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Major Reproductive Health Disorders of Dairy Cows in and Around Chencha Town, South East Ethiopia

Fitsum Dulo, Gelaye Salile and Lemlem Mathewos

Wolaita Sodo University, School of Veterinary Medicine, Wolaita Sodo, Ethiopia

Abstract: The study was conducted from November, 2016 to April, 2017 with objectives of determining the prevalence of major reproductive health problems and associated risk factors in small holder dairy cows in and around Chencha town. A total of 384 dairy cows were studied, out of which, 125(32.5%) were affected by at least one clinical reproductive health problem. The major reproductive health problems identified in the present study were retained fetal membrane (12.2%), dystocia (5.2%), abortion (4.7%), mixed problems (4.2%) and clinical endometritis (3.7%). The overall prevalence of reproductive problems showed significant difference ($p<0.05$) with respect to parity and age of dairy cattle where major reproductive health problems were observed more frequently in pluriparus and aged cows. While breed type, body condition score, breeding methods and management systems were not found to have a significant influence ($p>0.05$) on the occurrence of reproductive problems in the area. Therefore, it is recommended that awareness creation to farm owners, attendants and improving management aspect such as, hygiene, optimum feeding and health care should be provided adequately to minimize the occurrence of these problems and associated economic losses in the dairy farms of the area.

Key words: Cattle · Chencha · Ethiopia · Reproductive Health · Risk Factor

INTRODUCTION

Ethiopia holds a substantial potential for dairy development mainly due to its large livestock population coupled with the relatively suitable environment for livestock production [1]. According to recent estimates, Ethiopia was home for 56.71 million head of cattle, 29.33 million sheep, 29.11 million goats, 1.16 million camels and 56.87 million poultry [2].

Despite high livestock population and existing favorable environmental conditions, the current livestock output of the country is little. This is associated with a number of complex and inter related factors such as inadequate feed and nutrition, widespread diseases, poor genetic potential of local breeds, market problem and inefficiency of livestock development services with respect to credit, extension, marketing and infrastructure [3].

Among challenges to the dairy sector in particular, reproductive health disorder like bovine mastitis, cystic ovarian disease, pyomerta, abortion, dystocia, retained fetal membrane (RFM), metritis and endometritis, uterine or vaginal prolapse, anestrus and repeat breeding have direct impact on reproductive performance [4-6]. This is due to the slower uterine involution, prolonged inter-conception and calving interval, negative effect on fertility, increased cost of medication, drop in milk production and early depreciation of potentially useful cows [6, 7].

In Ethiopia, studies on reproductive health disorder of dairy animals are limited and mainly located in central high lands and in some parts of Eastern and Northern parts of the country [4]. Identification of prevailing reproductive health problems and understanding of the existing dairy production system in the area is vital to devise appropriate development interventions in small holder dairy farm sector in the area. Therefore, the objective of this study was to of determine the prevalence of major reproductive health problems and associated risk factors in small holder dairy cows in and around Chencha town, Southeastern Ethiopia.

Corresponding Author: Fitsum Dulo, WolaitaSodo University School of Veterinary Medicine, P.O. Box No. 138, Wolaita Sodo, Ethiopia.

MATERIALS AND METHODS

Study Area: The study was conducted in Chencha town, which is found in South Nation, Nationalities and People Regional State. Chencha district is located between 37° 29' 57" East to 37° 39 36 West and between 6°8 55" North and 60 25'30" South. Altitude of the district varies from 1800 m to 3500 m above sea level. Due to a high altitudinal range, the area is characterized by diverse agro-climatic distribution and vegetation cover. This district is divided into two agro-ecological zones, namely, Dega and Weyna Dega, which account for about 82 and 18% of the total area respectively. The rainfall regime in the District is bimodal. The first round of rain occurs from March to April. The second round of rain occurs from June to august. The rainfall distribution in Chencha varies from year to year and across seasons. The annual rainfall distribution in the district varies between 900 mm to 1200mm. The minimum temperature in the District ranges from 11 to 13°C, while the maximum temperature is in the range 18 to 23°C. The farming system in the District is a mixed farming system where the crop sub-system and the livestock sub-system are equally important to each other [8].

Study Population: Local and cross breed cows were included for the study. These animals were kept in different management systems. Sampled animals constituted different age groups, body condition score and have various numbers of parity.

Sample Size: The sample size was calculated according to Thrusfield [9] by considering 50% expected prevalence since there was no previous work in study area and 5% absolute precision at 95% confidence interval using the following formula:

$$N = \frac{1.96^2 pexp\ (1\text{-}pexp)}{d^2}$$

where,
N= Required sample size, Pexp =expected prevalence, d=absolute precision. Thus, by using the given formula the estimated sample size should be not less than 384 head.

Study Design: The cross-sectional type of study was undertaken from November, 2016 to April 2017. The study constituted questionnaire survey and regular follow up on the targeted dairy cows.

