

Prevalence of Major Reproductive Disorders of Dairy Cows in Hawassa City, Ethiopia

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Abstract: The study was conducted with the objectives of estimating the prevalence of major reproductive disorder of dairy cows and the possible risk factors in urban and periurban dairy farms in Hawassa City from October, 2016 to May, 2017. A total of 398 dairy cows were studied, out of which, 36.7% (n=146) were affected by at least one reproductive health problem. The major reproductive problems found were 9.6% repeat breeding, 6.28% anestrus, 5.02% retention of fetal membrane and more than one type of reproductive disorder was encountered in 4.27% of them. The prevalence of reproductive problems showed significant difference with respect to body condition and management system of dairy cows where major reproductive health problems were observed more frequently in poor body conditioned cows and in extensive production system. Age and breed of the animals were not found to have a significant influence on the occurrence of reproductive problems in the area. This study revealed the presence of major clinical reproductive problems in Hawassa City. Therefore, there is a need for in-depth investigation on the causes of the noted clinical disorders and improvement of management systems including feeding that could be the possible way to reduce the problems encountered in different production systems.

Key words: Dairy • Hawassa • Management • Prevalence • Reproduction Health Problem

INTRODUCTION

Livestock production is an integral component of the agricultural sector and approximately contributes to 45 % of the total agricultural gross domestic product (GDP) and 15-18 % of national GDP [1]. Cattle are one of the important livestock resource on to which much of the livestock keeping community depend on for livelihood, however, the full potential of the resource is untapped for multitude of reasons. Disease, scarcity of feed, poor management and genetic factors are some of the constraints that affect the productive and reproductive performance of cattle [2, 3].

Livestock productivity remains marginal in Ethiopia, despite the large livestock resource in the country, due to various reasons among which is the low genetic potential of indigenous cattle for milk and meat production [4, 5]. Among the constrains mentioned, reproductive disorders

have been found part of the major reasons for decreased reproductive efficiency in cattle and consequently reproductive efficiency is the major determinant of lifetime productivity of cows [6]. Reproductive problems are the main causes of poor productive performance in smallholder dairy farms [7, 8].

In the last few decades, as the major epidemic diseases that have been brought under control emphasis have increasingly shifted to economically important diseases to the dairy producers and reproductive health problem stands out as the most prominent [9-11]. Breeding efficiency depends upon the normal function of the reproductive system. In order to breed regularly, the cow has to have functional ovaries, display estrous behavior, mate, conceive, sustain the embryo through gestation, birth of viable calves and resume estrous cyclicity and restore uterine function after calving. Each of these aspects of reproductive function can be

affected by management, disease and the genetic make-up of the animal. When the function of the reproductive system is impaired, cows fail to produce a calf regularly [2, 3, 12, 13].

Among the major reproductive problems that have direct impact on the reproductive performance of dairy cows are abortion, dystocia, retained fetal membrane, pyometra, prolapse (uterine and vaginal), anestrous and repeat breeder. They are classified as before gestation (anestrous and repeat breeding), during gestation (abortion, vagina prolapse and dystocia) and after gestation (retained fetal membrane and uterine prolapsed). These result in considerable economic loss to the dairy industry due to slower uterine involution, reduced reproductive rate, prolonged inter-conception and calving interval, negative effect on fertility, increased cost of medication, drop in milk production, reduced calf crop and early depreciation of potentially useful cows [3, 14-17].

In Ethiopia, dairy cattle are maintained under different production systems. The difference in production systems and environmental conditions under which cattle are maintained could greatly affect the occurrence of reproductive health problems which result in poor reproductive performance [18-20].

The intensive production system is the predominant in the study area which is followed by semi intensive and small numbers of extensive production system, the data was gathered from Hawassa city administration livestock and fishery resources department. Although there are many small holder and medium size dairy farms in Hawassa City, few studies have been conducted on the major reproductive health problems in dairy animals. Therefore, the objectives of this study were to estimate the prevalence of major reproductive disorder of dairy cows and identify factors that possibly associate with reproductive disorders of cows in urban and peri-urban dairy farms in Hawassa.

MATERIALS AND METHODS

Study Area: The study was conducted in Hawassa city from October 2016 to May 2017. Hawassa city is the capital city of Sidama zone and SNNPR, which is located in the Northern part of SNNPR and 275 Km South of Addis Ababa along the Addis Ababa to Moyale highway. Geographically it is found between 7°3'1.35"N latitude 38°29'43.81"E longitude at an altitude of 1750 meter above sea level. The area annually receives an average of 800-1000 mm rain fall of which 67% falls in long rainy season which extends from June to September. The total

livestock population of Sidama Zone is estimated to constitute 2,131,224 cattle, 1,785,141 poultry, 455,052 sheep, 267,039 goats, 96,114 beehives, 69,941 donkeys, 50,143 horses and 10,008 mules. From this animals of Hawassa comprise 99,284 cattle, 475,776 poultry, 42,190 sheep, 39,943 goats, 639 beehives, 3,000 donkeys and 1,341 horses [21].

