Research Article

Major Reproductive Health Problems of Dairy Cows And Associated Risk Factors Under Small Scale and Medium Scale Dairy Farms in Nekemte Town, Western Ethiopia

Addisu Abdeta and Seifu Hailu*

Ministry of Agriculture, Addis Ababa, Ethiopia

*Corresponding author

Seifu Hailu, Ministry of Agriculture, Addis Ababa, Ethiopia, Tel: +251911263380; Email: seifuhailu77@gmail.com

Abstract

A cross-sectional study was conducted to determine the prevalence of major reproductive health problems and to know associated risk factors in precipitating reproductive health problems and to assess smallholder and medium scale dairy farms in Nekemte town from November 2010-April 2011. Three hundred eighty four (n=384) dairy cows (158 local breeds and 226 crossbreds) were included in the study using questionnaire survey (n=354) and regular clinical examination and personal observation (n=30).About 49.74% (n=191) were found to be affected with one or more of the clinical reproductive health problems. Repeat breeder, abortion, retained fetal membrane were found to be the major reproductive health problems whereas dystocia, stillbirth and an aestrus were assorted problems found to be the minor clinical reproductive problems with prevalence 14.1%, 12.1%, 8.6% and 5.5%, 4.7% and 2.6%, respectively. Age and hygienic condition were found to influence the occurrences (prevalence) of clinical reproductive problems being significantly ($X2$=14.8 & 4.38; P<0.05) higher in age groups above 5 years and poor hygienic conditions. Body condition score, breed, parity and management systems were not found to be significant ($X2$=0.195, 0.003, 0.05 & 0.18, P>0.05) in the occurrences of these problems. Therefore, this particular study revealed that the major clinical reproductive problems in this area included repeat breeder, abortion, retained fetal membrane, dystocia, stillbirth and uterine discharge are the major problems responsible for precipitation of reproductive health problems in dairy cows. In conclusion, the highest prevalence of reproductive disorders and the associated risk factors indicate the importance of management related constraints. In sum, in order to ameliorate the constraints more focused works on health management and hausing aspects of the local and cross breed dairy cows under extensive and semi-intensive management systems in Nekemte town is indispensible. In addition, detailed study is required in order to explain the responsible causes and design optimum control and or prevention strategies.

ABBREVIATIONS

BCS: Body Condition Score; RHPs: Reproductive Health Problems; RFM: Retained Fetal Membranes; NARDO: Nekemte Agricultural and Rural Development Office; KM: Kilometer; KG: Kilogram; CSA: Central Statistical Authority

INTRODUCTION

Ethiopia covers a total land area of 1.2 million Km^2 [1]. Agriculture dominates the economy, accounting for about 80% of the gross domestic product 35% of the export revenue. Over the 80% of the human population is engaged in this economic activity [2]. Ethiopia is known for its huge cattle population. However, the country's per capita milk consumption was estimated to be about 19.2Kg per year [3]. This low per capita milk consumption was mainly emanated from poor genetic potential of local cattle for dairy farms. Selection for high milk production within indigenous cattle would require a long-term genetic improvement program [4].

Feed more than any factor determines the productivity and profitability of dairy cows. Approximately, 25% of the difference in milk production between cows is due to heredity; the remaining 75% was determined by environmental factors, with feed making up the largest portion. Milk production declines linearly with the increasing forage maturity for high producing dairy cows [5].

Managing a dairy enterprise requires a tremendous academic as well as hands-on experience. Sound livestock management should always include some method to monitor continuously the reproductive performance of any herd [1]. In Ethiopia, as parts of the same efforts, the per-urban and urban dairy business have proliferated; the small holder dairy farmers who own the majority of the crossbred cows are now serving as the main suppliers of milk and milk by products to the population [6]. Upon closer examination of the reproductive processes in dairy cattle, the postpartum period is the most vulnerable to problems and that incidentally coincides with the peak of milk production, uterine involution, resumption of the ovarian activity, reception and the greater risk to infection [3].

In female cattle, the causes of infertility are many and bovine brucellosis is most notable, which causes the greatest economic impacts [7]. Brucellosis mainly affects reproduction, infertility, and known responsible for high rate of abortion, reduced survival of the newborn and milk yield, retention of fetal membranes and the development of uterine infections [6].

