Study on Prevalence of Major Health Problem of Dairy Cattle in Selected Towns of West Shewa Zone, Oromia, Ethiopia

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Abstract: A single –visit-multiple subject formal questionnaire survey and observation was used to conduct the study from October, 2013 to January, 2014 G.C. with the aim to assess the major health problems of dairy cattle in five selected towns of West Shewa Zone, Oromia, Ethiopia. For this purpose, a total of 60 dairy farm owners were interviewed using structured questionnaire and 816 dairy cattle of which 449 dairy cows were examined for major health problems. Data were analyzed by SPSS version 20 whereby descriptive statistics was used to summarize the results and chi-square was used to determine possible association with risk factors. Our salient findings showed that tick (13.6 %), lice (9.2%) and infectious diseases (6.0%) were the most prevalent clinical disorders. Tick and lice infestations has showed significantly ($P<0.05$) higher prevalence of 86% (49) and 59.6% (34); 29.5% (59) and 19.5% (39) and 22.4% (33) and 16.3% (24), in extensive farming system, poor hygienic housing condition and in animal with age range of 4 to 6 years, respectively. Among the study sites, a significantly high ($P<0.001$) prevalence of tick 46.6% (54) and lice infestation 27.6% (32) was recorded in Guder. On the other hand the study in dairy cows alone showed poor breeding performance (37.6%) and clinical mastitis (11.8%) to be the leading reproductive disorders. The study also revealed significant variation of breeding performance rate ($p<0.001$) among study towns, breeding method, management system, age and exotic blood level of the cow. In conclusion this study showed high prevalence of poor fertility rate, tick and lice infestation and clinical mastitis. Therefore, in order to minimize these risk factors and increase the productivity of dairy cows in the study area, it was suggested that strict animal husbandry practice especially ectoparasite and mastitis control and improved breeding and health management should be in place.

Key words: Dairy Cattle · Health Problems · Prevalence · West Shewa

INTRODUCTION

Livestock production in Ethiopia constitutes one of the fundamental means of improving living standards in many regions of the agricultural productive system. Managing the largest livestock population in Africa, Ethiopia is one of the few countries in the world with huge livestock potential. According to CSA [1], there are about 52.13 million head of cattle, 24.2 million sheep, 22.6 million goat, 8.73 million equine, 0.99 million of camel and 44.89 million poultry in the country. However, the productivity of the livestock has always been sub-optimal due to poor nutrition, prevailing diseases, poor management practices and low productive performance of the indigenous breeds [2].

Dairy production, among other sectors of livestock production system, is a crucial issue in Ethiopia. Consequently, following a cross breeding program which was introduced in the country at a wider scope in the late 1960's [3], urban dairying is flourishing in many small towns and big cities with different level of intensification from less than 1% to over 40% growth [4], particularly in West Shewa Zone of Oromia region. As a result there are so many dairy farms in urban and peri-urban areas of West Shewa Zone, which are aimed at provision of diary milk and milk products to the community. However, productivity of the dairy cows is not to the expected level, mainly due to poor management practices and different health problems. Diseases of dairy animals that cause morbidity and mortality are the major challenges in the

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dairy sector and occur as a result of multiple factors and the complex interaction among the factors namely, management practices, environment, infectious agent and the animal itself [5]. It is an established fact that development of urban and peri-urban dairy production needs above all a sound knowledge of the cause and predisposing factors of disease with its control and preventive methods [6].

Small holder dairy farming is increasing from time to time particularly in the West Shewa Zone; however, comprehensive studies conducted on dairy health problems and risk factors, which help to promote the desired output of dairy farming, were limited. Therefore the objective of this study was to assess the major health problems of dairy cattle in selected towns of West Shewa Zone, Oromia region, Ethiopia.

MATERIALS AND METHODS

Study Area: The study was conducted in five selected towns namely Ambo, Holeta, Ejere, Ginchi and Guder of West Shewa Zone, Oromia Regional State, Ethiopia. West Shewa Zone is found to the West of Addis Ababa and Ambo, which is located at 114 km West of Addis Ababa, is the administrative center of the Zone. Holeta, Ejere, Ginchi and Guder are the administrative towns of Welmera, Ejere, Dendi and Toke Kutaye districts found in West Shewa Zone of Oromia, respectively.

