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Major Health Challenges of Dairy Cattle in Hawassa Town SNNPRS, Ethiopia

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Abstract

The aim of this study was to assess major health challenges of dairy cattle in Hawassa town, Ethiopia, which occurred on November 2014 up to April 2015. A single visit-multiple subject formal survey technique was used to collect data from 20 dairy farming which were selected at random and were interviewed using pre-tested, structured questionnaire which indicated that over all prevalence in this study was 33.6% (n=269) cattle were found affected by either one or more of health challenges. It appeared from the study that LSD (30.1%), mastitis (20.4%), hypocalcaemia (17.5%), repeated breeding (13%), RFM (10%) and parturient paresis (6.7%) were identified as the most frequently occurring diseases. Results of the major dairy cattle disease in the study area ranked LSD as number one disease occurred in different dairy farms, followed by mastitis (20.4%) and hypocalcaemia (17.5%). The degree of association of risk factors was assessed and parity, age, farm scale, and management system found to be directly associated. As the result shows age with dystocia directly associated and have good significances with the x^2=12.479 and p-value =0.002, and LSD associated with farm scale but not significant, with the x^2=4.705 and (p>0.05) and also abortion associated with management system but have no significance (p>0.05). This particular study indicated major health challenges which included hypocalcaemia, ketosis, abortion, RFM, parturient paresis, repeated breeding, diarrhea, bloat, and anestrous, uterine prolapsed, vaginal prolapsed, dystocia and LSD were one of the major reproductive and metabolic disorders responsible for the low reproductive performance of dairy cows.

Keywords: Age; Breed; Cattle; Dairy farm; Hawassa; Health

Abbreviations: DVM: Doctor of Veterinary Medicine; P-Value: Expected Prevalence; RFM: Retained Fetal Membrane; SPSS: Stastical Package for Social Science; LSD: Lumpy Skin Disease; χ^2: Chi-square test.

Introduction

Ethiopia has the largest livestock population being the first in Africa countries and the 10th in the world and holds large potential for dairy development due to its large livestock population and Urban and peri-urban livestock production constitutes an important sub-sector of the agricultural production system [1]. In Ethiopia, livestock represents a major national resource and form an integral part of the agricultural production system [2]. The livestock sector in general and the dairy industry in particular do not provide the expected contribution to the national income despite their large numbers due to several factors. The development of the dairy sector in the country is hindered by a number of technical, institutional and socio-economic constraints. The growth in milk production has been slow and the annual milk production is estimated to be 1,089,488,251 liters [3] which doesn't meet even the domestic demand for dairy products. As a result the country imports large volumes of dairy products per annum to meet the domestic demand. In 2005, for instance, the country imported 457,260 kg of milk (liquid and powder) which is equivalent to 3,026,724 Birr [3].

Despite the huge number of cattle and their dairy industry the productivity is low due to the constraints of disease, scarcity of feed, inefficient and insufficient AI, veterinary services nutrition, poor management, lack of marketing facilities and opportunity, inadequate animal health services, uncoordinated development programs between various levels of government institutions and /or non-government organizations and poor performance of indigenous breeds. These constraints result in health challenges of dairy cattle [4].

Major health challenges of dairy cattle were consists of ketosis, hypocalcaemia, metritis, retained fetal membranes, LSD, bloating, mastitis and uterine prolapsed. All of these diseases are related to one another, with complicated cause and effect mechanisms in place. Numerous studies [5-10] had shown that postpartum diseases can affect the length of calving interval, the number of days open, and the reproductive efficiency in general. These diseases can also affect the overall productivity of dairy cows by reducing milk yield. Studies conducted so far in Ethiopia [11-15] revealed poor reproductive performance of dairy cows in the tropics. For feasible intervention, the poor reproductive performance of dairy cows should warrant investigation on the types and magnitudes of the existing postpartum problems. These constraints also result in poor reproductive performance of dairy cattle. Among the major problems that have a direct impact on reproductive performance of dairy cows are: abortion, retention of the fetal membrane (RFM) and metritis. These results in considerable economic losses to the dairy industry due to slower uterine involution, reduced reproductive rate, prolonged inter conception and calving interval, cost of medication, drop in milk production, reduced calf drop, and early depreciation of potentially useful cows [16,17].

