analysis (frequency, crosstab) and correlation to show the relationship between the disease and potential risk factors.

III Result and discussions

Prevalence of mastitis; the overall prevalence of clinical mastitis were 64 (19.5%) out of 382 cows randomly selected in 82 small holder dairy farms of urban and pri urban farms of Tigray. From 264 lactating cows tested for CMT 101 (30.8%) was respond positive for sub clinical mastitis test. From the clinical positive cows 42 (65.61%) were from urban and 22 (34.38%) were from pri urban.

Table 1 General prevalence of mastitis in urban and pri urban of the study area

	District	Cows examined clinical mastitis	Clinical mastitis positive	Cows tested for CMT	CMT positive
Pri urban	Enderta	20 (6.1%)	3 (15%)	17	7 (41.17%)
	KilteAwlaelo	34 (10.4%)	3 (8.82%)	31	9 (29.03%)
	DeguaTembien	47 (13.7%)	10 (21.27%)	37	15 (40.53%)
	HintaloWejerat	43 (13.1%)	6 (13.95%)	37	16 (43.24%)
Urban	Mekelle	186 (56.7%)	42 (22.58%)	144	54 (37.5%)
Total	5 districts	328 (100%)	64 (19.5%)	264 (100%)	101 (30.8%)

The severity level of clinical mastitis were revealed by high severity 28 (43.6%) low severity 22 (34.37%) moderate 14 (21.87%). From the positive cows the breed distribution revealed that, 11 (17.18%) was local or Zebu 53 (82.8%) was cross Holstein frieze. From the CMT positive cows 51 (50.49%) were weak positive 29 (28.71%) were distinct positive and 20 (20.79%) had strong positive respond for CMT test.

Table 2 level of damage due to mastitis

Degree of illness	Level	Total %
Severity of clinical mastitis	High	28 (43.75%)
	Low	22 (34.37%)
	Moderate	14 (21.87%)
CMT level	Weak positive	51 (50.59%)
	Distinct positive	29 (28.71%)
	Strong positive	21 (20.79%)

Risk factor: age and parity considering as a risk factor for mastitis revealed that cows with an age range from 5-7 years old were 10 (15.6%) for clinical mastitis range from

8-10 were 16 (23.43%) and cows with an age of more than 10 years old 38 (59.43%). The correlation between age and cow with positive clinical mastitis were 0.946 so this indicates that there is a strong correlation, as age increases the incidence of mastitis will increase. In relation to parity with mastitis correlation is 0.949 which has highly positive correlation these, as parity increase the occurrence of mastitis is increase this showed by the level of parity, 1-2 were 9 (14.06%), 3-4 were 17 (26.56%) and a level of parity more than 5 were 38 (59.37%). So considering the two risk factors has high contribution for the incidence of the disease.

Table 3. Risk factor

	Group	% positive clinical mastitis	Correlation
Age	5-7	10 (15.6%)	0.946
	8-10	16 (23.43%)	
	>10	38 (59.37%)	
Parity	1-2	9 (14.06%)	0.949
	3-4	17 (26.56%)	
	>5	38 (59.37%)	

In this study the overall prevalence of clinical mastitis was 19.5% which has significant impact on loss of milk production and economic loss to the study area. The result has finding of the present study is lower than the previous finding of other author in different regions of Ethiopia like 34.5% by (Biffa et al, 2005) 36.9 % by ([1]) in Dredawa eastern Ethiopia 38.6% by ([2]) in the chaff valley 39.5% by ([3]) in Debre Zeit central Ethiopia 49.7% (1) in Tigray. The difference report on prevalence of mastitis of present study could be the level of

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awareness of the dairy farm owners from time to time is increasing; attention to dairy cows is also increase due to high demand of milk. The economic growth of the country has a contribution to give attention on dairy cow and other livestock sectors. This study has a great agreement with the previous reports like 21.1% by ([1]) and 21.0% by ([2]) in Arsi region and 20.0% prevalence reported by ([3]). The prevalence of sub clinical mastitis of this study is 30.8% this also has a close agreement with pervious study findings like 36.7% by (10) 39.5% by ([4]) 39.6% by (3) 38.2% by (5). Al in all, the subclinical mastitis prevalence has higher than clinical mastitis this could be due to the defense mechanism of the udder, which reduces the severity of the disease (Biffa., 2005) In most developing countries including Ethiopia, the subclinical form of mastitis received little attention and efforts have been concentrated on the treatment of clinical cases (13). Al in all, the subclinical mastitis prevalence has higher than clinical mastitis this could be due to the defense mechanism of the udder, which reduces the severity of the disease (12) In most developing countries including Ethiopia, the subclinical form of mastitis received little attention and efforts have been concentrated on the treatment of clinical cases ([5]). Age and parity considering as a risk factor for mastitis revealed that the prevalence of mastitis in cows with an age an age of more than 10 years old was 59.43%. The correlation between age and mastitis is 0.946 so this indicates that there is a strong correlation between age and mastitis, as age increases the incidence of mastitis will increase. Which could be supported with different investigators like by (3) and (11) found that, the risk of clinical and subclinical mastitis increase significantly with the advancing age of the cow. Prevalence of mastitis was also significantly associated with parity revealed by this study by showing parity with mastitis correlation is 0.949 which has highly positive correlation these, as parity increase the occurrence of mastitis is increase the prevalence of mastitis in cows which has more than 5 parity is 59.37%. So considering the two risk factors has high contribution for the incidence of the disease. This finding is in agreement with findings of ([6]).

IVConclusion and recommendations

This study revealed clearly that, mastitis was a major health problem of dairy cows in the area and unquestionably this will result an adverse effect on productivity of dairy industry and hence it needs serious attention. Continuous assessment of abnormalities seen in the udder has to be evaluated and giving medication. Good record keeping practice on the general specially udder health of dairy farms, adequate housing with proper sanitation and ventilation should be regularly maintained and good milking techniques are essential in the prevention strategies. Furthermore, regular screening for the detection of subclinical mastitis and proper treatment of the clinical cases as well as appropriate treatment of cows during dry and lactation period should be practiced. Based on the above conclusion the following recommendation is forwarded

- The overall housing system and management of dairy cows is very low, this aggravates the occurrence of mastitis in dairy cows so attention has to be given adequate land preparation to dairy with house proper sanitation and ventilation should be regularly maintained and good milking techniques and regular CMT test has to be done for prevention strategies
- Awareness on prevention and control of mastitis of farm owner is very low so capacity building through continuous training of farm owners should be done to minimum the incidence of the disease.
- Further investigation on mastitis related to micro-organism identification level quality reduction due to mastitis in milk should be done.

STATEMENT OF ANIMAL RIGHTS

The study animals were treated and physically examined on the way the welfare of the animals couldn't be damaged.

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