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Major Management and Health Problems of Calves in Smallholder Dairy Farms in Selected Areas of Dugda Bora, Arsi Negelle, Shashemene and Kofelle Woredas

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Abstract

A longitudinal study on calf management and health problems was conducted in 97 small holder Dairy farms found in Dugda Bora, Arsi Negelle, Shashemene and Kofele districts of Oromia region, Ethiopia, from November 2010 to April 2011. A total of 97 calves (84 local and 13 cross breed) were selected randomly and regularly monitored up to six months of age. Information on potential risk factors was collected by personal observation during the regular visit to farms and from questionnaire survey conducted during the study period. Chi-Square statistics and comparison of proportions were used to analyze the data. Out of 97 small holder dairy farms, 88 (90.7%) follow an extensive type of production system. Out of 97 calves surveyed, 59 (60.8%) were female and 38 (39.2%) were male. Calves were housed separately away from adult animals on 75 (77.3%) of the farms. 86 (88.7%) of the farms practiced a residual suckling feeding system. Based on the questionnaire survey, 26 (26.8%) external parasite infection followed by diarrhea 16 (16.5%). Routine clinical examination of calves for any health problem were also carried out indicating calf diarrhea in 18 (18.6%), tick infestation in 16 (16.5%) and mange mite infection 9 (9.3%). Among the risk factors considered for analysis, hygiene is found to be significantly associated with health problems of calves replied by the farmers (χ^2=25.57.6; P<0.12) and result of routine examination (χ^2= 27.642; P<0.016). Out of the 97 calves surveyed, 33 (34.0%), 55 (56.7%) and 9 (9.3%) have poor, medium and good body condition scores respectively. Out of the 21 risk factor considered, about 9 were found to be significantly associated with body condition score of calves. The calf health and management problems found in this study can be achieved through creation of awareness among farm owner and implementation of improved calf management practices.

Keywords: Calf; Health; Management; Smallholder dairy farms

Introduction

Dairy farms have shown dramatic changes in most developed countries through genetic improvement with subsequent high milk yield [1]. However, the development of this sector is very gradual in countries of sub Saharan Africa. The low level of milk production attributed mainly to low genetic potential of the indigenous breeds, low input and wide spread livestock diseases [2].

In Ethiopia, the dairy farm has not been in a position to satisfy the growing demand for milk and milk products of the nation using indigenous breeds, whose milk yield per cow per lactation is very low [3]. Due to this fact, high grade cows (Island breeds and Friesian) were introduced starting before the Second World War by both individual and religious organizations [4].

The increase in milk production obtained due to importation of improved dairy breeds is often satisfactory. Fitness performance levels (performance under local condition) such as fertility and survival of calves and cows in the herd are, however; hardly acceptable, especially in pure breeds and their high grades [5].

The foundation of successful dairy industry using improved breed is laid on the consistent calf production. The proper care and management of calf crop, particularly for the replacement heifers is very crucial for the dairy enterprise to grow and prosper [6].

Dairy calf rearing is a long term investment (needs approximately 20% of total production costs) in feed, labour and other resources to insure high quality replacements for the lactating herd [7]. Hence, the main objective of dairy calf rearing is to produce replacement heifers [8].

The health and management of replacement animals are important components of total herd profitability [9]. Well grown dairy calves and heifers have important role in the future success of all dairy enterprises [10]. Therefore, replacement animals should get proper management if they are to be ready for breeding at the right time [11].

Even though dairy production system provides food and income for rural small holder dairy farmers, many farmers experience suboptimal production. The reasons for this are multifactorial; among them are poor livestock management and disease. Major diseases in dairy calves have a multifactorial etiology, resulting from interaction between the calf, infectious agents, management and environmental factors [12].

Several factors affect the health and vigor of the calves immediately after birth [13]. Proper nutrition is fundamental for calf growth and for the general profitability of calf rearing enterprise. In young stock, a good nutritional strategy optimizes rumen development and growth while minimizing stress and disease. Livestock housing conditions greatly affects health and productivity [14,15]. Cleanliness of the barn influences calf health, as calves housed in unclean barns are at higher risk of diseases than calves housed in clean barns [15].

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The poor immune system and lack of previous exposure to infection make new born calves susceptible to infectious diseases and poor management [16,17]. They should get colostrum soon (before 2-4 hours) after birth. The impacts of calve diseases could be direct (causing calf deaths) and indirect through increased treatment expenses and decreased life time productivity and survivorship [18].

Other environmental and managemental risk factors known to affect calf health and survival include level of herd production, practice prophylactic antibiotics, weaning age, separation or mixing of the calves [19,20].

