



2348-8069

DOI: <http://dx.doi.org/10.22192/ijarbs.2017.04.07.011>

Assessment of major Reproductive disorders of dairy cattle in Dessie and Kombolcha towns, South Wollo, North Eastern Ethiopia

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Abstract

Reproductive disorders are one of the most important problems that affect the production and productivity of dairy cows. The study which employed both questionnaire and regular follow up was conducted in Dessie and Kombolcha with the objectives of determining the prevalence of major reproductive health problems of dairy cattle and to asses possible risk factors and to forward the possible recommendations to the prevention and control approaches in 22 dairy farms from November 2015 to May 2016. A total of 487 dairy cattle 456(93.6%) cross and 31 (6.4%) local breed which were kept under different management system 444 (91.2%) intensive and 43(8.8%) semi intensive were included, out of which 39.8% (n=194) had at least one of the reproductive disorders. Repeat breeder, Retained Fetal membrane (RFM), anestrous, and dystocia were found to be the major reproductive health problems containing 9.9%, 7.6%, 5.3% and 4.5% prevalence rate respectively and other reproductive health problems observed with lower prevalence include mixed, vaginal prolapsed, abortion and uterine prolapsed having 4.1%, 3.3%, 3.1%, and 2.1% prevalence rate respectively in the study farms of the two towns. The prevalence of reproductive problems showed significant difference ($p<0.05$) with respect to age, BCS and parity of dairy cows Whereas, breed, management system and place of farm were not found to have a significant influence ($p>0.05$) on the occurrence of reproductive problems in dairy cows where major reproductive health problems were observed in cross breed and intensive production system as well as in Kombolcha dairy farms. Therefore, it is recommended that awareness creation to farm owners, attendants and improved management such as, proper feeding, accurate heat detection, considering the size of sire and dam while using AI, and health management should be improved to minimize the occurrence of these problems and associated economic losses in the dairy farms of the area

Keywords: Dairry Cattle, Dessie , Reproductive Disorders kombolch. Prevalence

1. Introduction

Ethiopia is one of the sub-Saharan Africa with a large potential for livestock production. The country is 1st among African countries and the 9th in the world (Hunduma, 2012). The total cattle population for the country is estimated to be about 53.99 million. Out of

this total cattle population the female cattle constitute about 55.5 percent (CSA, 2013). These are predominantly indigenous zebu cattle, which are well adapted to and distributed among the diverse ecological conditions and management systems of the

country Ethiopia is a country with a human population estimated to 85 million with annual population growth rate of 3.5%. Livestock represent a major national resource and form an integral part of the agricultural production system (Birhanu *et al.*, 2013).

The agricultural sector in Ethiopia contributes 43 percent of gross domestic product (GDP) and 86 percent of export earnings. A study by CSA (2009) indicated that the livestock sector contributes 26% of the agricultural GDP and 12% to the national GDP. Among livestock species, cattle have significant contributions to the livelihoods of farmers (Mekonnen *et al.*, 2012). They produce a total of 1.5 million tones of milk and 0.331 million tones of meat annually (FAO, 2005). Dairying is an important enterprise for many countries of the world and is especially important source of income generation for rural families in the developing agricultural countries like Ethiopia. With increase in population size the demand for milk also increases (Usman *et al.*, 2013). The development of the dairy sector in Ethiopia could contribute significantly to poverty alleviation and improvement in health and nutritional status of the whole community at large (Jan *et al.*, 2010). However, the dairy industry is not as developed as that of east African countries. Consequently, national milk production remains among the lowest in the world even by African standard. However, there is a slow and gradual overall growth in milk production in Africa owing to cross breeding program that are being introduced into many tropical countries to increase milk production (Kassa and Lema, 2005).