In developing parts of the world, most of the reported on the constraints of dairy cattle production focused on the work performed in research stations and institutional herds and thus had little bearing to the production conditions of the flourishing smallholder dairy farms. There is a general paucity of information on the reproductive problems and the associated risk factors of dairy cows in the predominant smallholder dairy production conditions [8].

Therefore, this study was conducted with the following objectives:

- to determine the prevalence of reproductive health problems in the dairy cows

- to know the possible risk factors, which play major roles in precipitating such problems in dairy farms

- to assess smallholding and medium scale dairy production system in this study area.

MATERIALS AND METHODS

Study area

The study was conducted in Nekemte smallholder and medium scale dairy farms. Nekemte is located in the western parts of Ethiopia and Oromia having a latitude $9^0 4'$ North and longitude $36^0 30'$ to the East at an altitude of 750-3178 meter above sea level. The area of woreda and the Town is 194,923.2 ha and 3, 192 ha respectively. The town was established in 1865 and 331km far from Addis Ababa. The annual rainfall is 1500-2200 mm with the average of 1850mm and the temperature is $16c^0$ -$31c^0$ with the average of $23.5c^0$. Agro-climate of the Woreda and Town is woinadega, dega and kola accounts for 51.08%, 7.18 % and 41.74% and 46.74%, 0.26% and 53% respectively [9].

The livestock population of the Woreda is 75,985 cattle, 11,995 sheep, 9,158 goats and 4,715 equine and 3,186 poultry and 53,701 honeybee colonies. The farming system of the district like other parts of Ethiopia is mixed farming system and animal production system of the Woreda is mainly extensive management system even though there are intensive management systems. The major crops grow in the area are teff, wheat, barley, sorghum, bean, pea and other cereal and oil crops. The types of vegetations found are natural forest like woodland, high forest, reverie, shrubs and bush land and savanna grassland [9].

Study population

The animals that were examined for this study include only female cattle groups. A local and crossbred of cows were considered under the study. The extensive and semi-intensive management system of dairy cows were determined.

Study design

The cross-sectional type of study was undertaken from November 2010 to April 2011 to achieve the goal. The study constitutes questionnaire survey and regular follow up on the randomly selected dairy cows.

Study methodology

Questionnaire survey: In this questionnaire, smallholder and medium scale dairy cows found in different kebeles were randomly selected; the relative risk factors such as age, parity, breed, body condition score, and hygienic conditions were recorded. Cows confirmed pregnant and calved were investigated and Body Condition Scored (BCS) using a scale 1 to 5 at calving. They were categorized as scale 1 and 2 as poor and scale 3, 4 and 5 as good [6]. In questionnaire, the member of dairy farms owned general management of cattle with particular emphasis on feeding practices and husbandry were included.

Follow up study: Under follow up study, personal observation and clinical investigation of the animals and evaluation of the management conditions of the farms were carried out. Pregnant cows that were expected to give birth within the study period were investigated. After calving, cows were clinically examined. Observations were made on retained fetal membranes, uterine discharges, abortion, still birth, dystocia, anoestrus and repeat breeder. During the study of cows and their respective farms, condition of animals (concerning to body condition score, hygiene, health problems were checked) and hygiene of the farm and management practices in the farm were targeted. This study method was done only for medium scale dairy production system.

Sampling size and sampling method

Three hundred eighty four (n=384) dairy cows from both cross and local breeds, at late pregnancy, parturition and postpartum period were included. The purposive sampling method was employed to select the study farms that keep reproductive history of dairy cows and willing to be part of study. The sample size required for this study was determined depending on the expected prevalence of dairy health problems and the desired absolute precision by the formula given by Thrusfield [10] as follows.

$$N = \frac{1.96^2 (p)(1)}{D^2}$$

$$N = \frac{1.96^2 0.5(1.05)}{0.0025} = 384 \text{ cattle}$$

where, n=sample

P=expected prevalence

D=desired level of precision (5%)

Using 95% confidence interval, 5% precision and 50% expected prevalence the number of cows needed to demonstrate the prevalence of RHPs in Nekemte were 384 dairy cows with different age and hygienic conditions. Both local and crossbred of dairy cows, which were, kept under smallholder and medium scale private owners and farmers were investigated.

Data collection

Dairy farm owners were interviewed using structured

questionnaires and data were collected on individual cow's reproductive status. One hundred fifteen (115) farm owners were interviewed and data on 354 dairy cows were included in this survey. Regular clinical examination or personal observation of pregnant cows during late pregnancy, parturition and postpartum conditions were considered and 30 dairy cows were included in the follow up study. Classification of management systems was done based on the criteria adopted by Mureda and Mekuriaw [3].

