

Research article

Study of calf health and management problems in urban and per-urban dairy farms of selected districts of East Wollega Zone of Oromia Regional State, Western Ethiopia

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Abstract

Calf care is not only essential for the sustenance of the dairy industry but is also essential for preserving and maintaining good-quality of germplasm. On the contrary, high levels of calf mortality have limited dairy herd expansion and genetic improvement in the study area. Therefore, the study was developed to evaluate the existing calf health and management problems and to assess the level of farmers' knowledge and calf health and management practices in the study areas. Thus, a cross-sectional study design was used and the study districts and peasant association were selected purposely where as the individual household was selected randomly using a systematic random sampling method. A total of 50 households were selected from the three districts and a detailed questionnaire survey format was designed to generate baseline information related to the calf health management system and major calf health problems. As the study result indicated diseases like blackleg, pneumonia, and internal and external parasites were the most dominant calves' health problems. About 50% of the respondents informed that most calf mortalities occurred due to pneumonia, blackleg, starvation, heartwater, diarrhea, and bloat. Even though all calves were getting access to colostrum feeding, they do not access the optimum level, and regarding calves' feed natural grass is categorized in the first rank where as concentrated feeds (ground maize, grain, noug cake) and food left over (local brewery by product and straw) were placed in the second and third rank, respectively. And all farmers in the study area have access to veterinary services, however, the accessibility is not uniform among the farmers. In general, as the study revealed there has been poor management practice regarding both feeding and housing of calves in the study area. Therefore, identifying economically important animal diseases and designing strategic preventive and control measures and improvement of calf management practices through awareness creation among farmers is valuable.

Background and justification

Of the livestock species that are found in Ethiopia, cattle are the most important to the GDP of the country [1]. However, diseases are important for all smallholder dairy production systems. As the report of [2] in Kenya disease of the newborn calf and calf mortality are the major causes of economic losses in cattle production. Ethiopia was ranked highest among Sub-Saharan countries in livestock disease burden [3], such as in the 2014/2015 fiscal year deaths estimated for Ethiopia due to various diseases were 3.23 million cattle, 4.37 million sheep,

and 4.90 million goats [4]. The productivity of the herd can be negatively impacted by impaired growth of calves, decreased milk production of animals that experienced chronic illness as baby calves, the spread of disease from calves to adult cows, increased veterinary costs, and the limited opportunity for genetic selection due to mortality of replacement. Calves play an important role in the development of the dairy sector of the country, as the future of the dairy herd solely depends upon the successful raising of young calves. Calf care is not only essential for the sustenance of the dairy industry but is also essential for preserving and maintaining good-quality germplasm. On



the contrary, high levels of calf mortality have limited dairy herd expansion and genetic improvement. Calf morbidity and mortality are perennial problems in all countries where cattle are raised. But the mortality rates vary from 2% to 20% with mortality on individual farms varying from 0% to above 60%, although in well-managed dairy herds of developed countries, average mortality is usually between 2% and 4% [5,6].

In developing countries, with poor management and major disease problems, especially in sub-Saharan Africa and further in Ethiopia, the usual average mortality is 7% to 25% [7]. In the tropics, mortality rates of young calves vary depending on the management and severity of the diseases. Studies on calf mortality rates in different African countries ranged from 9% to 45% [8-13].