Despite the huge number of cattle in the country, productivity is low due to constraints of disease, nutrition, poor management and poor performance of endogenous breed. This constraint results in poor reproductive performance of dairy cattle and lower economic benefit from the sector (Bitew and prased, 2011). Among the major problem that has direct impact on reproductive performance of dairy cows are abortion, dystocia, retained fetal membrane, repeat breeding, uterine and vaginal prolapse. This could be classified as postpartum and prepartum (Forar, *et al.*, 1995).

Some studies conducted in different parts of Ethiopia indicated that 26.5% of cows examined had at least one of reproductive problems in and around Bedelle south west Ethiopia (Bitew and Prased, 2011), and retrospective analysis of clinical data in central Ethiopia showed 44.3% of the cows had major prepartum and postpartum reproductive problems

(Hadush *et al.*, 2013). Gashaw *et al.* (2011) and Dawit and Ahmed (2013) also reported the prevalence of 33.59% and 40.3% of reproductive health problems of cows in Jimma town, South-west Ethiopia and Kombolcha, North-east Ethiopia, respectively.

Reproductive health problems cause considerable economic loss to the dairy industry due to slower uterine involution, prolonged inter conception and calving interval, negative effect on fertility, drop in milk production and early depreciation of potentially useful cows (Corea *et al.*, 2001).

Even though, there are a number of different size dairy farms available in Dessie and Kombolcha, only a few studies have been conducted on the major reproductive health problems in dairy animals. Therefore, the objectives of this study were to determine the prevalence of major reproductive health problems of dairy cattle in Dessie and Kombolcha, to asses possible risk factors that play a role in precipitating such problems in dairy farms and forward possible recommendations for the prevention and control approaches.

2. Materials and Methods

2.1. Description of study area

The study was conducted from November, 2015 to May 2016 in and around Dessie town, which is the capital city of South Wollo zone and located at 401km far from Addis Ababa with a latitude/longitude: North $11^{\circ} 7' 59.99''$ East $39^{\circ} 37' 59.99''$ and with an average elevation: 2,494metre (8,183feet) and altitude of between 2400-2800 meter above sea level in Amhara National Regional State. The area experiences a bi-modal rain fall patterns with a short rainy season which occurs from February to March and long rainy season which starts at the end of June and ends at early November. The annual rain fall of the area is ranged from 1100 - 1200mm and the mean annual minimum and maximum temperature are 15 and 27 $^{\circ}$ C, respectively. The farming system in the area is mixed farming and sheep are the dominant animal species kept by farmers (NMSA, 2013).

2.2. Sample size and Study Animals

The sample size required for this study was determined depending on the expected prevalence of reproductive problems and the desired absolute precision by the formula given by Thrusfield (2005). Therefore, using 95% confidence interval, 5%

precision and 50% expected prevalence, the number of cows needed to demonstrate the prevalence of reproductive health problems in Dessie and Kombolcha town were 384 dairy cows, but 487 cows were examined to increase accuracy of the result with different age groups, body condition score and have different parity.

Both local breed (n=31) and cross breed (n=456) dairy cattle which were kept under different management systems were also investigated.

$$N = \frac{(1.96)(P_{exp})(1-P_{exp})}{d^2}$$

Where, N= Sample size, P_{exp}= Expected prevalence, d= Desired absolute precision

2.3. Study design

The crossectional type of study was undertaken from November 2015 - May 2016 to determine the major reproductive problems of dairy cattle and the study employed were questionnaire and regular follow up on randomly selected dairy cows in Dessie and Kombolcha town dairy farms.

2.4. Data collection

2.4.1. Questionnaire survey method

Structured questioners was prepared and used to collect information from 22 dairy farm owners in one visit interview on individual level were studied. In order to get co-operation of the dairy industry and obtain reliable information about their animals, thorough explanation on the objectives of the study was given before the start of the interview. Following that, the actual questions and questionnaires were presented. On randomly selected 400 dairy cattle. Accordingly, information about the parity, breed, feeding system, production system, and type of feed, health care and major reproductive problems such as abortion, dystocia, retained fetal membrane, anestrous, repeat breeder, vaginal prolapsed and uterine prolapse were collected and defined on individual cattle level.