Study Design: A retrospective study was employed to identify the major reproductive health problems of cows in the study area. Data were collected from randomly selected dairy farms on individual cow level about the major reproductive health problems. A semi-structured questionnaire was used for interviewing farm owners or attendants to retrieve important animal bio data pertinent to reproductive performance and disorder encountered in its reproductive life time. Farms where these animals found were selected randomly using sampling frame of herds prepared in collaboration with district veterinary department. 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 breed, types of feed and feeding system, production system and major reproductive disorder such as retained fetal membrane, dystocia, abortion, pyometra, anestrous, uterine and vaginal prolapse and repeat breeding were collected on individual cattle level. In order to identify smallholder dairy farms considered in the current study, an initial list of dairy farms in the city was gained from Hawassa City Administration livestock and fishery resources department.

Study Population: The target population for this study was smallholder dairy farms found in Hawassa City. Extensive, semi-intensive and intensive type of production system, age (dairy cows less than 3 years were categorized as young and those greater than 3 years were categorized as old by asking the owners in this study) and other characteristics were recorded in the farms of study area. The exotic, local and cross breeds of cows was also used in this study.

Sample Size and Sampling Technique: Simple random sampling method was employed to select the study animals from dairy farms in the study area. For sample size determination the 95% of level of confidence and absolute precision of the 5% was used. Since the previous prevalence report of 49% on the major health challenges of dairy cattle in Hawassa town was reported by Nigussu

and Terefe [22], the current sample size calculation used the reported prevalence for the sample size determination. Hence using the Formula stated by Thrusfield [23], the calculated sample for the current study was 384; However 398 dairy cows were considered from 42 herds.

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$$n = \frac{1.96^2 P (1-P)}{d^2}$$

where N= total calculated sample size, P= expected prevalence, d= absolute precision

Data Analysis: The data were stored in Microsoft Excel (2010) and descriptive analysis of reproductive disorders were done using STATA version 10.0 for windows (Stata corp. 4905 Lake way drive College station, Texas 77845, USA). The proportion and associated confidence interval were calculated for different factors include age, breed, management system and body condition score. Consequently comparisons were made for presence or absence of prevalence of reproductive disorders in hypothesized covariates respective category.

RESULTS

In this study, a total of 398 cattle were considered from 42 dairy herds. The sampled animals were from the three production systems. The result revealed that 146 (36.7%) of the cows had experienced one or the other type of reproductive abnormality. Accordingly, repeat breeding was encountered in 9.6% of the animals, anestrus (6.28%), retention of fetal membrane (5.02%) and abortion (2.26%) were some of the most frequently reported abnormalities. Moreover, more than one type of reproductive disorder was encountered in 4.27% of them. Details of the study finding are given in Table (1).

In this study, risk factors such as breed, system of production, age and body condition score were assessed and their association with reproductive problems is presented in the Table 2. The present study revealed that there is no significant proportion of reproductive problems with breed, where highest prevalence of reproductive problems was found in local cattle followed by the exotic ones, while the lowest in cross breeds. The prevalence difference pertinent to age of the cow was assessed and the result showed that there was no significant difference. Reproductive problems were

Table 1: The prevalence of specific reproductive disorders reported in the studied farms

Type of reproductive disorder	Frequency	Prevalence
Abortion	9	2.26%
Vaginal prolapse	10	2.5%
Retention of fetal membrane	20	5.02%
Repeat breeding	38	9.6%
Anestrus	25	6.28%
Uterine prolapse	6	1.51%
Pyometra	11	2.76%
Dystocia	10	2.5%
Mixed	17	4.27%
Total	146	36.7%

Table 2: The proportion of reproductive disorders in relation to potential risk factors

Variable	Category	Frequency	Proportion (95% CI)
Breed	Exotic	249	34.5(28.9,40.7)
	Cross	33	30.3(17,48.1)
	Local	116	43.1(34.4,52.3)
Age	Young	186	36.6(29.9,43.8)
	Old	212	36.8(30.5,43.5)
Body condition	Good	258	22.5(17.8,28.0)
	Medium	119	56.3(47.21,64.98)
	Poor	21	100(83.9,100)
Management systems	Intensive	272	34.6(29.1,40.4)
	Semi intensive	105	36.2(27.5,45.9)
	Extensive	21	66.7(44.0,83.6)
Over all		398	36.7

assessed with respect to body condition score of dairy cattle and there was a trend of increment in prevalence of reproductive disorder as the cow body condition is deteriorating. The difference noted between the categories was statistically significant. Besides, the proportion of reproductive problems was observed to increase in cows from extensive management system compared to cattle in semi-intensive and intensive management systems.