The most frequent disease syndrome that affects calves was calf diarrhea with an incidence of 39% followed by joint ill 6% [14-16]. As [17] studied agents associated with neonatal diarrhea and mortality in Ethiopian dairy calves. They reported that out of 108 diarrhea cases, 38.9% were bovine enteric Coronavirus (BEC), 16.7% serogroup rotavirus (RV), and 11.1 percent K99 (F5) fimbrial adhesin-positive Escherichia Coli (K99 ETEC, / Enterotoxigenic Escherichia Coli/) that has zoonotic importance for calf attendants and consumers. A relationship between housing and health during the rearing period has been described by several authors [18,19]. The cleanliness of the barn influences calf health, as calves housed in unclean barns are at higher risk of disease than calves housed in clean barns (14). Diarrhea, pneumonia, septicemia, parasitism, congenital problems, and miscellaneous cases account for most calf illnesses, deaths, and post-natal treatment [20,21]. Skin diseases and pink eye are also causing health problems for young calves in intensified dairy farms in different areas and calf diseases have a significant financial impact on dairies. The costs associated with calf disease include treatment costs, replacement costs, genetic loss, and impaired future performance of dairy farms. Studies have also shown that calf disease results in a decrease in a heifer's likelihood of surviving until calving, placing them at increased risk of being culled prior to calving, and resulting in increased age at first calving. To have sound calf health management it also requires a dairy calf attendants or dairy household keeper are at least be oriented with simple disease diagnostic and treatment techniques of their animals.

The above-mentioned threats are considered limiting factors on the production and productivity of dairy cattle at present and in the future where much more care should be taken. In Ethiopia, most farmers do not have enough knowledge of proper calf-feeding regimes. Apart from that, farmers aim to optimize income by selling more milk and calves are, therefore, underfed. This is more serious in bull calves, resulting lack of bulls and oxen. Therefore, understanding the management, the causes of common calf hood diseases, their methods of transmission, and developing effective control programs through intensive household participation to minimize the negative impact on calf health is paramount important. Therefore, this study was developed with the objective of

evaluating the existing calf health and management problems of dairy calves in urban and peri-urban areas, to assess the level of farmers' knowledge of calf health and management practices.

Material and methods

Study area

The study was conducted in three selected districts (Digga, Guto-Gidda, and Wayu-Tuka) of the East Wollega Zone. The altitude of the study districts ranges from 1500 - 3000 meters above sea level. It is mostly known for its mixed agriculture production system mean suitable for both crop and livestock production. The maximum and minimum temperature of the area is 22.4°C and 10.9°C, respectively. The mean annual rainfall of the area ranges from 800mm-2400mm and about 352kms distance from Addis Ababa [22].

Study design and sampling

In this study, cross-sectional study design was used. The study districts and Peasant Associations (PAs) were selected purposely whereas the individual households were selected randomly using a systematic random sampling method. Therefore, 50 households were selected from these three districts.

Data collection

A detailed questionnaire survey format was designed in an attempt to generate baseline information related to the calf health management system with particular emphasis on major calf health problems. The questionnaire was pre-tested in a pilot study and modified before the actual survey was conducted. The questionnaire covers household characteristics, herd characteristics of cattle, mortality of calves and household access to veterinary services, name of calves' diseases known by farmers, size of the farm, calf rearing practices, feeding and housing of the animals, disease treatment and control practices, etc.

Data analysis

The data were subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) software, version 16.0 (SPSS Inc., Chicago, Illinois, USA), and descriptive statistical tests such as frequency distribution and percentages were used.

Major baseline survey result

A total of 50 dairy cattle owners were interviewed from urban and peri-urban smallholder dairy farms of respective selected districts. The majority of the respondents were male (85.7%) and the rest were female (14.3%). The age category of respondents ranges from 25 to 70 years old. Regarding education status 17% of respondents were illiterate. As the study result revealed that an almost equal proportion of male (50.4%) and female (49.6%) calves populations were present in the study area. Among the total cattle population (648) that the interviewed owner had, 39.8%, 21.76%, 19.6%, 9.4%, and



9.4% were cow, heifer, calves, bull, and oxen, respectively. As the result indicated almost all cattle that were kept in urban areas were female cattle (Figure 1)(Table 1).

In the study area, about 40% of calves were poor body condition scores and the rest were categorized as medium body conditions about 4% of farmers' calves encountered prenatal problems such as dystocia and early birth whereas 96% of the interviewees did not encounter the problem. As the study result revealed different types of infectious diseases were affecting the production and productivity of dairy cattle. Commonly known diseases that are affecting cattle in the study areas were trypanomiasis, blackleg, pasteurellosis, conjunctivitis, heart-water (candidosis), mastitis, Lumpy Skin Diseases (LSD), Foot and Mouth Diseases (FMD), and internal and external parasites. Out of the interviewed farmers, 25% were informed as they encountered many kinds of cattle diseases but they are not able to know the symptoms and type of diseases that

affect their cattle. Among above mentioned diseases blackleg, pneumonia, and internal and external parasites are the most dominant calves' health problems.

