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Calf health and management practices in small holder dairy farms in and around Wolaita Sodo town, Ethiopia.

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Abstract

A questionnaire, observational (by farm visit) and clinical surveys were conducted to assess management, constraint and major health problems associated with calves found in smallholder dairy farms in and around Wolyita Sodo, Southern Ethiopia. Considerable proportions (47.15%) of the farmers were female. 54.4% and 32.8% of the dairy farm owners had more than ten and five years of dairy farming experience respectively. More over in 90% of the cases calving location was found to be in the same barn where other animals are kept, on top of this the housesit were poorly constructed in many instances. The majority (77.1%) of the farmers already knew the importance of colostrum feeding, however 15.7% of the owners do not know the appropriate time to feed colostrum to their calves. The majority (75.7%) of the farmers reported providing of supplement feeds for their calves. The following calf health problems were reported by the dairy farm owners when they were asked to list the major disease type they had observed before: still birth, respiratory problem (pneumonia), diarrhoea, loss of weight and constipation, with report proportions of 18.6, 17.1%, 11.4%, 10%, 8.6% respectively. Up on clinical examination, out of the 141 calves examined 44 (31.21%) of them showed clinical sign (health problem), with an overall morbidity (prevalence) of 13. 48%, 12.17%, 9.22% and 0.7% for pneumonia, diarrhoea , eye infection and abdominal distension respectively, in addition 17.02 % of the examined calves showed a poor body condition. In conclusion, the management and health problems found in calves in this study were could affect the productivity of the dairy farms, therefore effort should be initiated to improve the calves health.

Keywords: Calf, Health problem, Management, Smallholder dairy farms.

Introduction

In Ethiopia, market oriented smallholder dairy farms(MOSH) is an important and emerging business. The system is characterized by the use crossbreed dairy cows, stall feeding proximity to urban centres (Azage *et al*., 2000). The sector is contributing immensely towards filling in the large demand-supply gap for milk and milk products in urban centers, where consumption of milk and milk products is remarkably high (Azage and Alemu 1998). The urban and peri-urban dairy production system has tremendous potential for development and could play a significant role in minimizing the acute shortage of dairy products in urban centers of Ethiopia.

The major constraints for the development of peri-urban dairying and the development of livestock industry in general have been summarized as policy, socioeconomic, institutional, technical and technological (Tegegne and Gebrewold, 1998). Animal diseases and management problems are among the technical and technological constraints for the peri-urban and urban dairy production systems (Tegegne and Gebrewold, 1998; Belihu, 2002).

Among the important health problems identified by different researchers' reproductive inefficiency, young mortality and some cattle diseases like mastitis, lameness, pneumonia, calf scour and ketosis are the major health problems in intensive dairy production

(ILCA, 1994, Wudu et al., 2008). In developed countries, an increase of 10-40% for mastitis, 10-20 % for calf mortality and 5-15% for lameness was observed to be associated with intensification of dairy production (ILCA, 1994).

Similarly, a three-fold increase in mastitis, calf mortality and lameness was observed from less intensive to more intensive groups in dairy production systems of Addis Ababa milk shed (ILRI, 1996). Within the dairy production system rearing calf is a key component, this because, the successful raising of healthy calves that grow optimally and attain either reproductive life or market weight age is vital to the sustenance of the dairy or beef herds . High calf mortality can severely affect the pool of available replacement heifers especially in the dairy enterprises . The most significant loss in the dairy or beef enterprises is associated with calf mortality (Radostitis, 1994). Various studies have been conducted in the past from many parts of the world using both retrospective and prospective data sources to document the major causes of calf mortality (Gitau et al. 1994: Gitau et al. 1999; Wudu et al. 2008).

The promotion of commercial dairy production around Wolyita Sodo was going on since 1967 (Ninprat, 2006) and attempts were also made to improve dairy production of smallholder farmers in the area through a number of agricultural development projects. Prominent among these are Swedish International Development Agency. In relation to calf management and health problems there is no documented information for the smallholder dairy farms found in and around Wolayita Sodo.