Although, the major health problems are greatly responsible for high economic loss in the dairy industry, there is scarcity of reliable information regarding the reproductive performances of dairy cows in subsistence dairy farms in the tropics, particularly in Ethiopia. Information pertaining to reproductive performance and interacting factors is of paramount importance primarily to the livestock owners and also to the extension agents, veterinarians and researchers. Moreover, it

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can assist in the development of strategies and prioritization of possible intervention options for performance improvement [18]. Dairy cattle require minerals in their diet for optimal productivity. These are derived from the feed and fodder. The input of minerals through feed and water must balance their output through faces, urine and milk to maintain the animal's health. If the output exceeds input, the animals meet out their normal requirements by mobilization from its body reserves for a shorter period. But continuous imbalances develop into productivity related problems.

Nutritional imbalances, deficiencies, or erratic management of feeding programs for dairy cows can create large numbers and various types of health problems generally categorized as metabolic diseases. Most periparturient abnormalities have some metabolic element as a component of the cause of clinical disease. The metabolic disturbance of milk fever can be measured through low serum calcium concentrations. Negative energy balance, fat mobilization and subsequent elevations in ketone body concentrations play a contributing role in the expression of fatty liver syndrome, clinical ketosis, and abomasal displacement. A negative energy balance may also increase the risk of retained placenta, metritis, and mastitis through impaired immune function.

Therefore, the objectives of present study were;

- To identify major health challenges of dairy cattle found in different dairy farms.
- To assess risk factors that cause to occurrence of health challenges in dairy cow.

Materials and Methods

Description of the study area

The cross sectional study was conducted from November, 2014 up to April, 2015, in Hawassa, capital city of the Southern Nations Nationalities and Peoples Regional State (SNNPRS), which is one of the high potential areas for milk production in Southern Ethiopia. It is located 275 km south of Addis Ababa along the Addis Ababa - Moyale highway. Hawassa is situated at an altitude of 1750 m above sea level and according to an estimate, it lies between 6°83' to 7°17' N and 38°24' to 38°72' E. Hawassa receives an average annual rainfall of 955 mm with mean annual temperature of 20°C [3] (Figure 1).

Study design and method of sampling

The cross-sectional study design was needed to determine the prevalence of hypocalcaemia, parturient paresis, ketosis, bloat, mastitis, uterine prolapsed, vaginal prolapsed, dystocia, abortion, anestrous, diahorrea, payometra, retained fetal membrane, LSD and its risk factors that predisposes to this major health challenges. The study was a questionnaire data collection and analysis to establish the prevalence and to identify the major health challenges in the selected