In Ethiopia, calves in most small holder dairy farms are not performing well. Most farmers particularly in the present study area do not have enough knowledge on proper calf management and feeding. Apart from that farmers aim to optimize income by selling more milk left calves under fed. These practices are more serious in bull calves, resulting in lack of bulls in small holder farmers. However, adequate studies have not been conducted on calf management and the impact of management on health of calves in small holder farmers. Hence, the objectives of the present study were:

- To determine the major management and health problems of calves in small holder farmers in the study area.
- To assess the level of farmers awareness on good calf management practices.

Materials and Methods

Study area

The study was conducted from November 2010 to April 2011 in Dugda Bora, Arsi Negelle, Shashemene and Kofele Woredas of Oromia Regional State on randomly selected small holder dairy farmers.

Geographically, Dugda Bora (Meki) is located in the East Showa Zone of Oromia Regional State. It has a latitude and longitude of 8°9' 38°49' E /8.15° 38.817°E with an elevation of 760 mm. The area receives the mean annual rainfall of --- mm^3. The average minimum and maximum temperatures of the area are 14°C and 26°C, respectively.

Arsi Negelle is located in the East Showa Zone of Oromia regional State on the pared high way North of Shashemene. The area has a longitude and latitude 7° 21' N 38° 42' E/ 7.35° N 38.7° E and an elevation of 2043 meters above sea level. The area has annual rainfall ranging from 600 mm^3 to 2500 mm^3. Annual temperature ranges from 12°C to 30°C [21].

Shashemene is located in West Arsi Zone, Oromia Regional State about 240 Km South of Addis Ababa lying on the main high way road to Awasa. Geographically, the area is located at 7° 11' 33" N altitude and 38° 35' 33" E longitude. The area has an annual average temperature ranging from 12°C to 28°C. The rainfall ranges from 1500-2000 mm^3. Agro ecologically, the area is tropical forest.

Kofele is located in the Arsi Zone of the Oromia Regional State. The area has an altitude and longitude of 7° 00' N 38 45 E/7 N 38.75° E. The area lies between 2600 and 2750 meters above sea level. Annual average rainfall is about 1232 mm^3 with a mean monthly rainfall of 102.6 mm^3. The mean monthly minimum and maximum temperatures are about 5.4°C and 19.8°C respectively [21].

Study population and farm selection

The study animals in the current study were calves. In this study, calf is defined as young cattle less than six months of age. All smallholder dairy farms in the study areas containing at least one calf were included in the current study. One calf in each farm was selected by simple random sampling method.

Data collection

Longitudinal study: Calves that are born before the beginning of the study and are under six months of age, and those that are born during the study periods were individually identified. Calf cards were prepared and these cards were used to record pedigree of the calf, events surrounding the birth of the calf, routine management practices provided to the calf and health problems. The calves were visited once every two weeks up to the end of the study periods (up to five months). Emergency visits were also being conducted whenever there are calls from farms due to calf health problems. When calves complete their 6 months of age, they were withdrawn from the follow-up group. During the regular visits, clinical examination of calves for any health problem, observation of different calf management aspects like cleanness of the calf barn and feeding practices, asking calf attendants the occurrence of sickness between visits and recording of the information were the main activities.

Questionnaire: A well-structured questionnaire format was prepared and administered to dairy farm owner. The questionnaire was designed so as to collect information on farm characteristics, calf management techniques including peri parturient care, feeding and housing, and previous history of calf diseases.

Data analysis

Data obtained from field will be organized using Microsoft Office Excel and used to calculate the descriptive statistics. Statistical analyses on the associations between risk factors and outcome variables were done using SPSS version 17. In all the analyses, confidence level was held at 95% and $P \leq 0.05$ was set for significance.

Results

Farm conditions

Out 97 small holder dairy farms, 88 (90.7%) follow an extensive type of production system. The number of cows on the farms was greater than or equal to four in 38 (39.2%) of the farm. The average milk yield per cow per day as reported by the farmer was less than 4 litter in 85 (87.6%) of the farms. 51 (52.6%) of the owners are illiterate and 56 (57.7%) are males while 41 (42.3%) are females (Table 1).

Calf management and health problems

As depicted in Table 2, out of 97 calves surveyed, 59 (60.8%) were female and 38 (39.2%) were male. Caves were housed separately away from adult animals on 75 (77.3%) of the farms. The milk feeding regimen on the farm varies between bucket and residual sucking of the dam. 86 (88.7%) practiced a residual suckling feeding system (Table 2). All farmers fed their calves twice daily. Most farmers provided their calves with poor quality food mainly natural grass and dray crop residues.