The objective of this study are:-

Initiated to assess the management practices, constraints and major health problems of calves in and around Wolyita Sodo.

Materials and Methods

Study area

Wolyita Sodo town is found part of Sodo wereda in Wolayta zone and located at about 390 kilometres sout hwest to Addis Ababa. The wereda has three different agro-ecological zones; 6.13% highland, 87.7% midland and 8.4% is lowland. The altitude range of the area is 1200 to 2950 m.a.s.l. (top of mount Damota). The area receives total annual rainfall of 1112.3 mm and theannual average maximum temperature of 25.0 ^{0}c and annual average minimum temperature of 14.5^{0}c. The wereda has 94, 746, 17, 405, 4761, and 2, 993 cattle, sheep, goats and equines respectively (CSA, 2001).

Study Population

The sampling units for the clinical examination the study on calf were smallholder dairy calves. All calves from dairy farms in Wilayita Sodo and its surrounding constituted the study population. There were different dairy farms with different herd size.

For questionnaire survey the study population were dairy farmers was sampled from small scale dairy owners found in and around Wolyita Sodo town.

Study Design

Purposive sampling method was employed to select study farms that have got individual dairy calf history or able to recall history of their farm at least the last calving and willing to be part of the study. Finally 70 smallholder dairy farm owners information was considered as dependable and used for the study. So 141 calves found reared under the above mentioned farms were also used for clinical examination.

Questionnaire survey

A cross-sectional survey was carried out across the farms a well structured questionnaire was administered to the 70 dairy farmers by one visit interview. The questionnaire was designed to collect information on farm characteristics, calf management techniques including per parturient care, feeding and housing, and previous history of calf diseases. The sample of questionnaire format is shown in Annex 1, together with this study observational study on management (housing), feeding and calf health were recorded.

Clinical examination of calves

Calves were examined by clinical conditions and were diagnosed based on presenting clinical signs in the actual calf examination work, calves were examined visited only once.

The main activities accomplished during examination were:

- Clinical examination of calves for any health problem. This involved physical examination of calves and taking normal body parameters like body temperature, respiratory rate and pulse rate when abnormality was suspected
- Observation on different calf management aspects like cleanness of the calf house and feeding practices
- Asking the owner or the calf attendants the occurrence of calf health problem incidents during the visits and recording of the history of the calf health problem that would enable the investigation to infer the possible cause and thus assist diagnosis. In addition the age, sex, breeds and body condition of each individual calf was recorded.
- Finally tentative diagnosis was reached based on the clinical finding after thorough examination.

Data analysis

A descriptive account of the state of nature of smallholder production systems was statistically described by means and standard deviations, and frequency distributions of the variables. Where appropriate, epidemiological indices.

Results

Questioners survey results

Household data

Major house and farm characteristics of the respondents are shown in tables 1.

This study revealed house heads age range of the small scale dairy owners was between 27-70 years, with an overall median age of 40.8 years. The 70 smallholder dairy farmers owners involved in the study were having diverse educational statuses (Table, 1) and 47.15% of the smallholder farms were owned by women. The majority of the households (63.9%) had 6-10 persons

Table 1 House Hold Data Chrematistics of Dairy Farm Owners

Parameter	Frequency	Percentage
Age of respondent		
30-45	55	78.57
46-60	12	17.14
≥ 61	3	4.29
Dairy farm owners gender		
Male	37	52.85
Female	33	47.15
Respondents Education		
Elementary	38	54.28
Junior high school	15	21.42
Diploma	11	15.71
University	6	8.59
Number of house hold members		
1-5	5	13.9
6-10	23	63.9
≥ 11	8	22.2
Duration of the farm(years)		
2-5	9	12.8
6-9	23	32.8
≥ 10	38	54.4

The study also revealed that out of the 70 dairy animal owners interviewed 34(48.6%) of them were dependent on dairy farms as their main income together with other incomes such as other business, salary and others. More over 17.1 %(12/70) of them were totally dependent on the income they generate from their dairy farms.