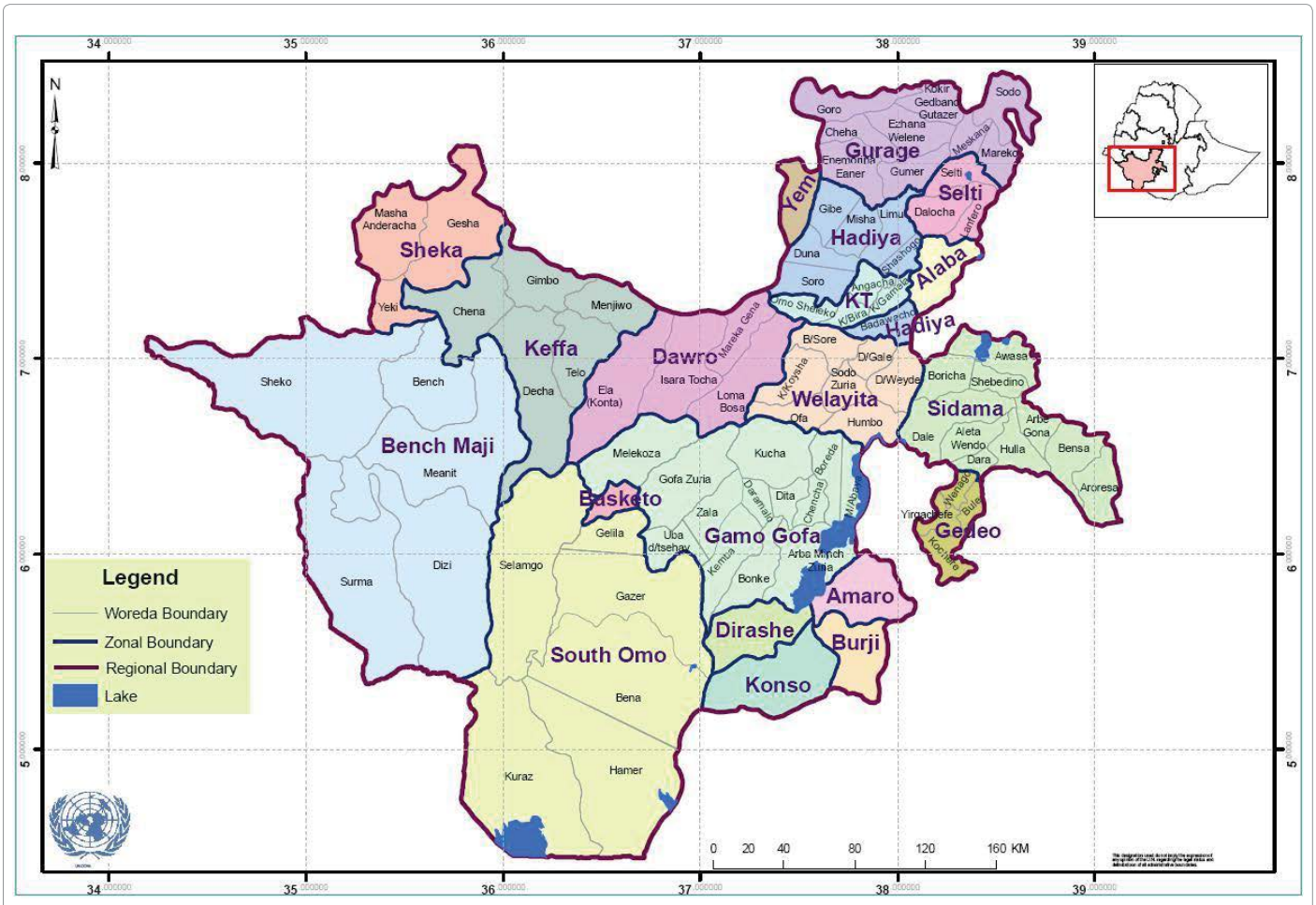

Figure 1: The regional map of SNNPRS.

farms. Farms purposively selected based their accessibility number of dairy populations in the area. Animals were selected by using simple random methods.

Study animals

The exotic, local and cross breeds of cows were used in this study. Addition to this extensively managed cross breeds that high grade Holstein Fresian, predominantly Holstein-indigenous zebu cross breeds and indigenous local zebu lactating cows in dairy farms were taken to this study. The history of the animals like age, parity, farm scale, stage of lactation, lactation number, milk yield, body condition, nutritional condition, symptoms observed by the owner, past and present history regarding other illness, and have different production system (extensive, semi-intensive and intensive type of management) were recorded in selected farms in Hawassa town.

Data collection

Questionnaires survey method: Structured questionnaire was prepared and used to collect information from 20 dairy farm owners by regular farm visit interview and recorded lists about major health challenges of their dairy cattle on individual level were studied. The questionnaires were checked for clarity of the questions prior the interview. Prior the interview, respondents were briefed to the objective of the study. Following that, the actual questions and questionnaires were presented. Accordingly, information about the parity, breed, feeding system, production system, and type of feed, health care and major health challenges such as hypocalcaemia, ketosis, abortion, mastitis, parturient paresis, anoestrus, uterine and vaginal prolapse, bloat, repeat breeding and LSD were collected on individual cattle level. From 20 selected dairy farms five farms have well recorded data list was needed to this study. In order to identify dairy farms considered in the current study, an initial list of dairy farms in the city was obtained from Hawassa City Administration Agricultural and Rural Development Office.