West Shewa Zone encompasses low land, mid altitude and high land environments with a share of 25%, 30% and 45%, respectively according to the zonal basic data. Districts such as Ejere and Welmera are dominated by highland temperature whereas Ambo, Dendiand Toke kutaye are dominated by mid altitude of which Toke Kutaye is characterized by warmer temperature than the rest of the study areas. Current estimates of the livestock resource base in the West Shewa Zone suggested 1.23 million cattle, 43,000 sheep, 19,000 goats, 207,000 equines on a tropical livestock unit basis and 1.2 million poultry, accounting for 13% of the total grazing herbivore and 9% of poultry in the region [7].

Study Population and Sampling Techniques: Study towns namely Ambo, Holeta, Ejere, Ginchi and Guder were selected purposively based on availability of dairy farms in West Shewa Zone. Since the number of dairy farms is small, all dairy farms found in urban as well as peri-urban areas, where there was at least three cross breed dairy cattle in the herd with volunteer owners were included in the study. The study animals were all dairy cattle managed under intensive or extensive system, with dairy

cattle of more than 6 months of age, both sexes and any exotic blood level. Accordingly a total of 816 dairy cattle of which 449 cows were included in the study from 60 farms from the selected study towns.

Study Design: Cross sectional study was conducted using questionnaire survey, observation and analysis of secondary data.

Questionnaire Survey: A detailed and organized questionnaire format was designed and an attempt was made to generate base line information related to dairy production (breeding method, herd structure, management, etc), major dairy cattle health problems and veterinary services. All owners of the dairy farms (n = 60) were involved in the interview. The questionnaire was framed in such a way that farmers could give information that is recent and easy to recall and it was pre-tested before the actual study.

Secondary data obtained from the questionnaire was used to assess reproductive disorders such as abortion, retained fetal membrane (RFM) and poor fertility and infectious diseases namely black leg, foot and mouth disease, lumpy skin disease etc. detected in the dairy farms for the last two years.

Observational Study: During the single visit, observation of the individual farms were made to record parameters namely hygiene and status of drainage of the house and filled into the format by the authors so as to increase the reliability of information. Moreover, clinical examination of individual animal was made for ticks, lice, clinical mastitis and other infectious diseases appearing in the farms. Knowledge of disease history, clinical findings and history of response to treatment were used as essential tools to group diseases and disorders in a systematic way. Diagnosis of clinical mastitis was based on physical examination of the udder for gross abnormalities such as the presence of swelling, pain, hotness, disproportional symmetry, fibrosis, visible injury, atrophy and teat blockage. Additionally, gross abnormalities in milk including the presence of flakes, abscesses or clots in the milk or watery secretion were also used to classify a case as clinical mastitis.

Data Management and Analysis: Data obtained from questionnaire survey and observational study were entered into Microsoft Excel spread sheet and coded appropriately. Data were analyzed using Statistical Package for Social Sciences (SPSS) software, version 20.0 (SPSS Inc., Chicago, Illinois, USA) with descriptive

statistics used to summarize the results and chi-square was used to determine possible association among factors. For statistical inference, the level of significance was taken as 0.05.

RESULT

Demographic Description of Farms in the Study Sites:
A total of 60 dairy farms from Ambo (n= 20), Holeta (n =15), Ejere (n =9), Guder (n =8) and 8 Ginchi (n=8) were included in the study. Majority of the farms 63.3% (38/60) were holding less than 10 dairy cattle, 26.7% (16/60) were holding 10 to 30 and the remaining 10% (6/60) had 31 to 70 dairy cattle. The herd composition in the dairy farms showed 8.0% (65/816), 5.9% (48/816), 27.3% (223/816), 55.0% (449/816), 2.3% (19/816) and 1.5% (12/816) for female calves, male calves, heifers, cows, bulls and oxen, respectively (Table 1).