The respondents were asked how they started dairy farm, 51.4%(36/70) witnessed that they bought the animals by their own money, where as 15.7%(11/70) them had taken loan either from a bank or friends to establish their dairy farms, and the remaining 8 (11.4%) and 15 (21.4%) of the interviewees responded that they started raring dairy cattle as they got it through inheritance form their parents and other means respectively. It was also revealed that 54.4% and 32.8% of the respondent had more than ten and five years of dairy farming experience respectively.

Calf management practice (housing and feeding)

Assessment of the type of dairy house in the study area revealed that 17.1% of them use no shed or any kind of construction to keep their animals (open), and 57.1 % of them were found to use a shed to keep their animal (Table 2). In relation with calves 78.6% of the owners kept their calves in the same shed as adult animals, more over calving is exercised in the same barn where other animals kept in 90% of the cases (Table 2). Generally the dairy farms were poorly constructed with no concrete floors.

However, farmers indicated a rather high degree (77.1%) of awareness about colostrum in managing newborn calves, 55.7% of owners indicated that feeding of first colostrum was within six hours after birth , but 15.7% of the owners do not know the appropriate time when to the new born should get colostrum. In addition 97.2% of the owners in this survey did not make any care on the navel of new born (Table 2)

Most dairy calves are supplemented with seasonal crop residues and by-products. Some of the major forage species fed to dairy animals were: hay, grassy, by product of 'tella' (atella), concentrate such as oil seed cake (not in the majority of the cases). According to the majority of the owners (75.7%) start providing supplement feeds to their calves when they reach in age group of 3.1- 4.5 months (Table 2). According to the result of this survey the average age at weaning was found to be 4.8±1 months, with minimum of two months and maximum of six months age at weaning.

Table 2. Some variables inspected or measured at the farm or animal level (calves)

Variables	Number of Farms exercising	Percentage
Calf Housing		
Solid	7	10
Only shed	40	57.1
Open	12	17.1
Shed and open	11	15.8
Calving place		
Calving pen	7	10
Same Barn	63	90
Calf keeping place		
Separate calf pen	15	21.4
Live with the other together	55	78.6
Navel care		
Yes	2	2.8
No	68	97.2
Awareness about Importance of colostrum		
Yes	54	77.1
No	16	22.9

First time of colostrum feeding after birth		
In 6hrs	39	55.7
6- 24 hrs	20	28.6
No idea	11	15.7
Time to start other feed (month)		
2-3	13	18.6
3.1- 4.5	53	75.7
> 4.5	4	5.7

Experience on calf health problems

Table summaries some of the major health problems reported by the owners during. The majority of the problems as it was reported by the owners were associated with gastrointestinal abnormalities (58. 6%), followed by still birth (18.7%), inappetance (17.1%) and respiratory problem, such as coughing (15.7%).

52. % (37/70) of the respondents observed calf mortality in their farms, and the total number of calves died in last year in the survey dairy small holder was 82.

Table 3 Some major calf health problems recorded on smallholder dairy farms in and around Wolaita Sodo town.

Health problems	Number of respondents reported the case	Percentage (%)
1.Gastrointestinal disorders	41	58.6
1.1. Abdominal distension	27	38.6
1.2.Constipation	6	8.6
1.3.Diarrhoea	8	11.4
2. Respiratory disorder (Coughing, nasal discharge etc...)	11	17.1
3.External and internal parasites	5	7.1
4. Loss of weight	7	10
5.Still birth	13	18.6
6. Sudden death	6	8.6
7. Un defined health problems	10	14.3
8. Occurrence of mortality		
Yes	37	52.8

Prevalence of Health problems Based on clinical examination

Physical examination was done on 141 calves reared under the 70 dairy farms owners involved in the interview during the study period for any observable clinical signs of abnormality (diseases). The analysis these results indicated that 44 (31.21%) of the examined calves were had at least one health problem (morbidity), and Significant variation ($P < 0.05$, $DF = 2$, $\chi^2 = 9.06$) was observed the overall health problem occurrence among the three categories of body conditions (Table 3).