The most commonly available and known drugs in the study areas are Oxytetracycline, Penstriptomycine, Diminazine aceturate, and Anthelmintic drugs such as Albendazole and Ivermectin. Even though 53% of farmers didn't know any types of veterinary drugs described, they treated their diseased calves by presenting veterinary clinics found in the nearby area. Of the total interviewed farmers, 76% of them reported that when they treated their diseased calves with a veterinarian the prognosis was very good, on the contrary, 24% of farmers reported that the treated animals do not recover and died.

As known feeding of colostrum is the most important for newly born animals to develop resistance to different types of infectious diseases. In this study almost all the respondents were offering colostrum to their calves, however, the time of starting colostrum feeding was different from farmer to farmer. For example, 36%, 24%, 34%, and 6% of the interviewed farmers have been given colostrum to their calves at 1hr after birth, 30 minutes after birth, just after birth, and 2hrs after birth, respectively. As it has been indicated that all calves had access to colostrums feeding in current study areas, the duration and amount they provide were variable across the farmers, such as 46%, 38%, and 14% of farmers are given colostrums for one week, two weeks, and one month, respectively, as well as 51% provided colostrums free access whereas 19%, 14%, 12% and 4% were 1lit, 2lits, 0.5lit and 6lits, respectively. In this study calf weaning age is tried to be assessed, accordingly, 40% of the farmers reported that calf weaning age is about 6 months where as 20% of farmers reported more than a year and the rest (40%) of farmers reported that the calf weaning age is between 7-12 months. Also, this study identified types of supplementary feeds that were offered for calves and ranked as; natural grasses categorized in first rank whereas concentrated feeds (ground maize, grain, noug cake) and food left over (local brewery by product & straw) were placed second and third rank, respectively.

As the study revealed all farmers have access to veterinary services, however, the service is not uniform among the farmers. For example, 26% of the respondents have access to both private and government veterinary services whereas 54% and 20% of the respondents only used government and private veterinary services, respectively. As well as the distance between the clinics among farmers to farmers is variable. Such as 57% of farmers are far from veterinary clinics by about 1km distance, 41% of farmers are far from the clinic by a 1 km - 5 km distance, and 2% of farmers are far from veterinary clinics by about 6-10 km distance (Table 2). This variation affects the treatment of diseased animals uniformly within communities of the area especially those farmers far away from the clinics who did not present diseased animals to the clinics due to the remoteness of clinics which creates favorable conditions for diseases (Figure 2).

As reported about 70% of the respondents have access to a different type of cattle vaccination service. Among those farmers that had vaccination service 65% of them didn't

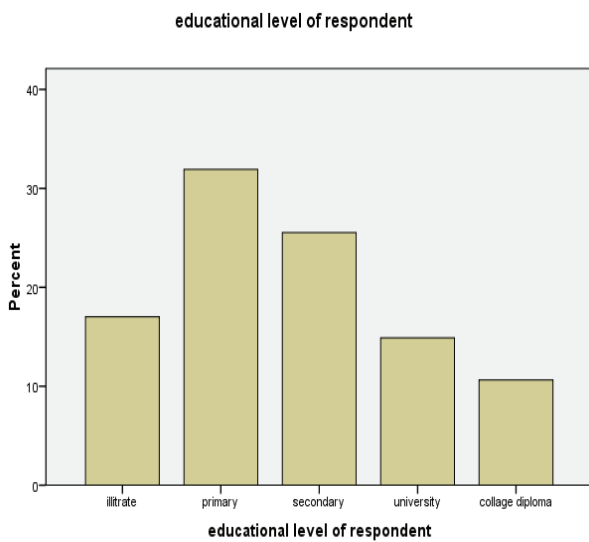


Figure 1: Shows the educational background of the respondent.