Major Health Problems of Dairy Cattle in the Study Area: In this study 816 dairy cattle were examined clinically for ectoparasite and prevalence of tick and lice infestation was found to be 13.6 % (111/816) and 9.2% (75/816), respectively. Similarly data from questionnaire survey showed cumulative prevalence of infectious diseases (dermatophilosis, lumpy skin disease, black leg, foot and mouth disease etc.) was 6.0% (49/816) and that of digestive disorders (bloat, indigestion, carbohydrate engorgement and nutritional deficiency) was 3.84% (31/816).On the other hand from records of the last two year revealed prevalence of 3.8% (17/449), 2.9% (13/449) and 4% (18/449) for abortion, dystocia and RFM, respectively. Clinical examination of the udder and milk of dry and lactating cows also revealed 11.8% (53/449) prevalence of clinical mastitis. Moreover, assessment of breeding record and clinical examination cows and repeated breeder heifers showed 37.6% (179/476) poor breeding performance rate (Table 2).

Furthermore, 75% (45/60) of the respondents also complained that there is not enough veterinary service particularly there is scarcity of artificial insemination (AI) technicians and lack sufficient skill of inseminators, shortage of veterinary drugs and commitment of the district veterinary officials to support the dairy farmers has been mentioned as the major bottle necks to perform the dairy effectively (data not shown).

Prevalence of Major Health Problems and Associated Risk Factors in the Study Area: The prevalence of ticks 46.6% (54/116) and lice 27.6% (32/116) was significantly higher in Guder town, while that of infectious diseases 5.6% (16/285) was significantly higher (P<0.05) in Holeta. Similarly significantly higher prevalence of tick and lice was also observed in extensive farming system (P<0.01), poor hygienic housing condition (P<0.05) and animal in age range of 4 to 6 years with a prevalence of 86% (49/57) and 59.6% (34/57), 29.5% (59/200) and 19.5%(39/200) and 22.4% (33/147) and 16.3% (24/147), respectively (Table 3).

Comparison of retrospective data of the last two years showed significantly high degree of association between towns major reproductive disorders as depicted by higher prevalence of cases of abortion (5.9%) in Ginchi, RFM (14.3%) and poor breeding performance (57%) in Guder and poor breeding performance (57%) and Ejere. On the other hand, cows with age ranging 4 to 6 years showed a significantly higher prevalence of cases of abortion (7.8%) and poor breeding performance (52%),while those cows older than 7 years showed appreciably higher (p<0.01) prevalence of clinical mastitis (20.4%) as compared to young age groups. Similarly a significantly higher (p<0.01) poor breeding performance rate was observed among local cows than cross breed dairy cattle of any exotic blood level. Comparison of prevalence of the major reproductive disorders among the different breeding method and management systems showed no statistically significant difference (Table 4).

Table 1: Description of herd structure of dairy farms in the study sites

District	Total No. of farms	Number of animals/farm			Herd structure					
		< 10	11 to 30	31 to 70	Female calves	Male calves	Heifers	Cows	Bulls	Oxen
Ambo	20	13	4	3	8	10	96	151	2	-
Holeta	15	10	3	2	19	21	78	167	-	-
Ejere	9	4	4	1	13	3	20	62	2	-
Guder	8	6	2	-	10	12	26	50	9	9
Ginchi	8	5	3	-	5	2	3	19	6	3
Total	60	38	16	6	65	48	223	449	19	12
					816					
Percent	100%	63.3	26.7	10	8.0	5.9	27.3	55.0	2.3	1.5

Table 2: Overall prevalence of major health problems of dairy cattle in the study sites

Diseases/disorders	No of animal examined	No. Diseased animals	Prevalence
Ectoparasite			
Tick infestation	816	111	13.6%
Lice infestation	816	75	9.2%
Infectious diseases	816	49	6.0%
Digestive disorders	816	31	3.8%
Reproductive disorders			
Poor breeding performance rate	476	179	37.6%
Clinical Mastitis	449	53	11.8%
Retained fetal membrane	449	18	4.0%
Abortion	449	17	3.79%
Dystocia	449	13	2.9%

Table 3: Prevalence of tick, lice and infectious disease and associated risk factors