2.4.2. Regular follow up

A regular visit was carried out once per two weeks on 7 dairy farms three farms in Dessie and four farms in Kombolcha which was randomly selected and were have about 87 cows selected randomly in total including pregnant cows and heifers suspected to give birth within the study period and having of age two

and above respectively and followed up from the start to the end of this study period. These cows were identified on the basis of their tag numbers/ID, parity number and color of animals, then they were subjected to different clinical and gynecological examinations including rectal palpation so that to identify the major reproductive health problems, then the findings recorded in prepared observational format.

2.4.3. Body condition scoring

For all of the animals under study body condition was scored in order to assess the nutritional status of the animal and the prevalence of post parturient reproductive health problems. Therefore, animals were grouped in to 1, 2, 3, 4 and 5 body condition scores according to Richard (1993) and later on classified as poor (score 1 to 2), medium (score 3) and good (score 4 to 5) Benti and Zewdie (2014). The measurement was done through palpation and visualization of the transverse and spinous processes for the lumbar vertebrae (loin) and tail head respectively.

2.5. Data management and analysis

The data obtained from questionnaire and regular follow up were entered on a Microsoft Excel spread sheet and analyzed using Statistical Package for Social Sciences version16 (SPSS). The prevalence of reproductive problems was determined as a proportion of affected animals out of the total animal examined. The differences or association between in different risk factors such as age, breed, parity, production system and body condition with over all prevalence of reproductive problems was analyzed by using X² (Chi-square) technique and value of p<0.05 considered as significant.

3. Results

3.1. Questionnaire Study

Based on the questionnaire study out of 22 respondents 19 (86.4%) were males and 3 (13.6%) were females, and as observed from the educational level of farm owners or attendants, 14 (63.6%) were educated with regard to the location of the farms, and the rest 8(36.4%) were illiterate. Out of 22 dairy farms included in this study 12 farms containing 346 dairy cows were in Kombolcha town and 10 farms having 141 dairy cows were in Dessie town and from which 139 (28.5%) and 55 (11.3%) cows were affected with one or more of reproductive problems.

3.2. Animals' Management

From the total of 487 dairy cattle, 444 (91.2%) were managed intensively and 43(8.8%) were semi intensively and of which 456 (93.6 %) were cross breed and the rest 31(6.4%) were local breed. Almost the entire respondent agreed that feeding practice depends on the availability of feed because land space and water that is important factors for cultivation of animal feed is limited in the farm area. The feed on which the animals are fed include natural pasture grass hay, straw, milling byproducts (frushka), dairy concentrate mix, crop residues, some green grasses like alfa alfa and elephant grasses were among the commonest and mainly available feed types. Most of the respondents (72.7%) (n=16) breed their animals using both AI and natural mating whereas (27.3%) (n=6) of the farms practiced AI method of breeding system 63.6% (n=14) respondent said that estrus

detection were observed by attendants of the farms and 36.4% (n=8) of respondent said that it was detected by both farm owner and attendants of the farm. As replied by the respondent, there was no regular vaccination and deworming practices but they call veterinarians and took their animals for treatment whenever diseases occurred.

3.3. Major reproductive disease identified

In this study, a total of 487 dairy cows were examined based on questionnaire and regular follow up, of which 39.8 % (n=194) Cows were found to have at least one of the reproductive problems. Accordingly, cows found to had reproductive problems by questionnaire interview of owners and on regular follow up were 30.6% (n=400) and 9.2% (n=87), respectively (Table 1).

Table 1: Reproductive disorders of dairy cattle in Dessie and Kombolcha dairy farms on different methods of study.

Method of study	No. of cows examined	No of cows with reproductive problems	Percent affected
Questionnaire survey	400	149	30.6%
Regular follow-up	87	45	9.2%
Total	487	194	39.8%

The major reproductive problems identified were repeat breeding (9.9%), retained placenta (7.6%), anestrous (5.3%), dystocia (4.5%), mixed (4.1%),

vaginal prolapsed (3.3%), abortion (3.1%), and uterine prolapsed (2.1%) as summarized on table 2 below.