Data analysis

The data was presented using the descriptive statistics, the retrospective data results was entered to a Microsoft Excel sheet 2007 and analyzed using a software SPSS® version 20. Different factors include age, breed, productivity, parity, management, farm scale and body condition score that were considered during the study period were analyzed using the Chi-square technique. The possible association of dystocia, abortion, and LSD with age, management, and farm scale respectively was also tested using these techniques. In all chi-square test application, probability of $p<0.05$ was considered statistically significant.

Results

In the cross sectional study of questionnaire LSD, mastitis, hypocalcaemia, and repeated breeding were found to be the major health challenges occur in Hawassa town dairy farm, containing (30.1%), (20.4%), (17.5%) and (13%), respectively. Other health problems observed with lower prevalence include retain fetal membrane (10%), parturient paresis (6.7%), diarrhea (6.3%), dystocia (5.6%), anestrous (5.6%), ketosis (5.2%), abortion (5.2%), bloat (4.5%), payometra (3.7%), uterine prolapse (3.7%) and vaginal prolapse (2.2%) accounting were obtained from study.

From the total of 269 dairy cattle, 129 (47.9%) were managed semi-intensive, 38 (14.1%) were intensively and 102 (37.9%) were extensively and of which 250 (92.9%) were cross breed and the rest 19 (7.1%) were local breed. Most of the animal were adult age group encountered, 222 (82.5%), the rest of them were 23 (8.6%) young and 24 (8.9%) old age group. The parity of the animal is few, moderate, and high, which was in number showed 194 (72.1%), 62 (23.0%) and 13 (4.8%) respectively.

Major health challenges identified in dairy farms

The major health challenges identified were LSD (30.1%), mastitis (20.4%) and hypocalcaemia (17.5%), as summarized on Table 1, bellow. In this study 33.6% (n=269) cattle were found affected by either one or more of health challenges.

Association of risk factors with health challenges of dairy cattle

In this study among risk factors age, farm scale, parity and management system were considered to assess its association with the occurrence of the health challenges as shown on the tables below (Table 2).

Table 3 showed that there is statistically significant ($p<0.05$) variation with regard to age and dystocia. Highest prevalence was found in cattle with age group adult and followed by age group young while the least in cows with age group old. The prevalence rate of LSD at farm scale level is higher in small farm scale (46.1%) than in medium (26.3%) and large (33.3%) farm scale.

As shown on the Tables 4 and 5 above, statistically no significant difference ($P>0.05$) was found in the prevalence of health challenges with respect to management system.

Discussion

In the present study (33.6%) of dairy cattle in the study areas were affected by either one or major health challenges based on questionnaires to the owners. Major health challenges are LSD, mastitis, hypocalcaemia, and repeated breeding were found to be the major health challenges occur in Hawassa town dairy farm, containing (30.1%), (20.4%), (17.5%) and (13%), respectively. Recent survey which assesses the risk factors and financial impacts of LSD in selected districts of North-eastern Ethiopia (Tigray and Afar Regional States) conducted by Birhanu [19] reported a higher herd prevalence of (51%) and (37%) was recorded in Afar and Tigray Region respectively which is higher result from present study (30.1%), this variation might be due to environment, breed of animal and management system. The prevalence rate of mastitis (20.4%) recorded in this study is higher than to the reports done in different dairy farms in Hawassa town (4.9%) by

Challenges	Frequency	Percentage (%)
Hypocalcaemia	47	17.5
Payometra	10	3.7
Parturient paresis	18	6.7
Diahorrea	17	6.3
Ketosis	14	5.2
Bloat	12	4.5
Mastitis	55	20.4
Dystocia	15	5.6
Abortion	14	5.2
RFM	27	10
Uterine prolapsed	10	3.7
Vaginal prolapsed	6	2.2
Anestrous	15	5.6
Repeated breeding	35	13
LSD	81	30.1

Table 1: Frequency and Prevalence rate of major health problems of dairy Cattle in Hawassa town.

