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Prevalence of Bovine Mastitis and its Associated Risk Factors in and Around Bedele Town

Anbu EG* and Kumsa KM

Jigjiga University, Ethiopia

***Corresponding author:** Elias Gezaw Anbu, Jigjiga University, Addis Ababa, Ethiopia, Tel: +251926771324; Email: eliasgizaw2010@gmail.com

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Abstract

A cross sectional study was conducted in and around Bedele town, Buno Bedele Zone, Oromia Regional State in different two breeds (Cross and Local breed) from November 2016 to May 2017 to estimate the prevalence of mastitis and the associated risk factors at Bedelle regional veterinary laboratory. The study was done on 420 lactating cows, of which 331 were local and 89 cross breeds by using California Mastitis Test (CMT), clinical examination of udder and teats and bacteriological examination were employed during the study period. Mastitis was categorized as clinical if lactating cows exhibited clinical features of mastitis, or subclinical based on degree of coagulation up on examination using CMT. Of these 76 (18.1 %) were positive by clinical examination and CMT for clinical and sub clinical mastitis, with prevalence of mastitis at cow level was 5.47 % and 12.61 %, respectively. Out of 1680 quarters examined 108 (6.43%) were blind and 76 (18.08%) were positive by CMT. The Chi-square ($\chi 2$) analysis of intrinsic risk factors revealed significantly ($P<0.05$) higher prevalence of mastitis in crossbred cattle (31.46%) than indigenous (14.5%), in cattle above 7 years old (24%) higher than 2-6 years of age (10.99%) and cows given more than 4 calves (29.27%) than those with less than 4 calves (16.89%) irrespective to their lactation stage. There was also significantly ($P<0.05$) higher mastitis prevalence in larger (23.84%) than smaller herds (14.87%) and among the farming systems in semi-intensive (25.97%) and intensive (31.82%) than extensive (15.26%) management system. The present study also revealed that mastitis is the major problem in smallholder dairy farms in the study area specially the sub clinical form, so that creation of awareness about the importance and prevention of subclinical mastitis among smallholder dairy farmers, milking infected animals and their respective quarters at last and periodic monitoring of infection status of the udder is recommended.

Keywords: Bedelle; Bovine Mastitis; Prevalence; California Mastitis Test; Bacteriological Examination; Risk Factors

Abbreviations: CMT: California Mastitis Test; CNS: Coagulase Negative Staphylococci; ETB: Ethiopian Birr; BC: Bacteriological Culturing.

Introduction

In Ethiopia, the livestock sector has been contributing a considerable portion to the economy of the country, and still promising to the economic development of the country. It is important that livestock products and by-products in the form of meat, milk, honey, eggs, cheese, and butter supply provide mainly the needed animal protein that contributes to the improvement of the nutritional status of the people. Livestock also plays an important role in providing export commodities, such as live animals, hides, and skins to earn foreign exchanges to the country. The country has a largest livestock population of any African countries with an estimated 57.83million cattle (55.38% were female and 44.62% were male cattle, out of that 11.66 were Dairy cows), 28.89 million sheep, 29.70 million goats, 10 million equines, 1.2million camels, and more than 60.51 million chickens and immense bee and fishery resources [1]. From the total

cattle population 98.59% are local breeds and 1.22% and 0.19%, hybrid breed and exotic breed respectively. From the total of female cattle about 11.66% of them were dairy cows. In Oromial Regional States the total cattle population is estimated at about 23 million. Nearly all the cattle population (98.41%) is found in rural areas while a small proportion (1.59%) is found in urban.

