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Major reproductive health problems of indigenous Borena cows in Ethiopia

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ABSTRACT

The study was conducted to identify the major reproductive health problems and its associated risk factors in indigenous Borena breed cows in Borena zone in Southern Ethiopia between September 2013 and February 2014. Out of the total 409 cows examined, 195 (47.7%) were having at least one of the reproductive problems identified by either questionnaire interview (n=329) or regular follow up (n=80) of individual cows. The major reproductive health problems identified in the present study were mastitis (21.3%; n=87/409), abortion (12.2%; n=50/409), repeat breeder (10.3%; n=42/409), anestrus (10.3%; n=42/409) and retained fetal membrane (RFM; 7.6%; n=31/409). The rate of abortion increased significantly (p=0.001) with the increase in the stage of gestation. Laboratory findings indicated that brucellosis and mastitis had great roles in reproductive health problems of dairy cows in the study area with prevalence rates of 2.91% and 68.41%, respectively. In conclusion, the study revealed that several reproductive health problems such as mastitis, abortion, repeat breeder, anestrus and RFM are mostly prevalent in dairy cows in Borena zone in southern Ethiopia.

INTRODUCTION

Ethiopia maintains huge number of livestock population. However, the low economic returns from these resources are associated with several factors such as diseases, poor management, and low genetic potential of indigenous breeds. Among which, reproductive health problems cause considerable economic loss to the dairy industry. This is due to 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 (Lobago et al., 2006; Gizaw et al., 2007).

The major problems that have direct impacts on reproductive performance of dairy cows are abortion, dystocia, retained fetal membrane (RFM), metritis, prolapse (uterine and vagina), anestrus and repeat breeding. These could be classified as prepartum and postpartum reproductive problems (Shiferaw et al., 2005; Lobago et al., 2006).

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 40.25% of reproductive health problems of cows in Jimma town, South-west Ethiopia and Kombolcha, North-east Ethiopia, respectively. Major reproductive

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disorders in crossbred dairy cows in different locations around Addis Ababa milk shed were 75.3%, 60.1%, 58.1% and 75.15% in Addis Ababa, Holleta, Debrezeit and Sululta, and Muka-turi, respectively (Haile et al., 2010).

Borena bred cows are become increasingly important throughout the country for their milk and meat production, but wide-spread abortion, high prevalence of specific infectious diseases and other related problems have adverse effects on dairy herds. Communities of the areas have less awareness on the primary causes, prevention and control of the problems. There is no previous study and available data on the reproductive problems and the associated risk factors of dairy cows in Borena areas. Therefore, the objective of the present study was to identify the major reproductive health problems and its associated risk factors in indigenous Borena cows.

MATERIALS AND METHODOLOGY

Description of study area: The study was conducted in Borena Zone, which is located at 570 Km from capital Addis Ababa, South Oromia, Ethiopia. Altitude of the study area varies between 1,200 to 1,624 meters above sea level and located at average longitude of 38°5′ E and latitude of 4°8′ N. The zone covers a total of 95,000 Sq. Km of range lands. The zone is bordering with Kenya to the south, Somali region to the east, Guji to the north and southern people, nation and nationalities to the west. Grazing is predominantly communal with emerging privatization of crop and "*Kalo*" lands. Rainfall delivery is bimodal; with the main rainy season locally "ganna" accounting for 60% (from March to May) and the short rainy season "hagayya" comprising of 27% (from September to November). Annual mean daily temperature varies from 19°C to 24°C with moderate seasonal variation. Out of 13 districts of the zone, two (namely Yabello and Arero) were selected purposely for the present study. The animals in the pastoral area were kept under extensive farming system in which selected districts were the center for other districts and stable in livestock movement than others. In addition to this, there was frequent report of reproductive health problems to regional laboratory specially the case of abortion; which was used as selection criteria of the study area.

Study animals and husbandry practice: The study animals were indigenous Borena cows managed under extensive farming system. These breeds of animals become increasingly important throughout the country for meat and milk production. All age groups of cows were included as study animals. The land use pattern in area is communal range land utilization managed by effective traditional management system. Livestock is kept in free communal grazing areas and are settled in woody fenced areas or simple enclosure during the night. Watering to the animals was done by one to two day's interval based on accessibility of wells and ponds, whereas, supplementary feed was rarely practiced due to huge livestock population and unavailability of supplementary feed in the area. Irregular removals of dung were commonly practiced by pastoralist of the study area. Livestock mobility would continue to ensure high productivity due to changing environment, change in water and feed sources, better pasture supply and sometimes for conflict reason.

Study design: A cross-sectional type of study was undertaken from September 2013 to February 2014 and conducted in two districts of Borena zone (Yabello and Arero), which constituted semi-structured questionnaire survey and regular follow up in the randomly selected dairy cows. From a total of 44 peasant associations (PAs; 21 PAs of Arero and 23 PAs of Yabello), 4 were selected from each district based on previous reports of the problems and livestock population owned in those PAs.