			Prevalence		
Factor	Category	Total no examined	Tick	Lice	Infectious disease
Towns	Ambo	277	47 (17%)	2 (0.7%)	2 (0.7%)
	Guder	116	54 (46.6%) **	32 (27.6%)*	2 (1.7%)
	Holeta	285	6 (2.1%)	37 (13%)	16 (5.6%)*
	Ejere	100	1 (1%)	2 (2%)	1 (1%)
	Ginchi	38	3 (7.9%)	2 (5.2%)	2 (5.2%)
Management System	Intensive	401	6 (1.5%)	12 (2.99%)	6 (1.5%)
	Semi-intensive	358	56 (15.6%)	29 (8.1%)	14 (3.9%)
	Extensive	57	49 (86%) **	34 (59.6%) **	3 (5.3%)
Hygienic housing	Good	306	5 (1.6%)	29 (9.5%)	16 (5.2%)*
	Medium	310	47 (15.2%)	7 (2.25%)	3 (0.9%)
	Poor	200	59 (29.5%)*	39 (19.5%)*	4 (2%)
Age	Up to 2yrs	204	15 (7.3%)	16 (7.8%)	6 (2.9%)
	2-4yrs	272	49 (18%)	30 (11%)	12 (4.4%)
	4-6yrs	147	33 (22.4%) **	24 (16.3%)*	4 (2.7%)
	>7yrs	99	13 (13.1%)	5 (5%)	1 (1.01%)
	Unknown	94	1 (1.1%)	-	-

** $P<0.01$, * $P<0.05$

Table 4: Prevalence of major reproductive health problems and associated risk factors

			Major reproductive disorders			
Factor	Category	N	Abortion	RFM	Poor breeding performance rate	Clinical Mastitis
Towns	Ambo	158	5 (3.16%)	3 (1.9%)	56 (35.4%)	14 (8.8%)
	Guder	49	1 (2%)	7 (14.3%) *	28 (57%) *	9 (18.4%)
	Holeta	162	8 (5%)	6 (3.7%)	23 (14.2%)	20 (12.3%)
	Ejere	63	2 (3.2%)	-	36 (57%)*	7 (11.1%)
	Ginchi	17	1 (5.9%) **	2 (11.7%)	9 (53%)	3 (17.6%)
Breeding method	AI	143	12 (3.4%)	9 (6.3%)	70 (49%)	18 (12.6%)
	AI+NM	209	2 (0.96%)	6 (2.8%)	45 (21.5%)	20 (9.5%)
	NM	97	3 (3.1%)	3 (3.1%)	37 (38%)	15 (15.4%)
Management system	Intensive	233	11 (4.3%)	7 (3%)	85 (36.4%)	32 (13.7%)
	Semi-intensive	197	5 (2.5%)	11 (5.9%)	53 (27%)	21 (10.6%)
	Extensive	19	1 (5.3%)	-	14 (73.6%)	-
Age group	2-4yrs	161	2 (1.2%)	6 (3.7%)	27 (16.7%)	10 (6.2%)
	4-6yrs	140	11 (7.8%) *	4 (2.8%)	73 (52%) **	19 (13.6%)
	>7yrs	88	2 (2.3%)	7(8%)	31 (35%)	18 (20.4%) **
	Unknown	60	2 (3.3%)	1 (1.7%)	21 (35%)	6 (10%)
Blood level	Up to 50%	45	3 (6.7%)	2 (4.4%)	18 (40%)	5 (11.1%)
	50-75%	189	7 (3.7%)	5 (2.6%)	59 (31%)	18 (9.5%)
	>75%	91	1 (1.1%)	6 (6.6%)	25 (27%)	14 (15.4%)
	Local	16	-	-	12 (75%) **	-
	Unknown	108	6 (5.5%)	5 (4.6%)	38 (35%)	16 (14.8%)

AI: Artificial insemination, N: Number of animals examined, NM: natural mating, RFM: Retained fetal membrane, * $P<0.05$, ** $P<0.001$

DISCUSSION

In this study tick infestation (13.6%) was the leading ectoparasite followed by lice (9.5%). This is in close agreement with the recent finding by Duguma *et al.* [8], who reported (14.5%) tick infestation from Jimma town of Oromia, Ethiopia. Similar studies on ruminants were conducted by several researchers [9-11] where dominance of tick infestation was reported. In contrast to this finding, a higher prevalence of ticks (39.6%) has been reported by Tadesse *et al*. [12].