The livestock disease which potentially infects and affects the wellbeing of livestock population among that mastitis (inflammation of mammary gland) causes a great deal of loss or reduction of milk yield to influence the development of dairy industry. It is a complex disease of multi-factorial etiology caused by a variety of microorganisms including bacteria, fungi, algae, etc. The majority of mammary infections are caused by bacteria namely Staphylococci, Streptococci and Enterobacteriacae. Organisms such as coagulase negative staphylococci (CNS), environmental streptococci, Mycoplasma species, and Serratia spp. are increasingly implicated as emerging pathogens causing mastitis [2]. Mastitis can be classified as clinical and subclinical. Clinical mastitis is characterized by change in the morphology of the udder, chemical and physical changes in the milk, while the subclinical form is without any noticeable manifestations of inflammation. Subclinical mastitis is more common than the clinical mastitis and causes the greatest overall losses in most dairy herds [3].

Economic losses due to mastitis are recognized worldwide as a major problem on dairy farms. Financial loss involved as a result of permanent loss of production in individual cows, discarded milk following antibiotic therapy, early culling of cows, veterinary costs, drug costs, increased labor, death of per acute cases and replacement costs. Bishi AS [4] also reported that the economic losses from clinical and subclinical mastitis in Addis Ababa milk shed to be approximately 270 Ethiopian birr (ETB) per lactation. Mungube EO [5] estimated the economic losses from mastitis in the peri-urban areas of Addis Ababa; losses due to mastitis (milk production loss, treatment cost, withdrawal losses and culling losses) were estimated to 210.8 ETB/cow/lactation from which milk production loss contributed to 38.4%. In other study conducted in the same study area by Mungube EO, et al. [6] was reported that a quarter with mastitis loss an average of 17.2% of its milk production.

The primary reservoir of contagious pathogens is the mammary gland itself [7]. Milk from a mastitis animal can create potential danger for food poisoning, the interference with manufacturing processes, and for the spread of zoonotic disease such as tuberculosis, brucellosis, streptococcal sore throat. In addition, antibiotic residue and milk of mastitis treated animals is a matter of public health concern [2]. The most frequently used diagnostic methods are California Mastitis Test (CMT) and Bacteriological Culturing (BC) of milk. Epidemiological investigation of bovine mastitis, status of infection, treatment pattern would provide useful management information to the producer, veterinarian and other mastitis control team members [8].

In Ethiopia, several studies in various parts of the country were conducted on bovine mastitis [9-11]. However, more research outputs are needed on the epidemiology of the disease in many areas of the country including Bedele in order to support the control and prevention strategies of this economically important disease. Bovine mastitis is one of the diseases the country's dairy farm personnel, particularly Bedele district livestock experts and dairy owners complain for its being the cause of culling and reduction of milk production (Oral question). Currently there is a growth of modern dairy farming in urban and peri-urban areas of major towns in Ethiopia. Moreover, the milk production in Ethiopia is expected to increase more rapidly in response to the fast-growing demand for milk and milk products resulting from increasing human population in urban areas, and rising consumer income [12]. Thus, it is necessary to have epidemiological information about mastitis and factors associated with udder infection so as to improve dairy production and uphold quality of milk for consumers. Therefore, the objectives of the present study were to estimate prevalence of bovine mastitis (clinical and subclinical) and identify associated risk factors in dairy cows in and around Bedelle town.

Materials and Methods

Study Area

The study was carried out in and around Bedele town of Buno Bedele Zone, Oromia Regional State from November, 2016 to July, 2017. Bedele town is the administrative center of the Zone of Buno Bedele located at 492km from west of Addis Ababa. Geographically, Bedele town falls between 8o to 26o 80 N latitudes and 36o to 20o 97o E longitudes. The total land area covers 1140.57 square kilometers with altitudes of 1400 to 2010 meter above sea level. The annual mean temperature ranges from 12.5oc to 27.5 o c and receives annual rain fall greater than 1400mm. The area is categorized under Woinadega agro-ecological climate.

Study Population

The study populations were lactating cows of different age, lactation stage, parity and breed of some smallholder farms and house hold farmers of the town including surrounding Keble. Representative Keble was selected using systematical random sampling methods. The study animals were the cross breed and indigenous lactating

Zebu cows managed under intensive, semintensive and extensive farming system. All lactating cows were included in the sampling frame. They were often provided with some supplementary diet in addition to the natural pasture and agricultural by-products. Age of the animals was determined based on birth records and dentition and grouped as young adults (2-6 years) and adults/old (≥7 years). Parity was also categorized as few (with 1-4 calves) and many (≥5 calves). Information on extrinsic factors such as management system (as extensive, intensive, and semi-intensive) and herd size (as <10 cows and ≥10 cows) was also gathered.