Table 1: Shows cattle distribution in the district.

District	Guto-Gida	Wayu-Tuka	Diga	Total
No of the owner interviewed	20(40%)	18(36%)	12(24%)	50(100%)
Agroecology				
Highland	20(100%)	3(16.67%)	12(100%)	35(70%)
Midland	-	15(83.33%)	-	15(30%)
Number of cattle				
Cow	137(21.14%)	48(7.4%)	73(11.27%)	258(39.8%)
Heifer	91(13.9)	24(3.7%)	27(4.17%)	141(21.76%)
Calves	60(9.26%)	36(5.56%)	31(4.78)	127(19.6%)
Oxen	1(0.15%)	34(3.7%)	26(4%)	61(9.4%)
Bull	35(5.4%)	13(2%)	13(2%)	61(9.4%)
Total	324(50%)	155(23.9%)	169(26.1%)	648(100%)
Sex of calves				
Male	28(22%)	20(15.75%)	16(12.6%)	64(50.4%)
Female	32(25.2%)	16(12.6%)	15(11.8%)	63(49.6%)



Table 2: Shows different factors that affect cattle production in the study districts.

parameters	Percentage (%)
Calves body condition	
Good	10
medium	60
poor	30
Prenatal problems	
Free	96
Dystocia	3
Early birth	1
Disease type	
Trypanomiasis	9
Blackleg	18
Pasteurellosis	8
Conjunctivitis	2
Cawdrosis (Heart-water)	6
Lumpy skin disease	3
Foot and mouth disease	4
Internal and external parasite	25
Pneumonia	15
Calf diarrhea (colibacillosis)	10
A drug is known by farmer	
Oxy TTC	7.6
Pen strip	3.4
Anti-trips	13
Ant-helmentic	23
No response	53
Prognosis	
Good	70
Moderate	6
poor	24
Type of Veterinary service	
Governmental	54
Private	20
Both	26
Distance to nearest vet service	
< 1 km	57
1-5 km	41
6-10 km	2

know the vaccine type that has given to their animals but the rest 35% of farmers mentioned at least one of the following vaccine types as anthrax, FMD, CBPP, pasteurellosis, and blackleg vaccines. All most all farmers in the study area have not used prophylactic drugs to treat their animals and also did not understand its concept. In the study area there were frequent calves mortalities occurred, however about half of the respondents didn't know the symptoms and the causes whereas 50% of the respondents informed that mostly calf mortalities occurred due to pneumonia, blacklegs, starvation, heartwater, diarrhea, and bloating.

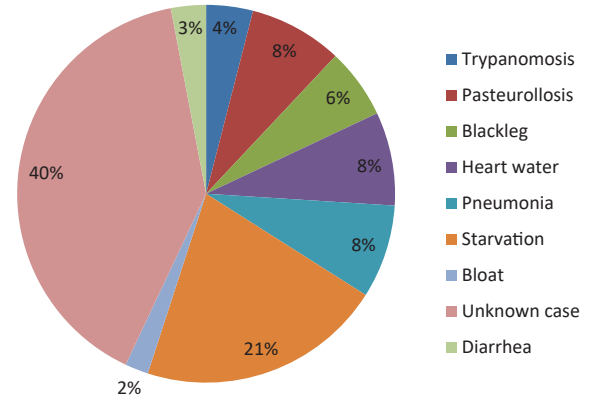


Figure 2: Shows major diseases that cause calf mortality in the study area.

Discussion

Epidemic diseases particularly bacterial pneumonia, viral and diarrhea that are associated with parasitism in calves were very important in the study area. As different studies reported in different area of Ethiopia diseases become a more serious threat and causes significant morbidity, mortality, and production loss. For example, the concurrent infection of trypanomiasis with the GIT parasite causes a series of economic losses in livestock production in the study area as well as has been reported by [23] around Bedelle in the western part of the country. Foot and mouth virus (FMD) is also more prevalent and has been one of the major economic losses of the farmers found in the study area which is in line with the reports of [24] and [25] that affecting the livestock population of the country such as mortality and case fatality rates were relatively higher 1.6% and 8.9% in calves than the other age groups due to the FMD viral diseases. Parasitic gastroenteritis in calves is an important disease in the area according to the observational study indicated as well as calf diarrhea was severely affecting calves.