Risk factors	No. of cattle	Percentage
Age		
Young (<4 years)	23	8.6
Adult (4-8 years)	222	82.5
Old (>9 years)	24	8.9
Parity		
Few (<3 birth)	194	72.1
Moderate (3-5 birth)	62	23.0
High (>5 birth)	13	4.8
Productivity		
No	1	4
Low	157	58.4
Medium	94	34.9
High	17	6.3
Breed		
Local	19	7.1
Cross	250	92.9
Body condition		
Poor	78	29.0
Medium	138	51.3
Good	53	19.7
Management system		
Extensive	103	38.3
Semi-intensive	128	47.6
Intensive	38	14.1
Farm scale		
Small	26	9.7
Medium	171	63.6
Large	72	26.8

Table 2: Association of risk factors with health challenges of dairy cattle.

Challenge	Age				χ^2	P- value
Dystocia	Young	adult	Old	Total		
-ve	18	213	23	254	12.479	0.002
+ve	5	9	1	15		
Total	23	222	24	269		

Table 3: Association of age group with health challenge.

Challenges	Farm scale				χ^2	P- value
LSD	Small	Medium	Large	Total		
-ve	14	126	48	188	4.705	0.095
+ve	12	45	24	81		
Total	26	171	72	269		

Table 4: Association of farm scale with health challenge.

Challenges	Management system				χ^2	P-value
Abortion	Extensive	Semi-intensive	intensive	Total		
-ve	99	122	34	255	2.615	0.270
+ve	4	6	4	14		
Total	103	128	38	269		

Table 5: Association of management system with health challenge.

Nibret et al. [20]; in and around Mekelle (6.55%) by Wudu [21] and in central high lands of Ethiopia (6.6%) by Mungube et al. [22]. While it was comparable in the reports done in and around Sebeta (16.1%) by Hunderra et al. [23]; in Dire Dawa Administrative Council and Eastern Hararghe Zone (19.8%) by Birhanu [24]; in two major state owned dairy farms at Rapi and Debre Zeit, Ethiopia (21%) by Workineh et al. [25]; but it was lower in the research finding in selected areas of southern Ethiopia (37%) by Kerro and Tareke [26].

The prevalence rate of hypocalcaemia (17.5%) recorded in this study is lower than the result (30.2%) reported by Samuel et al. [27] this difference may be management, type of breed and study population. Most of the literatures suggest that when the incidence of milk fevers increases above (10%) in their third or latter lactation, considerations should be given to a specific control program [28]. Therefore, these results indicated that control methods are required to avoid loss due to milk fever. Milk fever is caused by a severe deficiency of metabolizable calcium ion in the circulation. This could be attributed due to several risk factors [29]. The risk factors identified in this study include milk yield, parity and breed of the cows.

The higher prevalence of repeated breeding (13%) found in the present study is in close agreement with (13%) reported by Micheal [30] in and around Hawassa and (13.08%) by Adane et al. [31] but higher than (11.4%) reported by Hadush et al. [32] from central Ethiopia. Repeated breeding 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 [33]. In addition to these, communal use of bull for natural services also considered as contributing factor. Hence the difference between the findings of the current study and previous reports may be attributed to the above-mentioned factors.

Other health problems observed with lower prevalence include retain fetal membrane (10%), parturient paresis (6.7%), diarrhea (6.3%), dystocia (5.6%), anestrous (5.6%), ketosis (5.2%), abortion (5.2%), bloat (4.5%), payometra (3.7%), uterine prolapse (3.7%) and vaginal prolapse (2.2%) were obtained.