Based on the questionnaire survey, 26 (26.8%) external parasite infection followed by diarrhea 16 (16.5%) (Table 3). Routine clinical examination of calves for any health problem were also carried out indicating calf diarrhea in 18 (18.6%), tick infestation in 16 (16.5%) and mange mite infection 9 (9.3%) (Table 4).

Association of risk factors with health problems of calves

Among the risk factors considered for analysis, hygiene is found to be significantly associated with health problems of calves replied

Variable	Category	Dugda Bora (*n*=15)	Arsi Negelle (*n*=48)	Shashemene (*n*=17)	Kofele (*n*=17)	Total number	Percent (%)
Education background	Illiterate Literate	10 5	25 23	8 9	8 9	51 46	52.6 47.4
Gender	Male Female	4 11	31 17	11 6	10 7	56 41	57.7 42.3
Production Type	Intensive Extensive	1 14	1 47	2 15	5 12	9 88	9.3 90.7
Number of cows	<4 cows ≥ 4 cows	9 6	28 20	13 4	9 8	59 38	60.8 39.2
Milk yield per day	<4 liter ≥ 4 liter	13 2	45 3	14 3	13 4	85 12	87.6 12.4

Table 1: Educational level, gender and production type of the small holder farmer and number of cows found on the farm.

Factor	Category	Number (*n*)	Percent (%)
Sex	Male Female	38 59	39.2 60.8
Age of the calve	≤ month ≥ month-3 mth >3 mth-6 mth	26 33 38	26.8 34.0 39.2
Barn type	Same barn with cows individual pen	22 75	22.7 77.3
Amount of milk fed daily	<4 liter ≥ 4 liter	88 9	90.7 9.3
Method of milk feeding	Calf sucking hand feeding	86 11	88.7 11.3
Weaning age	≤ 3 month >3 month	4 93	4.1 95.9
Provision of additional feed	Yes No	63 34	64.9 35.1
Age at 1st colostrum feeding	≤ 6 hr >6 hr	92 5	94.8 5.2
Knowledge on the importance of colostrum	Yes No	52 45	53.6 46.4
Knowledge on the optimum age to feed colostrum	Yes No	49 48	50.5 49.5
Housing	Very good Good Poor	7 73 17	7.2 75.5 17.5
Hygiene	Very good Good Poor	12 68 17	12.4 70.1 17.5

Table 2: Management factors in 96 small holder dairy farms given in a questionnaire survey.

Health problem	Dugda Bora (*n*=15)	Arsi Negelle (*n*=48)	Shashemene (*n*=17)	Kofele (*n*=17)	Total number (*n*)	Percent (%)
Calf diarrhea	4	6	5	1	16	16.4
Respiratory Problem	1	3	1	0	5	5.2
External parasite infection	3	16	2	5	26	26.8
Babesiosis	0	0	1	1	2	2.1
LSD	0	1	0	0	1	1.0
Navel ill	0	2	1	0	3	3.1

Table 3: Health problems (disease conditions) replied by 96 small holder dairy farmers during questionnaire survey.

by the farmers (χ^2=25.57.6; P<0.12) and result of routine examination (χ^2=27.642; P<0.016).

Association of risk factors with body condition score of calves

As can be seen from Table 5, out of the 97 calves surveyed, 33 (34.0%), 55 (56.7%) and 9 (9.3%) have poor, medium and good body condition scores respectively. Of the 22 risk factors considered, only 9 (educational background, production type, time of first colostrum feeding, provision of additional feed, amount of milk fed daily, barn type, knowledge about the importance of colostrum, knowledge on the optimum age to feed colostrum and hygiene were found to be significant associated with the body condition score of the calve (Table 6).

Discussion

A total of 97 smallholder dairy farms were included in the present study. One calf from each farm was selected by simple random sampling methods. Each calf was visited regularly. From these farms, about 88 (90.7%) followed extensive production system. Out of 97 smallholder dairy farms, 59 (60.8%) contained less than four cows. The average milk yield per cow per day as reported by the farmer was less than 4 litter in 85 (87.6%) of the farms. This is in comparable with the estimation reported by Hussen et al. [22] who estimated the average cow milk yield per head/day in Ethiopia at 1.24 ± 0.01. More than half 51 (52.6%) of the owners included in the present study were illiterate.