Data Management and Analysis

The collected data was sorted and coded before processing. In addition, the data was checked again for completeness and consistency. The prevalence and the relative frequencies of reproductive health problems were determined as the proportion of the affected animals out of the total animals examined and the total number of cases, respectively. During processing, the data was summarized on the data MS (MASTER SHEET) or EXCEL (2003) and SPSS software and Pearson chi-square (X^2) test were used to assess the effect of risk factors such as breed, age, parity number, body condition and of the cows on the prevalence of reproductive health problems. The outcome variables for farm study were the case of dairy farm reproductive diseases detected during clinical investigation. STATA computer software was used for analysis.

RESULTS

One hundred ninety one (191) cows were found to have reproductive health problems in dairy farms included in this study accounting for an overall prevalence of 49.74%. The largest proportion was revealed during questionnaire survey as compared to what was recorded during the short follow up study Table 1.

Of the total cows examined for reproductive health problems, repeated breeder, abortion, retained fetal membrane were major whereas dystocia, still birth and uterine discharge were found to be minor reproductive health problem with 14.06%, 12.76%, 8.6% and 5.46%, 4.67% and 2.6%, respectively.

Other reproductive health problem observed with lower frequency includes anestrous with 1.56%. However, from all cows having reproductive problems, repeated breeders and abortion cases accounted for 28.3% and 26% and retained placenta and dystocia were found to be among the major health problems in dairy cows of the study area Table 2.

Of the total cows examined (n=384) for reproductive health problems, repeat breeder, abortion, retained fetal membrane were major whereas dystocia, still birth and uterine discharge were found to be minor reproductive health problem with 14.06%, 12.76%, 8.6% and 5.46%, 4.67% and 2.6%, respectively. Other reproductive health problem observed with lower frequency includes anestrous with 1.56%.

Moreover, from all cows having reproductive problems, repeat breeders, abortion cases, retained placenta and dystocia accounted for 28.3%, 26%, 17.3% and 11% prevalence rate and appeared to be the major health problems in dairy cows of the study area Table 3.

Age and hygienic conditions were found to significantly (P<0.000, P<0.037, respectively) influence the prevalence of reproductive health problems in dairy cattle of the study area whereas all other risk factors were not found to affect (P>0.05) the prevalence of reproductive diary health problems of the area.

DISCUSSION

Many production constraints are hampering productive and reproductive performance of cattle worldwide. Reproductive health problems are found to be the bottleneck in production sectors in Ethiopia.

Of the total 384 cows, 49.26% were found to be affected either with one more reproductive health problems in the current study.

Table 1: Showing the overall prevalence of reproductive health problems in smallholder and medium scale dairy farms at Nekemte town.

Method of study	Total cow examined	Number of cows without problems	Number of cows with problems
Regular follow up	30	18 (4.69%)	12 (3.13%)
Questioner survey	354	175 (45.57%)	179 (46.63)
Total	384	193 (50.26%)	191 (49.74%)

Table 2: The relative frequency of major reproductive health problem in dairy cows in smallholder and medium scale dairy farms (n=384) at Nekemte town.

Major problems	No. of affected cows	Prevalence (%) as per cows examined	Prevalence of respective problem calculated frovm total affected (%)
Abortion	49	12.76	26.0
Repeat breeder	54	14.06	28.3
Retained fetal membranes	33	8.59	17.3
Dystocia	21	5.47	11.0
Anoestrus	6	1.56	3.14
Uterine discharge	10	2.60	5.0
Still birth	18	4.69	9.4
Total	191	49.26	100

Table 3: The prevalence of associated risk factors on the all reproductive disease conditions in smallholder and medium scale of dairy cows.

Risk factor	cows examined	cows affected	Affected cows (%)	X^2	P-value
Age (years) ≤5 ≥6	72 312	22 169	30.6 69.4	14.80	0.000
Parity (calf) Primiparous Pluriparous	132 252	65 126	49.2 50.8	0.05	0.825
BCS: 1-2 3-5	58 326	29 162	50 50	0.1946	0.659
Breed: Local Cross	226 158	115 76	50.9 49.1	0.0024	0.961
Hygienic condition: Good Poor	242 142	111 80	45.9 54.1	4.38	0.037
Management system: Semi-intensive Extensive	132 252	66 125	50 50	0.179	0.672

The prevalence of major clinical reproductive problems reported in this study was found to be in between 67.8% and 33.59% reported by [6,11], respectively. This variation in prevalence might be due to the difference in management, environmental factors and breed of the animals.