The prevalence rate of RFM (10%) in recent study is similar with the (8.6%) reported by Molalegn and Shiv [34] and lower than (14.2%) reported by Mamo [35] and 19.2% by Gashaw et al. [36]. The variation in the incidence of RFM attributed to variations in predisposing factors to which the animals are subjected to nutritional status and management problems such as lack of exercise. Dystocia that accounted (5.9%) of the problems is an important predisposing factor for occurrence of RFM. Previous report (5.79%) on the prevalence of dystocia by Mamo [35] in small holder dairy cows in and around Debre Zeiet fairly agrees to the prevalence of (5.6%) obtained in this study. However, the current finding is lower than the prevalence of (7.7%) reported by Dawit and Ahmed [37], and higher than those (3.8%) of Gashaw et al. [36]. This variation in the occurrence of dystocia due to the fact that it is influenced by the factors such as, age and parity of the dam as well as breed of the sire. Inseminating cows with semen collected from large sized bulls without taking into account the size and age of cows is an important factor in precipitating dystocia [38].

The prevalence of anestrous observed in this study (5.6%) was lower than the results of Hadush et al. [32], who reported (12.9%) in dairy cattle in Debre Zeit and Befekadu [39], who reported (24%) in cross breed dairy cows in central high lands of Ethiopia. This variation might be due to the age, faulty heat detection, and breed and management system differences.

The prevalence rate of abortion (5.2%) recorded in this study was higher than the result (2.2%) reported by Bekana et al. [34] in Nazret, but is lower than the (9.0%), (13.9%) and (14.6%) reported by Dawite and Ahmed [37], Molalegn and Shiv [34] and Hunduma [40] respectively. The lower prevalence rate of abortion may be attributed to the increasing practice of AI in the study area where the semen is collected from bulls free from brucellosis, in addition breed, management system specially feeding and sanitation. Study methodology and geographical location differences are all sources of differences in prevalence of abortion [36].

The prevalence rate of vaginal prolapse (2.2%) recorded in this study is lower than the result (5.2%) reported by Kidusan [41] but is higher than the (1.2%) reported by Dawite and Ahmed [37]. This

variation might be due to management system (feeding), abortion, RFM, dystocia and breed of animals.

The prevalence rate of ketosis (5.2%) recorded in this study is lower than the result (11.2%) reported by Mulat et al. [42] in and around Addis Ababa. The highest prevalence of ketosis was recorded in the month of January. This indicates that ketosis occurred mostly during the winter season as the animals are usually housed and there is scarce of pasture [43].

There was both reproductive and metabolic problems (49%) and (29.4%) respectively. This result indicates that it is higher value than the prevalence (43.3%) reported by Adane et al. [31] in urban and per urban area of Hossana, (44.3%) by Hadush et al. [32] in central Ethiopia and (40.3%) by Dawite and Ahmed [37] in Northeast Ethiopia. This difference might be due to sample size, production system, study methodology and breed of animals as well as environmental factors.

The higher prevalence rate of health challenges in cross breed animals 92.9% (n=250) than local breed 7.1% (n=19) may be due to the fact that cross breeds are less adapted to tropical conditions of high temperature and humidity, disease and low feed quality than zebu cattle [44-46] making them more susceptible than indigenous zebu. In addition to this the risk factors like age group, parity, management system; farm scale, body condition and productivity are great effect up on major health challenges of dairy cattle.

Conclusion and Recommendation

The result found in the current study was an agreement with the other studies those metabolic and reproductive problems which have adverse effects on the health, production and reproduction indices of the dairy cow. Hypocalcaemia, ketosis, bloat, mastitis, uterine and vaginal prolapse, LSD, abortion, dystocia, RFM, anestrous and diahorrea were major health challenge in the dairy farm. Age, breed, parity, and management systems were the most important predisposing risk factor for the various health challenges. Development of practical management strategies to cope with the negative effects associated with reproductive and health problems on dairy cattle is critical in this study area. Therefore, the following recommendation will be forwarded:

- Providing an adequate amount of a properly formulated and delivered ration,
- Providing a clean, comfortable and minimal-stress environment.
- There should be proper animal management, cleanliness and good hygiene on dairy farms.
- Improving veterinary services with respect to adequate vaccination.
- There should be Routine and periodical examination of cows during postpartum period.
- Screening, sanitation, serious follow up and health care are very important.

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