Study Design

A cross-sectional study was conducted on systematic random sampling methods of local and cross breed lactating cows, was conducted from October 2016 to April 2017 in and around Bedelle town.

Sampling Method and Sample Size Determination

For estimation of the prevalence of mastitis, since there is no work done in the study area, the sample size is determined by assuming the expected prevalence to be 50% with the 95% confidence level and desired precision of 5% using the formula described by Thrusfield M [13]. The number of animals required for the study was determined using the formula given by Thrusfield M [14] for statistical random sampling.

$$N = \frac{1.96^2 \, Pexp(1\text{-}Pexp);}{d^2}$$

Where: N = required sample size,
P exp= expected prevalence,
d = desired absolute precision (usually 0.05).

The size of the sample is determined using 95% level of confidence, 50% expected prevalence and 0.05-desired absolute precision. Therefore, 384cattle are needed for the study. Accordingly, the minimum sample size required was 384. But total of 420 lactating cows were screened by CMT test. Data collection format was prepared during the sampling of animals for the present study, the breed, parity number, status of mammary gland, management system, herd size, housing system, infected quarters, milk production and health condition were collected from the farmers and records, and clinical findings (e.g., palpable and visible abnormalities of the udder, nature and appearance of milk secretion).

Clinical Examination of Udder

The udders were carefully inspected followed by through palpation to detect possible fibrosis, inflammatory swellings, visible injury, tick infestation, atrophy of the tissue, and swelling of supramammary lymph nodes. The size and consistency of mammary quarters were checked for the presence of abnormalities, such as disproportional symmetry, swelling, firmness, and blindness. Viscosity and appearance of milk secretion from each mammary quarter were examined for the presence of clots, flakes, blood, and watery secretions [15].

Information from Farmers

Data were collected from farmers regarding management aspects such as herd sizes, housing systems, rearing system, feeding system, milking system and frequency milking. Cow parameters such as breed, age, parity, stage of lactation, infected quarters, milk production and health condition were collected from the farmers and records. It was aimed at generating basic information on livestock management system, nutrition, hygienic practices, disease detection, housing, prevention and control measures.

Bacteriological Culture

Bacterial culture was performed according to Quinn PJ, et al. [16]. Milk samples from both clinical and subclinical cases were streaked on blood and MacConkey agar plates fewer than 24 h after sampling, then incubated under aerobic conditions at 37°C and analyzed at 24 and 48 hr. Bacteria on culture-positive plates were identified according to their size, shape, color, hemolytic characteristics, Gram's reaction and catalase production of colonies. For confirmation, different biochemical tests were used following sub culturing and isolation of distinct colonies. The culture was considered negative if no growth occurred after 48 hr of incubation.

Study Method

Sample collection and transportation: Milk sample was also collected from cows in which clinical mastitis is not detected to look for sub-clinical mastitis. Milk samples were collected from each quarter and analyzed using CMT. From each quarters of udder, a squirt of milk sample is placed in each cup on the CMT paddle and an equal amount of 3% CMT reagent is added to each cup and mixed well. Reactions will be graded as 0 and trace for negative, +1, +2 and +3 for positive. When found positive, milk sample is further collected for bacteriological analysis from positive quarters and stored at 4°C for a maximum of 24 h until culturing.

Data Management And Statistical Analysis: Data collected from the CMT test result and the information related to the risk factors was entered in to Microsoft Excel 2007 and data analysis was carried out using STATA-11 Software. Descriptive statistics is performed to summarize the prevalence of

mastitis and blind teat. The Chi-square (x2) test+++ was used to assess the association of potential risk factors with prevalence of mastitis. In all the analyses, confidence level of 95% and significance level of $\alpha \leq 0.05$ were used.