DISCUSSION

Out of the total examined cows 36.7% were found to be affected with at least one of the reproductive health problem. The prevalence of major reproductive problems reported in the current study was lower than the values reported by Haile *et al.* [24] who reported a higher percentage of 43.07% in urban and peri-urban areas of Hosanna in Southern Ethiopia, Tesfaye and Shamble [25] who reported a higher percentage of 40.25% in Kombolcha, Northeast Ethiopia and Wagari and Shiferaw [26] who reported a higher percentage of 39.5% at Horro Guduru animal breeding and research Center, Ethiopia. The difference in the results could be related to production systems, sample size, study methodology, breed of animals and environmental conditions that might be appeared in the different study areas.

The current study indicated that repeat breeding, anestrus, retained fetal membrane, were the major reproductive health problems; while, pyometra, dystocia, vaginal prolapse, abortion and uterine prolapse were reported at lower frequency. The prevalence of repeat breeding (9.6%) found in this study fairly agrees with the values reported by Gizaw *et al.* [27], Haftu and Gashaw [28], Sahlu [29] and Hadush *et al.* [30] who reported slightly lower or higher percentages of 8.91, 8.72%, 9.1% and 10.6%, respectively. In comparison our repeat breeder percentage is higher than the reported findings of Bitew and Shiv [31] and Gashaw *et al.* [32] where their prevalence's were 3% and 1.3%. A higher prevalence of repeat breeding was noted in the current study, but it is lower than when compared with the findings of Dinka [33], Esheti and Moges [34] and Micheal [35] who reported prevalence of 26.8%, 15.9% and 13%, respectively. The variation between the values of the current study and previous reports could be due to several factors including climatic condition of the area, sub fertile bulls, reproductive tract infections, communal use of bull for natural service and other managerial factors; however this study could not provide conclusive evidence as it is beyond the scope of the design used.

The prevalence of anestrus found in the current study (6.28%) is higher than the previous reports by Haftu and Gashaw [28] and Bitew and Prased [30] who reported an overall prevalence rate of 2.29% and 1.7%, respectively. Previous reports of the prevalence of anestrus of 10.3% by Benti and Zewdie [20] and 10.26% by Haile *et al.* [24] are higher than the current finding. The difference observed in the prevalence of anestrus could be due to difference in heat detection practice and management system particularly nutritional variation in animals.

The retention of fetal membrane found in this finding is 5.02% which is higher compared with the report of Esheti and Moges [34] having prevalence of 0.8%, but it is lower than Gizaw *et al.* [27] who reported prevalence of 12.91%. The variation in the prevalence of retained fetal membrane may be attributed to the difference in prevalence if infectious causes, nutritional status and management factors. Likewise pyometra was the other important reproductive abnormality noted with 2.76% in this study. These finding is higher than the finding of Simenew *et al.* [36] who reported the prevalence rate of 1.6% at Sululta slaughter house in Ethiopia. The differences could be attributed to microbial infections, management and animal age. Dystocia was the other type of clinical disorder noted to prevail at 2.5%. This finding is lower than previous report by Bitew and Prased [30] who reported an overall prevalence of 6.6%. The insemination of small sized breeds of cows with semen collected from larger sized bulls can be an important cause of dystocia.

Abortion recorded in the present study was (2.26%) which is fairly consistent with the finding of Gizaw *et al.* [27] who reported 2.23% and Haile *et al.* [24] who reported 2.56%. On the other hand, Degefa *et al.* [37] and Dinka [35] reported 8.7% and 14.6% respectively which are higher than the current finding, but compared with the finding of Gashaw *et al.* [32] who reported prevalence rate of 1% the present finding is higher. As the disorder in question is multifactorial in its nature, there is a need for in-depth studies. The other clinical disorders noted in this survey included, uterine and vaginal prolapse. Similar prevalence were reported elsewhere, Melkamu [38] and Ebrahim [39] with 1.9% and 1.28%, respectively.

Body condition was one of the factor from which reproductive disorders were noted to vary significantly. In poor body condition cattle the prevalence was noted to rise followed by medium and good body condition. This finding is in agreement with reports of Haftu and Gashaw [28] and Benti and Zewdie [20]. On the other hand

the current finding contradicts with the report of Gashaw *et al.* [32]. This difference may be due to animals with poor body condition is and it could also be an indication of improper animal management and nutritional imbalances that compromise reproductive performance Benti and Zewdie [20].

Management with the study indicated an increased reproductive problem in animals managed extensively than those managed under semi intensive and intensive management practice. The current finding is in line with the report of Haftu and Gashaw [28]. This could be due to, faulty heat detection, poor nutrition and management in the extensive production system.

CONCLUSION

This study revealed that reproductive health problems particularly of repeat breeder, anestrus and retained fetal membrane, were the major clinical disorders noted. Besides a number of cows were noted to have severed more than one type of disorders. The low reproductive performance of dairy farms in Hawassa could be linked to the causes of these clinical disorders. In line with cows with poor body condition and animals kept in extensive management system needs special attention. Therefore, there is a need for in-depth investigation on the causes of the noted clinical disorders and improvement of management including feeding that could be the possible way to reduce the problems encountered in different production systems.

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