Health problem	Dugda Bora (*n*=15)	Arsi Negelle (*n*=48)	Shashemene (*n*=17)	Kofele (*n*=17)	Total number (*n*)	Percent (%)
Calf diarrhea	4	7	6	1	18	18.6;
Pneumonia	1	0	1	3	5	5.2
Tick infestation	3	9	2	2	16	16.5
Mange mite infection	1	6	2	0	9	9.3
Babesiosis	0	0	0	1	1	1.0
LSD	1	4	0	0	5	5.2
Navel ill	0	1	0	0	1	1.0

Table 4: Health problem (disease conditions) routinely examined in calves.

Variable	Category	Dugda Bora (*n*= 15)	Arsi Negelle (*n*=48)	Shashemene (*n*=17)	Kofele (*n*=17)	Total number	Percent (%)
BCS	**Good**	**2**	**1**	**1**	**5**	**9**	**9.3**
	Medium	**7**	**26**	**10**	**12**	**55**	**56.7**
	Poor	**6**	**21**	**6**	**0**	**33**	**34.0**

Table 5: Body condition scores (BCS) of calves.

Risk factors	χ^2	P-Value
Education back ground	17.062	0.000
Production type	74.776	0.000
First colostrum feeding	10.224	0.006
Provision of additional	9.201	0.010
Amount of milk fed daily	55.624	0.000
Barn type	12.051	0.002
Knowledge about the importance of colostrum's	26.459	0.000
Knowledge on the optimum age to feed colostrum	30.940	0.000
Hygiene	36.583	0.000

Table 6: Association body condition score of the calves with the recorded variables.

Out of the 97 randomly selected calves, 87 (87.7%) were delivered without assistant. This finding agrees with the reported of Odoch [23] who reported non-assisted delivery of 82%. From the studied 97 calves, 92 (94.8%) ingested colostrum before six hours of birth. To provide an initial immune protection against infectious diseases, colostrum must be fed to calves before 6 hours after birth in sufficient quantity [24,25]. This might be the reason that majority of the calves did not show any signs of disease conditions like navel ill (99%), pneumonia (94.8%) and diarrhea (81.4%) which are closely associated with colostrum ingestion. Delay in colostrum intake latter than 6 hours after birth results in the occurrence of calf health problem. Olsson et al. [20] reported that each hour of delay in colostrum ingestion increase the chance of a calf becoming ill by 10%.

Residual calf suckling was practiced by most farmers 86 (88.7%), where by one hind quarter is left unmilked or partially milked for the calf to suck, milking was performed twice daily, morning and evening and the calf was allowed to suck for 20-30 minutes. The amount of milk available to the calf was, therefore, determined by the quantity of milk remaining after milking. About 88 (90.7%) of the calves included in the study obtained less than four liters of milk daily. Many farmers rely on the sale of milk to provide income and consumption, and calves could, therefore, be easily starved since residual milk may be in adequate to meet the requirements of the calves. The impact of this is shown by the poor body condition of 33 (34.0%), calves, however, residual calf suckling have the advantage of reducing contamination, the feeding of cold milk to the calf and incidence of mastitis in the dam [26].

In the present study, 22 (22.7%) of the calves were kept in free stalls (same barn cows). Free stalls provide an opportunity for the farmer to feed, clean, and monitor the calves. However, another study revealed that calves raised in free stalls had a higher incidence of diseases than those raised in tie stalls (individual pen) [27]. This may be a reason for the occurrence of diarrhea and external parasitic infestation in the study animals. Calf diarrhea was reported by the farmers as the most common disease conditions in the calves. This is in agreement with other reports [15,28].

From the study it was found that hygiene (cleanness of the calf house) was significantly associated with the health of the calves. The higher risk of morbidity was associated with the dirtiness of calf house. This finding is in agreement with the results of Shiferaw et al. [29] who reported the effect of the micro environment of calves in the occurrence of calf mortality and morbidity in Holleta Ethiopia. Bendali et al. [30] also reported that unclean calf house associated with high risk of calf scour. Farmers frequently disposed of dung and waste materials in the vicinity of the animal housing which often resulted in unhygienic calf-rearing conditions. The housing hygiene affects calf health, especially for the calves with low immune status [15,31]. The present study showed that an increased emphasis should be placed on this issue by advisory personnel.

Conclusions and Recommendations

The health and management of replacement animals are important components of total herd profitability. The calf health and management problems found in this study were economically tolerable and that can be achieved through good management practice. Given the fact that the study farms raise their own replacement stock and have small herd size, those management and health problems will be great hindrance to improved productivity through selection.

Based on the above conclusion the following recommendations are forwarded:

- Special emphasis should be given to the hygiene of the calf house
- Implementation of improved calf management practice is greatly suggested to reduce the high level of calf disease problems.
- Creation of awareness among farm owner on the major causes of calf health problems and their respective preventive measures could be of great importance to maximize productivity and farm income.

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