Table 2: Summary of relative frequency and prevalence rate of major reproductive disorders of dairy cattle in Dessie and Kombolcha dairy farms.

Reproductive problems	Questionnaire survey No (%)	Regular follow up No (%)	Total (%)
Abortion	10 (2.1%)	5 (1.0%)	15 (3.1%)
Dystocia	16 (3.3%)	6 (1.2%)	22 (4.5%)
Repeat breeding	38 (7.8%)	10 (2.1%)	48 (9.9%)
Anestrus	18 (3.7%)	8 (1.6%)	26 (5.3%)
Retained placenta	30 (6.2%)	7(1.4%)	37 (7.6%)
Uterine prolapsed	8 (1.6%)	2 (0.4%)	10 (2.1%)
Vaginal prolapsed	14 (2.9%)	2 (0.4%)	16 (3.3%)
Mixed problems*	15 (3.1%)	5 (1.0%)	20 (4.1%)

*Mixed problems include abortion and retained placenta, anestrous and repeat breeding, and dystocia and retained placenta (2 cases).

The result show that the influences of BCS, age, parity, breed and production system in the occurrence of major reproductive problems. BCS, age and parity were highly statistically significant with ($P<0.05$) while breed and production system were not

statistically significant ($p>0.05$). In this study, age showed variations in reproductive disorders among young, adult and old with the prevalence of 11.7%, 11.9% and 16.2% respectively (Table 3).

The effect of body condition on the prevalence rate of reproductive disorder were highest in poor body conditioned animals and decreased in medium body conditioned animal and in higher in good body conditioned animals 30.6%, 3.1% and 6.2% respectively (Table 3). The prevalence of reproductive health problems in heifers, premparous and

pluriparous is 0.8%, 9.4% and 29.6% respectively. It was therefore parity was statistically significance ($p < 0.05$) (Table 3). Whereas breed has not statistical significance ($p > 0.05$) on the prevalence of reproductive problems, with cross breeds more susceptible (27.9%) than indigenous breed cows (1.2%) (Table 3).

Table 3: The effects of risk factors on the prevalence of all reproductive disorder

Risk factors	Categories	Cow examined	Cow affected	Prevalence (%)	X ²	P-value
Age	<4	130	57	11.7%	35.0	0.00
	4-7	268	58	11.9%		
	>4	89	79	16.2%		
Parity No	Heifer	18	4	0.8%	50.0	0.00
	1-3	203	46	9.4%		
	>3	200	144	29.6%		
BCS	Poor	237	149	30.6%	1.023	0.00
	Medium	77	15	3.1%		
	Good	173	30	6.2%		
Breed	Local	31	10	2.0%	0.79	0.37
	Cross	456	184	37.8%		
Production System	Intensive	444	178	36.6%	0.136	0.71
	Semi-intensive	43	16	3.2%		

4. Discussion

This study revealed that, the majority of dairy farm operation mainly covered by males (86.4%) and majority of the farm owners (63.6%) were educated more than high school, and a few were up to elementary school and illiterates.

In the present study a total of 487 animals examined from this 39.8% (n=194) of dairy cattle in the study areas were affected with either one or more reproductive disorders based on questioner to the owners and with regular follow up information from which 28.5% (n=139) and 11.3% (n=55) prevalence of reproductive disease were in Kombolcha and Dessie towns dairy farms respectively. This total prevalence is closely related with the report by Dawite and Ahmed (2013) and Esheti and Moges (2014), in Northeast Ethiopia and East Shoa who reported 40.3 and 37.1% respectively, but higher than 18.5% which was reported by Hunduma (2013) in Assela town and 26.5% by Molalegne and Shiv (2011) in Bedelle. This difference prevalence might be due to differences in environmental factors, breeds of the animals and

variation in management system between the different areas of the studies.