Questionnaire Survey: To get information, thorough explanation on the objectives of the study was given to workers before the start of the interview. Then questions asked about major reproductive disorders like abortion, dystocia, retained fetal membrane, clinical endometritis, repeat breeder, management systems and parity. Questionnaire survey included 360 indigenous and cross breed cows.

Regular Follow Up: A total of 24dairy cows randomly selected from small scale farms in Chencha town during the study period. These cows subjected to different clinical and gynecological examinations including rectal palpation and respective findings recorded.

Data Management and Analysis: Data obtained from questionnaire survey and observational study were entered into Microsoft Excel spread sheet and coded appropriately. Data were analyzed using Statistical Package for Social Sciences (SPSS) software, version 20.0 (SPSS Inc., Chicago, Illinois, USA) with descriptive statistics used to summarize the results and chi-square was used to determine possible association among the risk factors. For all analyses, a *P*-value of less than 0.05 was taken as significant.

RESULTS

In this study, a total of 384 dairy cows were examined for major reproductive health problems by classifying the method of study as questionnaire survey and longitudinal study (Regular follow up) (Table 1).

Out of 384 dairy cows assessed during the study period, the overall prevalence rate of reproductive disorder found in and around Chenca town farm was 32.5% (n=125). The reproductive disorders observed were retained fetal membranes, dystocia, abortion, mixed problems, repeat breeder, clinical endometritis, anoestrus and vaginal prolapse. The current study identified retained fetal membranes (RFM), abortion, dystocia, mixed problems and clinical endometeritis as major reproductive health problems, while repeat breeder, anoestrus and vaginal prolapse indicated lower rate of prevalence in relation to others (Table 2).

The differences in parameters *viz.* age, breed, body condition, parity, breeding methods and management systems on reproductive problems were analyzed by using $x2$ (Chi-square) technique (Table 3) and the level of significance was set at $p< 0.05$.

Table 1: The prevalence of reproductive health problems in smallholder dairy cows in and around Chencha town

Method of study	No. of cows examined	No. of cows positive (%)
Questioner survey	359	115(32.03%)
Regular follow up	25	10(40.00%)
Total	384	125(32.55%)

Table 2: The relative frequency of major reproductive health problems in small holder dairy ows in and around Chencha town

Major reproductive problem encountered	Frequency	Percent
Retained fetal membrane (RFM)	47	12.2%
Dystocia	20	5.2%
Abortion	18	4.7%
Mixed problems	16	4.2%
Clinical endometritis	14	3.7%
Repeat breeder	4	1.0%
Anoestrus	4	1.0%
Vaginal prolapsed	2	0.5%
Total	125	32.5%

Table 3: Association of breed, management system, age, body condition, parity and breeding methods with reproductive health problems

Factor	No. of cow examined	No. cow affected	Percent	*x*2	*P* -value
Breed				1.00	0.317
Local	250	77	30.80		
Cross	134	48	35.82		
Management system				1.28	0.528
Extensive	51	20	39.22		
Semi-intensive	282	88	31.21		
Intensive	51	17	33.33		
Age				28.33	0.000
<5 years	82	14	17.07		
5-7 years	173	47	27.17		
>7 years	129	64	49.61		
BCS				2.38	0.304
Good	142	44	30.98		
Medium	141	42	29.87		
Poor	101	49	48.51		
Parity				17.94	0.000
≤ 2	283	75	26.50		
≥ 3	101	50	49.50		
Breeding methods				0.17	0.897
NM	244	80	32.89		
AI	140	45	32.14		

BCS: Body condition scoring, NM: natural mating, AI: Artificial insemination

DISCUSSION

In current study, out of 384 examined animals, 125 animals were positive for at least one reproductive health problem with overall prevalence rate of 32.5%. Among which, retained fetal membrane, abortion, dystocia, mixed problems and unidentified endometritis were found to be the major reproductive health problems comprising 12.2%, 5.2%, 4.7%, 4.2% and 3.7% respectively.

Other reproductive health problems observed with lower prevalence include repeat breeder, anoestrus and vaginal prolapse accounted 1.0%, 1.0% and 0.5% respectively.

The overall prevalence of major clinical reproductive problems reported in this study was in close agreement with previous study conducted in Jimma town [10] Nazareth town [7], Wolaita town [11] and Bishoftu [12] which had an overall high prevalence rate of 33.59%, 31.76%, 35.5% and 30.12% for retained fetal membrane, abortion, dystocia and endometritis respectively. However, our prevalence of reproductive problems was lower than the report of central Ethiopia [4,13], Hosanna and Northeast Ethiopia [14] where their prevalence rate was 44.3%, 43.07% and 40.3% respectively. Moreover, Bedelle town [15] and Assela town [16,17] had an overall high prevalence rate of 24.8%, 18.3% and 18.5% for

retained fetal membrane, abortion, dystocia and endometritis respectively compared to our results. This variation in overall prevalence rate could possibly be attributed due to difference in management system, nutritional status, breeds of animals and environmental conditions as well as sample size, production system and study methodology [10].