Lumpy Skin Disease (LSD) was also among the important disease in different age groups of cattle in the study area which was in line with the report of [26] the disease was observed to be more serious in young animals and females. Besides, heart-water, blackleg, salmonellosis, and pasteurellosis were the most common diseases mentioned by the farmers which are mostly affecting replacement stocks. As the report of [27] in Nigeria, blackleg is an endemic disease in both developed and developing countries and severely attacks young animals in many parts of the world, in the current study area also Blackleg disease has been the most important disease of calf. Animal disease morbidity and mortality rates are high in young animals as well as reproductive performance, growth rates, and milk production are low on average and fluctuate markedly depending on environmental conditions. Moreover, inadequate animal nutrition is an important determinant and interacting factor for poor health and productivity [28]. Since calves are in direct competition with humans for milk, growth rates are low, and significantly, morbidity and mortality are associated with management practices. As the report of [29], management



practices aimed at identifying and resolving these very early problems are the single most important and cost-effective way to improve calf health.

As the report of [30] most calf deaths were attributed to infectious diseases such as scour, septicemia, and pneumonia, however, noninfectious problems cause most of the losses in the first losses in the first 2 to 3 days, and these problems greatly increase the risk of later infectious disease if they do not kill the calf right away. Colostrum is milk produced by the dam during the first 1 – 3 days after calving. Feeding colostrum is very important for calf health, because as the report of [31] colostrums contains antibodies that are absorbed from the intestine into the calf's bloodstream and search for and destroy viruses, bacteria, and some parasites [32] in Ethiopia also reported that keeping of calf with its mother for the first three to four days so that it will be able to suckle colostrums as much as it likes and every farmer should know about colostrum feeding if she/he wants to rear a good healthy calf.

In the study area, good management regarding both feeding (concentrate & roughage) and housing of calf is not much practiced. As the report of [32] in Ethiopia on calf and heifer rearing manual, since concentrate is readily not available for smallholder farmers of Ethiopia feeding of concentrate to calves is not practiced at all. Therefore, it has to be recommended to offer milk feeding until the age of 3 to 4 months. But, in the study area as the result of the survey described most farmers are feeding milk to their calves' inappropriately. In general in addition to milk feeding good quality roughages or hay and concentrate supplementations are very important for the calf, however in the current study area not practiced, accordingly.

On the report of [33] in the USA calves should be kept in separate pens that are disinfected and provide clean, dry, and draft free, shade and shelter [32] also reported that the calf and the dam should be kept in a warm and clean place he also added good environment is very important, especially for young calves, since during the first three weeks calves are unable to adapt to sudden changes in temperature because the change in temperature may lower their resistance to diseases. On the contrary, as the observational assessments result of the study revealed the majority of farmers in the area were grouped under poor housing management practices meaning there is no separate house, high dung accumulation, and poor ventilation.

Conclusion and recommendations

Since no control of animal movements many infectious diseases are transmitted easily. Diseases and parasites are among the major factors that limit the benefits expected from livestock as a result of mortality and morbidity in the study area. There are no well-organized vaccination and treatment systems for the control of infectious, non-infectious diseases and parasitic diseases. To consider the economics of animal diseases and disease control in the study area the problems related to service delivery of the area should be well understood. In this study generally, calf management problems are typically observed like housing and feeding. The study indicates there is a high economic loss in live animal mortality

particularly replacement stock like calf. Therefore, studying the prevalence, incidence, mortality and identifying the causative agent of economically important animal diseases, and designing strategic preventive and control measures through farmers' training, periodic vaccination, regular deworming, and strengthening veterinary extension with the participation of all stakeholders is necessary. As well as improvement of calf management practice through awareness creation is valuable.

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