The current study identifies repeat breeding (9.9%), retained placenta (7.6%), anestrous (5.3%), dystocia (4.5%), mixed (4.1%), vaginal prolapsed (3.3%), abortion (3.1%), and uterine prolapsed (2.1%). The higher prevalence of repeated breeding (9.9%) found in the present study is higher than prevalence rate of 3% reported by Bitew and Prased (2011) and 6.2% by Haile *et al.* (2014) and lower than 11.42% prevalence rate reported by Hadush *et al.*, (2013) from central Ethiopia. This variation for repeated breeding might be due to various predisposing factors such as use of infertile bulls, malnutrition, reproductive tract infections and improper management practices such as incorrect time of insemination, inappropriate semen handling and insemination techniques, faulty heat detection and communal use of a bull for natural service and endocrine imbalance (Arthur *et al.*, 1996). 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.

The prevalence rate of RFM (7.6%) in current study is in agreement with (7.6%) and (7.18%) reported by Duguma and Zewdie (2014) and Haile *et al.*, (2014) respectively and 8.6% reported by Molalegn and Shiv (2011) but lower than (14.28%) reported by Mamo (2004) and 19.2% by Gashaw *et al.* (2011). The variation in the prevalence of RFM might be attributed to the presence of infection, dystocia and its predisposing factors, as well as management difference especially feeding and sanitation. The current study revealed that the prevalence of anestrous (5.3%) which was lower than (10.26%) reported by Haile *et al.*, (2014). This variation might be due to the differences in breed, nutritional status, management system, poor body condition and failure to detect estrus.

The prevalence of dystocia obtained in this study (4.5%) was higher than 3.3% reported by Esheti and Moges (2014) but lower than the previous reports (5.9%) by Haile *et al.* (2014). This variation in the occurrence of dystocia might be due to the fact that it was influenced by several factors such as nutritional status, age and parity as well as breed of the sire and size of the dam. Small sized breeds of cows inseminated with the semen collected from larger sized bulls could be an important cause of dystocia. The prevalence rate of mixed problems (4.1%) recorded in this study is higher than 1.05% reported by Simiret (2010) in Mekelle. This variation could be due to inter relationship between of reproductive problems as predisposing factors for each other, but comparably similar to 5.6% indicated by Gashaw *et al.* (2011).

The prevalence rate of vaginal prolapsed (3.3%) recorded in this study is similar to the 3.44% reported by Haile *et al.* (2014) but is higher than 1.24%, and 1.95% reported by, Dawite and Ahmed (2013), and Hadush *et al.* (2013) respectively. This variation might be due to management system (feeding), sample size, environment and breed of animals. The prevalence rate of abortion (3.1%) recorded in this study is similar to 2.56% reported by Haile *et al.* (2014) in Hosanna, Southern Ethiopia, but is lower than the 9.05%, 13.9% and 14.6% reported by Dawite and Ahmed(2013), Molalegn and Shiv (2011) and Hunduma, (2013) respectively. The lower prevalence rate of abortion may be attributed to the increasing practice of AI ,the semen is collected from bulls free from diseases, in addition breed, management system specially feeding and sanitation, study methodology and geographical location differences are all sources of differences in prevalence of abortion (Gashew *et al.*,2011). Uterine prolapsed (2.1%). Higher than the

finding of Dawite and Ahmed (2013) who reported 0.56%. This variation might be due to environmental and managemental factors.

Age was significantly related ($P<0.05$) with reproductive disorder and the present study (11.7%), (11.9%) and (16.2%) indicated that the highest prevalence of reproductive problems were increased along increasing of age which was lower than to the findings of (32.03%), (44.06%) and (49.62%) by Dawit and Ahimed (2013) North eastern Ethiopia. This variation possibly due to improved management such as feeding, sanitation systems and environmental factors. And increased reproductive problems along increased age might be due to increased exposure of aged cows for different factors which contribute for reproductive problems while they calving during pregnancy periods than those lower aged animals.