Table 4 The overall health problem prevalence in different sex, age, body condition and breed of caves examined

Variables	Number examined	Number of calvs showed clinical sign (Prevalence)	χ^2	P-value
Sex				
Female	64	21(32.8)	0.15	0.70
Male	77	23 (29.8)		
Age (month)				
2-3	67	22 (32.8)		
4	33	8 (24.2)	3.87	0.28
5	19	9 (47.4)		
6	22	5 (22.7)		
Body condition				
Good	83	13 (15.7)	9.68	0.008
Medium	34	9(26.5)		
Poor	24	11 (45.8)		
Breed of calves				
Cross breeds	8	4 (50)		
Holstein	75	11 (14.6)	4.96	0.174
Jersey	36	15 (41.6)		
Local	22	7 (31.8)		

The sex, age, breed of the calves examined were not found to influence the health problems observed ($P < 0.05$) (table 4).

The major diseases or conditions recorded in the examined calves were respiratory problem (pneumonia, coughing, nasal discharges) , diarrhoea, poor body conditions in 13.48%, 12.77% and 17.02 % of the calves examined (Table 5).

Table 5 Health problems observed on clinical examination (n = 141)

Health problems/conditions	Number of calves with the problem	Percentage (prevalence)
Diarrhoea	18	12.77
Depression	4	2.84
Abdominal distension	1	0.7
Eye infection	13	9.22
Pneumonia	19	13.48
Body condition		
Good	83	58.8
Medium	34	24.18
Poor	24	17.02

Discussion

Involvement of women in dairy farming (owners) in the study area was found to be very high (47.15%), when compared to the previous reports of 38% and 11% women ownership of small dairy farms of Debreziet and Jimma by Mekonnen *et al*, 2006 and Cherenet (2009) respectively. This indicates that smallholder dairy farming provides self-employment to women and, therefore, contributes to the alleviation of poverty in this particular group. A reason for this could be the results of women supportive by current local government and previous nongovernmental organizations (NGOs) which have increased support to rural women in agriculture since the 1967s (the Wolaita Agricultural Development Unit (WADU).

The majority (54.4%) of the dairy farm owners in the present study have started, this condition could again be associated with the above mentioned facts.

The study also revealed that out of the 70 dairy animal owners interviewed 34(48.6%) of them were dependent on dairy farms as their main income, this indicates that smallholder dairy is becoming an attractive business in a growing towns like Wolyita Sodo.

Animal sheds are in general poorly constructed. Moreover, most owners paid little attention to the importance of having properly constructed calf sheds; in addition the majority of the calves were kept with other adult animals. Thus, these situations cloud put calves easily prone to pneumonia, diarrhoea, parasitic diseases, mortality, kicking and trampling by mature animals as it is reported elsewhere (Kivaria *et al.*, 2006; Mekonnen *et al.*,2006; Wudu *et al.*, 2008).

The survey revealed that the majority (77.1%) of the farmers do have awareness about colostrum, but 15% of the dairy owners do don't know about the right time to feed to calves. In this study 55.7% of the owners practiced feeding of colostrum to the new born with 1-6hrs after birth. This was considered by different researchers as a good practice of ensuring enough milk to the calves in the early days to keep the animals health and protect liability to some neonatal diseases and mortality.(Besser et al, 1991; Gay *et al.*, 1988). Contrary to the above groups of owners, more than 28% of the interviewed dairy farm owners were allowing the new born calves to suckle either after 6 hr or don't know the right time to feed colostrum to their calves. In relation with the delayed first colostrum feeding (later than 6 hours of age) , some authors reported a higher risk of mortality in weaned calves (Matte et al. 1982; Bath et al. 1985 le Rousie et al. 2000; Wudu *et al*, 2008).

The average weaing age (4.8 month) observed in the current study higher than the reports of Wudu et al, 2008 in Ethiopia and comparable with similar small scale dairy surveys done in Tanzania (Jelly et al, 2010) and Zimbabwe (Kaziboni et al, 2004) , these authors recorded weaning ages of 3-8 and 4-6 months. Radostits (2001) suggested that calves should be weaned only when they are capable of thriving on a non milk feed.