The prevalence rate of RFM (12.24%) found in the present study is in slightly higher than those previously reported [18, 12] where their prevalence rate was 11.5% and 10.01% respectively. Contrary, the report of Ada'a District recorded the lowest (0.8%) prevalence for RFM [19], but higher of 31% from in and around Gonder town [20], of 21.9% in Nazareth town [7],of 17% in Addis Ababa [21], of 19.2% in Jimma town [10] and 18.3% in Arsi Zone [22] were also recorded. The relatively highest prevalence rate of RFM in the current study could also be due to dystocia that accounted 5.21% of the problems, which is an important predisposing factor for occurrence of RFM. The reason for retained fetal membranes could be due to previous exposure to reproductive problems or other health problems and nutritional deficiencies [18].

The prevalence of dystocia found in the current study (5.21%) fairly agrees with previous study report in Bedelle [23] and Kombolcha [14] where an overall slightly high prevalence rate of 6.6% and 7.75% reported, respectively. Moreover, a higher prevalence of dystocia of 15.5% was recently reported in and around Gonder town [20]. The difference in prevalence may be due to small sized breeds of cows inseminated with semen collected from larger sized bulls, environmental factors and breed and management practices.

Prevalence rate of abortion in this study recorded as 4.69% which is fairly consistent with finding of 2.56%, 6.3% and 2.23% from Hossana [4] central highlands of Ethiopia [5] and Nazreth [24] respectively. However, the finding was little bit higher than that of 1% report from Jimma [10] and lower than 9.05% report from Kombolch [14] 19.7% in Gonder town [20],13.9% in Bedelle [15] and 14.6% report from Assela [17]. The prevalence rate difference of abortion in different area may be attributed to breed, management system specially feeding and sanitation, study methodology and geographical location differences as well as the nutritional status, age, number of parity of the dams [10].

The 3.65% prevalence of repeat breeder is in close agreement with prevalence rate of 3.87% and 3%report in Kombolcha[14] and Bedelle [23]respectively. However, it is lower than the prevalence of 6.2% that had been reported in Addis Ababa [21], 13.08% in Hossana [4], 13% in Hawassa [25] 11.42% in Central Ethiopia [13], 21.1% in Gonder town [20] and 21% reporting in Mekelle [18]. The difference between the repeated breeding findings of the current study and previous reports may be attributed to 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 improper heat detection, inappropriate semen handling and insemination techniques and communal use of bull for natural services also considered as contributing factor. High incidence of repeat breeding could be due to lack of nutrition, improper insemination and timing of AI and poor semen quality [19].

The very low prevalence rate of anestrous observed in this study 1.04% compared to that of 3.7% recorded in Bishoftu [12] and 10.26% recorded for cross breed dairy cows in urban and per urban area of Hosanna [4] in southern Ethiopia and 37.8% in crossbred dairy cattle in and around Mekele [18], may refer to the breed, age and improper heat detection and breed, environment, nutrition and management system differences.

In contrast to the very low prevalence of endometritis (1.04%) recorded in the current study, Bishofitu town [12] had a very low record of 0.6% but in Jimma [10] and on Bako [26], high records of 2% and 3.21% were reported. Moreover, very high records of (8.7%) in central Ethiopia [13], 16.63% in Nazereth [7] and 12.7% in and around Gonder town [20] were also reported. Factors influencing the incidence of undefined clinical endometritis may be retention of fetal membrane, negative energy balance, dystocia and parity of cow had been reported to be associated with metritis [27]. Other influencing factors for undefined metritis may include unhygienic parturition, unhygienic AI and injury of uterus by AI guns during insemination.

The prevalence rate of vaginal prolapsed (0.52%) recorded in this study are nearly close with other records of 1.95% [13] and 1.24% [14], but is lower the prevalence of 5.2% [28] and 3.44% [4] that had been reported. Prevalence rate of mixed problems of 4.16% fairly agreed with that of 5.6% in Jimma [10], but higher than that of 1.03% the record of Hossana [4] and that of 1.05% in Mekelle [29]. This variation could be due to inter relationship between of reproductive problems as predisposing factors for each other.

The significantly higher occurrence of reproductive health problems ($x2$=17.9, P=0.0001) had ≥ 3 parturitions (49.5%) compared to those gave ≤ 2 parturitions (26.5%) in this study is similar to the previous finding [7]. This is

possibly due to repeated exposure of the genital tract of pluripara cows to environmental risk factors that can cause uterine infection [30].

This study recorded a statistically significant association of reproductive health problems ($x2$=28.3, P=0.0001) with increasing age in cows where cows of age greater than 7 years had the highest prevalence (49.6%). Reproductive health problems were assessed with respect to the breed of the cows, body condition scores, breeding methods and management systems, however; there was no significant association found.

CONCLUSION

This study revealed a high prevalence of reproductive health problems in and around Chencha town, out of which RFM, abortion, dystocia and mixed problems were the most prevalent problems of dairy cows in the study area. It was found that reproductive health disorder most of the time occur concurrently as mixed rather than appearing as single problems. Thus, such interrelated problems require further detail study to identify the most important predisposing factors in existing situation so as to devise sound control strategy and create community awareness on its early control and prevention activities in the study area.

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