The higher prevalence rate of reproductive problems in crossbreed animals 37.8% ($n=184$) than local breed 2% ($n=21$) may be due to the fact that less adaptive behavior of the cross- breed cows to tropical conditions of high temperature, humidity and various diseases and low feed quality than local breed cattle making them more susceptible than indigenous breed. (Mukasa, 1989). Another reason may also be due to the fact that, cross breeds require more elaborated management, feeding and better health care than the indigenous zebu to get better reproductive performance and productivity in the tropics (Teklye *et al.*,1991). The influences of breed in the current study was not significantly associated with ($P>0.05$) to the occurrence of reproductive problems.

Body condition score was significantly association ($P<0.05$) for the occurrence of major reproductive problems. The current finding indicated higher prevalence of reproductive health problems in cattle with relatively poor and good body condition (30.6%) and (6.2%) and less in medium body condition(3.1%) this finding agree to the report of Benti and Zewdie (2014), with being High prevalence of reproductive health problems in poor (48.3%) and good(57.1%) body condition and less in medium condition(42.4%), who reported a low prevalence of the problems in poor body condition as compared to good body condition cows. These finding realized the fact that cows in poor body condition were the most susceptible to reproductive health problems due to the weak expulsive force to expel out the fetal membranes leading to secondary complications (Robert, 1986) and the poor body defense mechanism that increases the rate of infection (Isahk *et al.*, 1983) as well a fat

cow was more susceptible to metabolic problems and infections and is more likely to have difficult at calving, retained fetal membrane and metritis. Therefore, thinness or fatness could be a clue to underlying nutritional imbalance, health problems or improper herd management. If done on a regular basis, body condition scoring can be used to trouble shoot problems and improved the health and productivity of the dairy herd; whereas, medium body condition animal was in perfect condition to meet performance needs. Management system was not statistically significant ($p>0.05$) on the prevalence rate of the reproductive disorders and the effect was in animals under intensive (36.6%) than those under semi intensive (3.2%). This might be related to poor sanitation of the barn, resulting in contamination during calving, improper feeding and trauma.

5. Conclusion

Despite the huge number of cattle in Ethiopia, economic importance and productivity is low due to different constraints such as disease, poor nutrition, poor management and poor performance of endogenous breed. This constraint results in poor reproductive performance of dairy cattle and lower economic benefit from the sector. Poor nutrition results in poor body condition, again this enhance the susceptibility of dairy cows to health problems and stress which results lower production, longer calving intervals as well as problems in fertility. Among the major problem that has direct impact on reproductive performance of dairy cows are abortion, dystocia, retained fetal membrane, repeat breeding, uterine and vaginal prolapsed. Poor management such as lack of proper breeding management like lack of accurate heat detection and timely insemination might have contributed considerably to delayed age at first service, take long days to become estrous (stay anestrous), long calving interval, late age at first calving, short lactation length and low milk production. This study revealed that reproductive health problems particularly of repeat breeder, RFM, anestrous, and dystocia were the major causes and mixed vaginal prolapsed, abortion and uterine prolapsed were relatively lower causes for low productive performance of dairy farms in Dessie and Kombolcha towns. So, this study tried to point out the magnitude of major reproductive problems and their relative importance, the association of the problems with body condition, age, and parity.

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DOI: 10.22192/ijarbs.2017.04.07.011	

How to cite this article:

Ambaw Tigabneh, Selamawit Fantahun, Temesgen Bihonegn and Wale Tesfaye. (2017). Assessment of major Reproductive disorders of dairy cattle in Dessie and Kombolcha towns, South Wollo, North Eastern Ethiopia. *Int. J. Adv. Res. Biol. Sci.* 4(7): 89-96.

DOI: [http://dx.doi.org/10.22192/ijarbs.2017.04.07.011](https://doi.org/10.22192/ijarbs.2017.04.07.011)