The main health problems observed during the clinical examination and according to the farm owners preconceptions were gastrointestinal abnormalities (in 58. 6% of the examined calves) more importantly abdominal distension, diarrhoea (11.4% up on clinical; examination), and constipation. This agrees with the findings Wudu et al. (2008) and Lema et al. (2001) from the central part of Ethiopia of Gitau et al. (1994. Calf diarrhoea is a common, complex and multi-factorial disease that is affected by the intrinsic characteristics of the calf, its nutritional and immunological status, the management of the herd, the environment, and various infectious agents (Bendali and others 1999a).

Respiratory system infection was reported by 17.1% of the respondents and it prevalence among the examined calves (n=141) was 13.48%. These findings are in agreement with reports of Lemma *et al*. (2001) and Hussein (1998) in Ethiopia and many other studies elsewhere, which reported pneumonia as the second important disease complexes that affect calf health (Olsson *et al*., 1993; Debanth *et al*., 1995; Sivula *et al*., 1996; Wudu et al, 2008).

The other health problem reported by the dairy owners was still birth (premature birth), where 18.6% of them witnessed observing the case in their farm in the last two years before this study was undertaken. Such kind of problem was not reported in pervious similar studies in Ethiopia. Factor(s) involved were not inquired but a further detailed study is needed in the area. However the finding was in agreement with a similar questionnaire survey done in Turkey by Erdogan et al (2009), who reported premature birth of up to 20% in some dairy farms of Kar district. In addition studies under improved farming system in the developed countries suggested that abortion, still birth and congenital defects account for approximately 2% to3 % of calf mortality and include the common causes of such problems could be brucellosis, leptospirosis, intrapartum hypoxia, inherited and non inherited congenital defects (Judson and Radostits, 2001).

A variety of host related risk factors were tested for their association(table) with overall presence or absence of at least one health problem (morbidity) among the 141 examined calves that were found in smallholder farms of Wolayita Sodo. Body condition was the important calf (host) factor found to affect morbidity. It was the only risk factor significantly associated with risk of morbidity ($x^2 = 9.68$, DF = 2, P =0.008). The risk of morbidity was found to be high in calves with poor body condition.

Age, breed, sex of the examined animals were found to have no influence in the prevalence of morbidity in the current study. However other similar studies done in the country and elsewhere found a different results, for example: Wudu et al (2008), reported that younger calves under three months of age were at higher risk of morbidity and mortality as compared to older calves. Olsson *et al.* (1993) reported that 65% and 75% of morbidity and mortality in three months of life occurred in the first month of age. Waltner-Toews *et al*. (1986a) also found that 60% of all deaths occurred in the first months of life over a period of four months. Virtala *et al. (*1996b) in their three months study showed the peak occurrence of crude mortality and diarrhea at the second week of life, which decreased sharply thereafter.

Conclusion and Recommendation

The results of the questionnaire and observation of the dairy farms showed that calf management problems such as poor housing, keeping calves with adult, absence of calving pen were prevalent, further more even if there owners do have a high awareness about the importance of colostrum, some of the owners were found to have little knowledge about the right time to feed colostrum to their calves. Providing supplement feed other than milk was well practiced.

The present study also depicted that one third of the calves were affected by at least with one disease condition. Calf gastrointestinal problems, particularly diarrhoea, Pneumonia, still birth were the most predominant health problems identified by the questionnaire survey and clinical examination of calves. The host factors such as sex, breed, and age were found to have no influence on the prevalence of the health problems in the study period.

Based on the above conclusion remarks the following points are important to be considered for the future improvement of calve health in the study area.

- Advice to the dairy owners should give emphasis to the time of colostrum feeding , proper timing, management of calves (hygiene of barn)
- Maintain proper housing and feeding for calves to reduce diseases
- It is important to identify the causative agents (infectious, non-infectious , nutritional or genetic) involved in the major health problems identified in this study

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