Results

Over all Prevalence of Mastitis

The overall prevalence of mastitis positives at cow and quarter level was 18.08% (76/420) and 5.54% (93/1680), out of the total of 420 lactating cows and 1680 quarter examined, respectively. Out of this 18.08% of mastitis 23 (5.47%) were clinical mastitis and 53 (12.61%) subclinical mastitis cases. From 1680 quarters examined, 108 (6.43%) teats were found blind. From the total of the 1680 teats examined; 25 quarters (1.49%) showed clinical mastitis. From those teats screened by CMT, 68 quarters (4.05%) showed evidence of subclinical mastitis as described in Table 1.

Types of mastitis	Cows level		Quarter level	
	No. +ve	Prevalence (%)	No. +ve	Prevalence (%)
Clinical	23	5.47%	25	1.48
Subclinical	53	12.61%	68	4.04
Total	76	18.08%	93	5.52

Table 1: Prevalence of clinical and subclinical mastitis at cow (n=420) and quarter level (n= 1680).

Prevalence of Mastitis by Quarter Level

This study showed that the prevalence of mastitis in each quarter level as left hind 5.48%, right hind 8.81%, right front 5.24% and left front 2.62% recorded. The right hind quarters shows the highest infection rate followed by the left hind. The prevalence of mastitis was significantly higher in right rear quarters. Increased prevalence of mastitis in hind quarters might be due to increased milk production performance followed with relaxed teat sphincters and contaminated hind legs. These results are supported by various other workers who also reported increased prevalence of mastitis in rear quarters [17,18].

Prevalence of Mastitis by blind Quarter Level

This study showed that the prevalence of mastitis in quarter level as left hind 19.8%, right hind 18.8%, right front 17.7% and left front 16.7% recorded. The left hind quarters show the highest infection rate followed by the right hind. Results indicate increased prevalence of mastitis in cattle with cup shape udder, pointed teat, dirty hind legs, in chained animals and the animals which were kept on brick or cemented floor.

Association of mastitis with different risk factors

The association between the occurrence of mastitis in the selected cows and different potential risk factors (Table 4). Accordingly, mastitis prevalence showed significant variation among different breed, age groups ($p < 0.05$), husbandry system, parity number ($p<0.05$), herd size and housing system ($p<0.05$).

Prevalence of Mastitis by Breed

In this study area, the prevalence of mastitis associated with local breed was (14.5%; n=331) in ($P<0.05$) and with cross breed was (31.46%; n=89). The prevalence of mastitis associated with breeds was found statistically significant ($P<0.05$). Generally, when respect to breed significantly higher prevalence of mastitis in cross breeds as compared to local breeds.

Age Wise Prevalence of Mastitis

The distribution of mastitis in different age group is presented in Table 2.

Quarter	No. of blocked quarter	Total examined	%prevalence	95%CI Involved
LF	25	420	5.95	0.9-2.06
LH	27	420	6.43	1.0 -2.20
RF	28	420	6.67	1.05 – 2.27
RH	28	420	6.67	1.05 – 2.27
Total	108	1680	6.43	

No.= number, RF=right front, RH=right hind LF = left front LH= left hind, CL= confidence intervals.
Table 2: Proportion of blocked quarters due to various reasons.

The prevalence of mastitis was significantly (p<0.01) higher (47.61%) in the age group belonging to more than 13 years than others. The prevalence of clinical mastitis was also increased in older cows. With respect to age, there was an observation of significantly higher (P< 0.005) prevalence in old cows (24.0%; 55/229) than in young cows (10.99%; 21/191).

Prevalence of Mastitis in Relation to Number of Parity

The distribution of mastitis in different parity group of lactating cows is shown in Table 4. There was also significant association between parity and mastitis evidenced by higher infection rate of 29.27% (12/41) in cows having more than 4 calves 16.89% (64/379) than in cows having less than 4 calves (Table 3).