The results of the current study shown in table 2 indicate that repeat breeder, abortion, retained fetal membrane, dystocia, still birth and uterine discharge were found to be the major reproductive health problem with 14.06%, 12.76%, 8.6%, 5.46%, 4.67% and 2.6%, respectively. Other reproductive health problem observed with lower frequency includes anestrous with 1.56%.

Repeated breeding is one of the problems affecting reproductive ability of cows. In the current study, the prevalence of repeat breeder accounted for 14.1% is higher than earlier reports of Haile et al. [6] Gashaw et al. [11]; Prasad [12] who indicated prevalence rates of 6.2%, 1.3%and 3%, respectively. The variation in the prevalence of repeat breeders may be attributed to variations in predisposing factors such as nutritional status (malnutrition) and management practices (incorrect timing of insemination, faulty heat detection, communal use of a bull for natural services, sub-fertile bulls, endocrine imbalance and reproductive tract infection [13].

Abortion was found to be a major problem in dairy cows of the study area responsible for the prevalence rate of 12.8% which is higher than earlier reports of Gashaw et al. [11], Gizaw et al. [8], Berihu and Abebaw [14]; Shiferaw et al. [15] and Haile et al. [6] who reported prevalence rates of 5.9 %,2.23%,5.96%,6.3% and 1%, respectively. The sources of differences might be related to breed, geographic position, case definition and procedural differences, but it was in agreement with Prasad [12] who reported a prevalence rate of 13.9%.

Our finding in the current study revealed Retained Fetal Membrane (RFM) accounting for a prevalence rate of 8.6% which appeared to be somewhat lower than what was reported by Shiferaw et al. [16] Gashaw et al.[11]; Haile et al.[6]who indicated 19.2%, 17%, and 14.7% prevalence, respectively. This variation

might be due to nutritional status and management and could be due to dystocia cases, accounting for 5.6% of the problems. However, Prasad [12], Gaines [17], and Correa et al. [18] reported a prevalence of 8.6%, 10% and 5-8%, respectively, which is in agreement with our finding in this study. On the other hand, Tekelye et al. [19] & Erb and Martin [20] reported a prevalence rate ranging between 7.1 and 28.9% and our report of the current study fall between this predetermined range.

In the present study revealed that dystocia represented 5.5% of the encountered cases of reproductive health problems in the study area and agrees well with earlier reports of Prasad [12], Gashaw et al. [11] and Haile et al. [6] with the prevalence of 6.6%, 3.8% and 3.1% respectively. These variations could be attributed to age, parity, breed of the sire and inseminating cows with semen collected from large sized bulls is an important precipitating factor for dystocia [21]. Earlier infections such as endometritis may also contribute to cases of dystocia.

Uterine discharge represented a prevalence of 2.6% & 4.7% in the current study was found to be lower than the 9.5% prevalence reported by Haile et al. [6] but our finding of stillbirth rate agrees with the finding of the same author. In dairy cows, uterine infections are the main causes for uterine discharges and endometritis and the low prevalence might be due to low uterine infections.

Absence of estrus is a common problem of diary production. Several authors indicated different prevalence rates at different times. Among others, Shiferaw et al.[16], Haile et al. [6], Gashaw et al. [11], Prasad [12] reported prevalence rates of 38.6%,10.1%, 0.3 and 1.7%, respectively. Our finding is lower than the former two reports but agrees well enough with the later two.

Hygienic conditions and age of the animals influenced the prevalence (occurrences) of the reproductive health problems in the current study being significantly (P>0.05) higher in poor hygienic condition and in cows of older ages compared to good hygienic condition and younger cows below 5 years of age. Haile et al.[6] reported similar finding. This variation might be due

to the general fact that the diseases are prevalent in animals managed in poor hygienic conditions and in older animals.

CONCLUSION AND RECOMMENDATION

This study revealed that reproductive health problems are serious in dairy cows managed under semi-intensive and extensive systems of production. Repeat breeder and abortion were the most significant reproductive health problems encountered in Nekemte. Age and hygienic conditions are possible risk factors identified for the occurrence of reproductive health problems in the study area.

From the study results, it can be recommended that improvements in hygienic condition and management systems such as housing or shelter, feeding, and health care such as heat detection and proper selection of bulls for breeding that takes into account the size of cows could help to alleviate health problems.