The lower prevalence of tick infestation in the present study might be due intensive management system where the farmers give more health care to the dairy cattle and also the time of the study, which is relatively drier season, making it unfavorable for multiplication of ticks [13].The finding of significant higher tick infestation in Guder than the rest of the study towns could be attributed to the relatively warmer temperature in Guder. Tiki and Addis [14] reported higher prevalence of tick in extensive system; in agreement with this the higher prevalence in extensive management system and in poor housing condition in the present study could be attributed to differences in favorable condition for the tick in such management system and lack of regular control measures against ectoparasites. Previous reports confirm that tick infestation of cattle increases with poor management system and during wet season [5, 13, 15- 17].

The prevalence of clinical mastitis obtained in the current study (11.8%), was almost comparable with the report from around Holeta (10.3%) [18], but it was higher than (3.9%) by [19] from Bahir Dar and 4.9% by Moges *et al.* [20] from small holder dairy farms in Hawassa Ethiopia. Whereas this finding was lower than report from Modjo (21%) [21], in Addis Ababa (25.1%) [22] and around Addis Ababa 19.6% [23]. It has been well known that mastitis is a multifactorial disease involving interactions of various risk factors related to host, environmental conditions, causative agents, management and husbandry, thus its prevalence varies with these factors as reported by different researchers [5, 8].

It has been documented that variations in the prevalence of abortion is suggestive of differences in breed, geographical location, production system and differences in procedures among the different studies [24]. In line with this, different researchers reported prevalence of abortion that range from 2.23% to 6.3% [25-27], which is in agreement with the present result (3.79%). The occurrence of dystocia and RFM may vary due to the fact that it is influenced by factors such as age and parity of the dam, breed of the sire as well as prevalence of infectious causes [28]. The variation in these factors might attribute to the differences in the prevalence of dystocia (4%) in the present study which was much less than the report by Gizaw *et al*. [24] and Molalegne and Shiv [29] from Adama and Bedelle accounting for 25.81% and 24.8%, respectively.

Poor breeding performance can be caused by a number of factors, including sub-fertile bulls, endocrine imbalance, malnutrition, reproductive tract infections and poor management practices such as wrong time of insemination or faulty heat detection, inappropriate semen handling and insemination techniques [30]. The poor breeding performance rate (37.61%) recorded in the present study was higher than 26.8% and 21.8% reported by Dinka [31] and Mekonnen [32] from around Asella town and Ada'a district of Central Ethiopia, respectively and much more higher than the 8.9% and 4.6% prevalence rate reported by Gizaw *et al*. [24] and Tigre [33] from Adama and Holeta, respectively. In this study poor breeding performance rate was significantly (p<0.001) influenced by location (towns), breeding method, management system, age of the cow and exotic blood level. This might be due to the management system that influences cow's heat (estrus) detection especially in younger cows and heifers [34], difference in the technical efficiency of AI workers among the towns and genetically low reproductive performance of local cows under extensive management system.

In conclusion this study revealed that tick and lice infestation were the leading diseases problem in all the cattle, whereas poor breeding performance rate and clinical mastitis were the major health problems in dairy cows alone in the study area. Thus they certainly had adverse effects on productivity of dairy cattle and hence necessitate serious attention. Moreover, the higher prevalence of the tick and lice infestation which was observed in Guder area and in dairy animals managed under extensive system gives an alarm for strategic control of ectoparasite, improving dairy management and the veterinary services in the study areas. Regular screening for the detection of subclinical mastitis and proper treatment of the clinical cases during dry and lactation period need to be practiced. Improving breeding strategy such as heat detection and bull selection and health care could help to alleviate poor breeding performance rate. Together with this there should also be good herd record keeping practice, health education about disease transmission, adequate housing with proper sanitation should be regularly maintained to reduce associated productive and reproductive wastage to the dairy production.

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