Quarter	No. positives	Total examined	prevalence	95%CL
LF	11	420	2.62	1.08 – 4.15
LH	23	420	5.48	3.29 – 7.66
RF	22	420	5.24	3.09-7.37
RH	37	420	8.81	6.08 – 11.53
Overall	93	1680	5.55	------

No =number, CI= confidence interval

Table 3: Distribution of mastitis at each quarter level (n=1680).

Prevalence of Mastitis in Herd Size Relation

Among 110 house hold farmers of different sizes examined for mastitis, 19.10% (n=21) were affected with clinical mastitis and 43.64% (n=48) were affected with sub clinical mastitis. It was observed that the prevalence of mastitis was significantly (p<0.05) higher with the increased number of milk cows per herd. Herds having ≥10 milk cows per herd had significantly higher (70.0%) prevalence of mastitis than those with fewer than 10 milk cows. Analysis of extrinsic risk factor solicited higher infection rate in animals from larger herd size (23.84%) than small herd size (14.87%).

Farming System and Housing System

Prevalence of mastitis positive recorded in intensive system (31.82%), semi-intensive system (25.97%) and extensive system (15.26%). High prevalence was observed in the intensive system and the lowest prevalence was found in the extensive system in table 4. Semi intensive and intensive had more chances for mastitis positive in terms of OR value for semi-intensive and intensive system were 4.1 and 10.3 times more than extensive farming system on Table 4. These differences of prevalence rates of mastitis positive might be due to difference of breeds of animals, management practices and the tests used for screening of the milk samples.

The result revealed in table 4 that cows in closed housing system had higher prevalence (31.33%) of mastitis positive than an open housing system (14.84%). Closed housing had more chances for CMT positive in terms of OR value compared to open housing system in table 4. Closed housing system increases the risk of mastitis because the confinement of the animals and contagious of microorganisms in the various litters chance to form the mastitis [19].

Risk factors	No. examined	No. positive (%)	X2	P-value
Breed				
Cross	89	28(31.46)	13.6114	0
Local	331	48(14.50)		
Age years				
Adult 2-6	191	21(10.99)	11.9165	0.001
Old More than 6	229	55(24.02)		
Calving				
Few	379	64(16.89)	3.8271	0.05
Many	41	12(29.27)		
Management system				
Intensive	22	7(31.82)	7.755	0.021
Semi-intensive	77	20(25.97)		
Extensive	321	49(15.26)		

Herd size				
Small	269	40(14.87)	5.2518	0.022
Large	151	36(23.84)		
Housing system				
Open	337	50(14.84)	12.2165	0
Close	83	26(31.33)		

χ2=Chi-square· *p<0·05=Significant

Table 4: Association of potential risk factors with prevalence of mastitis in and around Bedelle town of Western Ethiopia.

Isolated Bacterial Genera

The bacteria species isolated from CMT positive samples that growth on culture are Staphylococcus, Streptococcus, Enterobacter spp, Pseudomonas, Micrococcus species, and Aeromonas (Table 5).

Bacterial isolates	Isolates Frequency	Prevalence%
Staphyloccus	39	53.42
Streptococcus	*9*	*12.3*
Micrococcus	8	10.95
Enterobacter	6	8.21
Pseudomonas	*4*	*5.47*
Aeromonas	*3*	*4.1*
Rhodococcus	*2*	*2.73*
Acinetobacter	*2*	*2.73*
Total	73	*100*

Table 5: Isolated bacterial Genera from CMT positive milk sample.