The RHPs in the study site were multifactorial. Therefore, a detailed study is required to address the extent of the problem and thus the possible solution in control and prevention strategies.

ACKNOWLEDGEMENT

REFERENCES

1. Kumsa T. Smallholder dairy in Ethiopia. Bako Agricultural Research centre, Bako, Ethiopia. Journal of Veterinary Medicine. 2009.

2. Central Statistical Authority: Area of population density by autonomous, administrative region and awuraja. Statistical Bulletin 76. CSA, Addis Ababa.1990

3. Mureda E, Mekuriaw Z. Reproductive performance of dairy cows in western lowlands of Ethiopia. Agricultural collage, ATVET, Ethiopia. 2007.

4. Tadesse M, Thiengham J, Prasanparinch S. Productive and reproductive performance of Holstein Friesian dairy cows in Ethiopia. Department of Animal Science, Faculty of Agriculture, Kasets art University, Bang ken campus, Bangkok. 2008.

5. Shapiro LS. Introduction to Animal Science. Print ice Hall, Upper Saddle River, New Jersey. 2001; 99-108.

6. Haile A, kassa Mihret M, Asfaw Y. Major reproductive disorders in crossbred Dairy Cows Under smallholding in Addis Ababa Milk shed. School of veterinary medicine, Debreit, Ethiopia. 2010.

7. Radostits OM, Gay CC, Hinchcliff KW, Konstable PD. Veterinary Medicine. A textbook of diseases of cattle, sheep, pigs, goats and horses. London Sounders Camp any Ltd.10th. 2007; 1450-1465.

8. Gizaw Y, Bekana M, Tekele A. Major reproductive health problems in smallholder dairy production in and around Nazareth town, central Ethiopia. Vet Online. The International Journal of veterinary Medicine. 2007.

9. Nekemte Agricultural and Rural Development Office (NARDO, 2002)10. Thrusfield M. Veterinary Epidemiology, 2nd, University of Edinburg, Black well science. 2005; 180-188.

10. Gashaw A, Worku F, Mulugeta S. Assessment of small holder dairy production system and their reproductive health problems in Jimma town south west Ethiopia, Jimma University, College of Agriculture and Veterinary medicine, Jimma, Ethiopia. 2011.

11. Prasad RB. Cattle production manual for veterinary students, Animal breeding Department of Animal and Range sciences, Hawassa college of Agriculture, Ethiopia. 2007.

12. Arthur GH, Noakes DE, Pearson H, Perkinson TJ.Veterinary Reproduction and Obstetrics. Theriogenology, 4thed. Baillier, Tindall. Great Britain. 1996.

13. Berihu H, Abebaw G. Major Reproductive Health Problems of Dairy Cows in and around Bako,West Ethiopia. Ethiopian Journal of Animal Production. 2009; 9: 89-98.

14. Shiferaw Y, Tenhagen BA, Bekana M, Tenhagen BA, Kassa T. Reproductive performance of crossbred dairy cows in different production system in the central high land of Ethiopia .Tropical Animal Health Production. 2003; 35: 573-780.

15. Shiferaw Y, Tenhagen BA, Bekana M, Tenhagen BA, Kassa T. Reproductive disorders of crossbred dairy cows in the central high lands of Ethoipia and their effect on reproductive performance. Tropical Animal Health Production. 2005; 37: 427-441.

16. Gaines JD. The role of record analysis in evaluating sub-fertile dairy herds. Journal of Veterinary Medicine. 1987; 84: 532-543.

17. Correa MT, Curtis CR, Erb HN, Screllet JM, Smith RD. An ecological risk factor for postpartum disorders of Holstein-Friesian cows form thirty-two New York farms. Journal of Dairy Science. 1990; 73: 1515-1524.

18. Tekelye B, Kasali OB, Gashaw T. Reproductive problems in indigenous cattle of the Ministry of Agriculture-farms in central Ethiopia. Tropical Agriculture (Trinidad). 1992; 69: 247-249.

19. Erb HW, Martin SW. Interrelationships between production and reproductive diseases in Holstein cows. Age and Seasonal pattern. Journal of Dairy Science. 2000; 63: 1911-1917.

20. Morrow DH, Dale AD, Kitchen AW. Clinical investigation a herd with a fat Cow syndrome. Journal of American Vet Med. 2002; 174: 161.