Discussion

The study was carried out to determine the prevalence of bovine mastitis and associated risk factors in and around Bedele town, of Western part of Ethiopia. The present study revealed the dairy farms owner's awareness on mastitis; the majority has information about the disease how it came to the picture in their farms. The overall prevalence of mastitis was 18.1% at cow level and 5.55% in quarter levels. The infection rate in cow levels was closely agrees with Mdegela RH, et al. [20] and Katsande S, et al. [21] with (21.7%) and 21.1% respectively. However, it is relatively lower than those findings of Kerro DO, et al. [22], Bishi AS [4], Mungube ED, et al. [23] who reported 40.4% in southern Ethiopia, 38.2% in Adami-Tulu central Ethiopia, 39.8% in and around Addis Ababa, 46.6% from central highlands of Ethiopia and 39.7% in Chaffa valley in north eastern Ethiopia, respectively. However, it is relatively lower than the study of Mekibib B, et al. [11], Sori H, et al. [7], Geressu B [24], Lakew M, et al. [25] and Zeryehun T, et al [17] who got 71.1% from Holeta, 52.8% from Sebeta, 61.1% from south Wello, 63.0% from Addis Abeba, 64.6% from Assela and 74.7% around Addis Ababa respectively. This variation is may be due to mastitis is a complex disease involving interactions of various factors such as managemental and husbandry, environmental conditions, animal risk factors, and causative agents [26].

In the present study, like some other studies, the majority of the cases of mastitis were subclinical [27,28]. It may be due to a higher knowledge of farmers on clinical mastitis which appears by visible changes and is treated as soon as possible. The present finding showed clinical mastitis cases with the prevalence level of 5.47% in cross and local breeds. The clinical prevalence in this study was close agreement with report of Bishi AS [4] who reported the prevalence of 5.3% in Addis Ababa [29] who reported 5.3% in central Ethiopia. However, the finding was higher than previous reports of clinical mastitis at cows' level was comparable with that of Kivaria FM, et al. [30] and Almaw G, et al. [7], who reported 3.8 and 3.9% in Tanzania and Ethiopia, respectively. The prevalence report of clinical mastitis are lower than those reported by 9,5% and 25.1% Workineh in Addis Ababa and 21.1% by Zerihun T [31] and 21.0% by Lemma D [32] in Arsi region and 20.0% prevalence reported by Bagadi HO [33] in Sudan. Sub clinical mastitis was higher as compared to clinical in the two breeds. The prevalence of sub clinical

mastitis at cow level based on CMT in the present study (12.61%) was lower than the finding of Biffa D, et al. [15] who reported 23% Sori H, et al. [7] who reported 36.6%, Toloso T, et al. [34] who reported the prevalence in wolyta sodo (17.5%). However, the present result was lower than. In general, subclinical mastitis has been reported to be higher than clinical mastitis owing to the defense mechanism of the udder, which reduces the severity of the disease. High prevalence of blind mammary quarters (6.42%) closely agrees with the result of Biffa D, et al. [15]. Lack of screening subclinical mastitis and late or not treating clinical cases could possibly leads mammary gland to blindness. Blind mammary quarters contribute to high subclinical mastitis and loss of milk production with a subsequent impact on food security.

The prevalence of mastitis associated with breeds, cross breeds 31.46% and local breeds 14.50%, was found statistically significant (P<0.0.5) as described on table 4. Breed difference can play a vital role in the prevalence of different diseases. In this study, the prevalence of mastitis in crossbred cows was statistically higher than that of local breeds. This finding is comparable with report of other studies such as Almaw G, et al. [10] in and surrounding of Gondar town [7] in and around Sebeta, Ethiopia and [35] Sokoto metropolis. This variation of mastitis prevalence in breeds' level could be that the disease is associated with the lactating cow's milk yield that recently stated high yielding cows are more susceptible to mastitis than low yielding ones. And also the survey result agreed with this idea; the dairy farm owners responded that the prevalence of mastitis with higher milk producer cows, low milk producers cows and both (higher and low milk producer cows) were 52.8%, 6.8% and 40.4% respectively. In addition to these factors, Stress associated with a high milk yield may upset the defense system of the animal. Higher-yielding cows have been found more susceptible to mastitis may be due to the position of teat and udder and anatomy of teat canal, making them prone to injury [36] and due to less efficacy of phagoacytic cells in higher yielding cows associated to dilution [37]. And also, may be influenced by some inheritable characteristic such as capacity of milk production teat characteristic and udder conformation [38].

The results of analysis of the supposed risk factors showed that age was one of the predisposing factors. The occurrence of more cases of mastitis in older animals observed in the present study is in agreement with reports of Biffa D, et al. [15]. Biffa D, et al. [15] has also found strong association between age and prevalence of mastitis. The previous investigation carried out elsewhere showed that the higher prevalence of mastitis in older animals is due to increased patency of teats and increased degree and frequency of previous exposure in multiparous old cows [39,40]. This investigation also showed that prevalence of mastitis was lower in cows with fewer parities and the prevalence was higher in cows with multiple parities. This finding is in consent with findings of Sergant JM, et al. [41], Bustan A, et al. [42] and Kerro DO, et al. [22]. Several factors can be involved in the development of mastitis in animals with multiple parities. The risk of clinical and subclinical mastitis increases significantly with advanced age of cows, which approximates with parity number. This will increase the patency of the teats and decreases the local defense mechanisms. Repeated parturition also exposes cows to environmental and contagious bacteria. Besides, multiples parturition stresses cows and ultimately down regulates their immunity. In general, the immunity animals decrease through age making older animals more prone to mastitis.

The rate of infection revealed significant variation between small herd size (14.87%) and large herd size 23.84% (p<0.05). The effects of the housing system on the prevalence of mastitis assessed 31.33% in closed and 14.84% in open housing system. This finding was less than those finding of Frandos RD, et al. [43] who found a significantly higher prevalence rate in close housed animals, this has substantiated by an easy transmission of organism from infected to healthy ones. This indicates that, beside the lack of knowledge of the community regarding to the animal husbandry the large size can affect the health of animals. A wide range of farm and animal level management factors can influence husbandry conditions [15]. This was obvious in the present study, which showed significant higher prevalence in semi-intensive (25.97%) and intensive farming systems (31.82%) when compared to extensive farming system (15.26%). This could be attributed to the variation in hygienic standards of dairy environment and milking conditions as the cows in these systems in the current study were maintained in dirty and wet area which favors the proliferation and transmission of mastitis causing organisms. In conjunction with this the questioner finding indicated that majority of the dairy farms were not visited by veterinarian and training for farm owners was not practiced at all which could negatively influence dairy health management in the area.

A total of 1680 quarters were examined, of which 93(5.55%) were positive for mastitis while 108 (6.43%) were blind in Table 3. The prevalence of mastitis associated with quarter, right hind (RH) showed the highest rate of infection (8.81%) followed by the Left hind (LH) which is 5.48%. The quarter prevalence of mastitis (5.55%) found in this study was lower when comparable with the finding of Almaw G, et al. [44-54] who reported the prevalence rate of 17.9 % in and around Bahirdar town, Ethiopia. As compared to the others the left hind quarters were affected with the highest infection rate (19.8%). The left hind quarters were the second with an infection rate of 5.48%. Thus, this study revealed that

the hind quarters have higher infection rate than the front quarters. This might be due to the high production capacity of the hind quarters [55-63] and the high chance of getting fecal and environmental contamination.

Conclusion

Mastitis is still the main problem as reduced milk production quantitatively and qualitatively, and affects public health thro ugh a number of milk borne infections like tuberculosis, brucellosis in humans. The present study indicated that mastitis is the major problem in dairy cows in and around Bedele town. Breed, age, parity, herd size, housing system and management system are the main factors that were associated with the likelihood of contracting mastitis [64]. Inadequate hygienic condition of dairy environment, poor milking procedure, poor animal health service and lack of proper attention to health of the mammary gland were important for the high prevalence of mastitis factors in the study farms. Adequate housing with proper sanitation and regular screening for early detection and treatment, follow up of chronic case, culling of older cows with repeated attacks, avoiding consecutive milking and susceptibility testing of the mastitis pathogens before treatment are recommended to alleviate the problem. Further detailed epidemiological, microbiological and economic analysis studies are suggested at countrywide level to shape the existing control and prevention strategies.

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