Sample size and sampling method: 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 Borena were 384 dairy cows with different parity and body conditions, but 409 cows were examined to increase accuracy of the result. Simple random sampling was used to sample individual animals from selected herds of PA based on composition of livestock population.

Data collection: In questionnaire survey, observations were made and questions were asked about major reproductive problems like abortion, dystocia, retained fetal membrane, uterine and vaginal prolapse, anestrus, repeat breeding and management systems, as described in the study of Hadush et al. (2013); including factors associated with reproductive health problems in dairy cows.

Abortion, dystocia and RFM: The expulsion of dead fetus of recognizable size before full term of the gestation period is termed as abortion. Dystocia is an abnormal and difficult birth in which the first or specially the second stage of parturition was markedly

prolonged and subsequently found impossible for the dam to deliver without artificial aid. RFM is the lack of expulsion of the fetal membranes within the first 24 h after calving.

Anestrus, repeat breeding and uterine or vaginal prolapse: Anestrus is a state of complete sexual inactivity with no manifestation of estrus for more than two months. A cow or a heifer that failed to conceive for three or more consecutive services was termed as repeat breeding. Uterine or vaginal prolapse is the coming out of the uterus or vagina through the vulva after parturition.

Regular follow up was undertaken on 80 pregnant cows which were purposively selected at last months of their pregnancy and regularly followed for any reproductive problems encountered by owners and clinical examination by professionals. Individual cows' history was recorded including the name given by owners for their cows for identification during the study.

Body condition scores were determined as 1, 2, 3, 4 and 5 based on the criteria adopted from (http://www.dpi.qld.gov.au/documents/Biosecurity) and later on classified as poor (score 1 to 2), medium (score 3) and good (score 4 to 5).

California Mastitis Test (CMT) was performed to detect percent positivity of mastitis milk samples collected aseptically from each quarter of lactating cows based on the method described by Quinn et al. (2004). If at least one quarter was found positive by the CMT, then the cow was considered positive.

Rose Bengal Plate test (RBPT): All the collected serum samples were screened using RBPT. The antigen was obtained from Institute Pourquier, Montpellier, France. Antigen and serum were left at room temperature for half an hour before the test. Exactly 30 µL of each test serum was taken and placed in a clean plate, then 30 µL of RBPT antigen was added to the side of each test serum using a dropper. Then the antigen and the test serum were mixed thoroughly by an applicator and the plate was shaken by hand for 4 min. The samples showing any visible agglutination were considered as positive.

Data management and analysis: The data were entered and managed in Microsoft Excel. SPSS version 16 software was used for the data analysis. The differences in parameters *viz.* age, body condition, parity and other factors on reproductive problems were analyzed by using χ^2 (Chi-square) technique, and the level of significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

In this study, a total of 409 dairy cows were examined based on questionnaire and regular follow up, of which 195 (47.7%) cows were found to have suffered from at least one of the reproductive problems. Accordingly, cows found to be suffered from reproductive problems by questionnaire interview of owners and on regular follow up were 51.1% (n=168/329) and 33.8% (n=27/80), respectively (**Table 1**).

Table 1: The reproductive health problems based on questionnaire and regular follow up.

Method of study	No. of cows examined	No. of cows with reproductive problems (%)
Questionnaire	329	168(51.1)
Regular follow up	80	27(33.8)
Total	409	195(47.7)

The study indicated high prevalence of reproductive health problems of cows in the study area. This was relatively in agreement with the report of Hadush et al. (2013), who reported 44.3% prevalence of reproductive health problems of cows in central Ethiopia. However, higher prevalence was recorded in the present study as compared to the findings of Gizaw et al. (2007), Gashaw et al. (2011) and Dawit and Ahmed (2013), who reported the prevalence as 31.76%, 33.59% and 40.25%, respectively in different parts of Ethiopia. This variation in 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 identified mastitis, abortion, repeat breeder, anestrus and RFM as the major reproductive health problems, while dystocia and uterine prolapse indicated lower rate of prevalence in relation to others (**Table 2**). Comparable with the report of Bitew and Prased (2011), 12.2% abortion was observed in the present study. In contrast to our study, Dawit and Ahmed (2013) reported relatively lower prevalence (6.3%) of abortion. Difference in rate of abortion could be related to variation in genetic, nutritional status, infection and level of toxicities in different areas of studies.

The prevalence of repeat breeding in the present study (10.3%) is in agreement with the findings of Amene (2006) and Hadush et al. (2013), who reported the incidence of the problem as 9.6% and 10.6%, respectively. However, our result is relatively higher than the study of Haile et al. (2010), Dawit and Ahmed (2013) and Bitew

Table 2: Relative occurrence of major reproductive health problems of cows of Borena Zone.

Reproductive health problem	Questionnaire survey (%)	Regular follow up (%)	Overall incidence (%)
Dystocia	10(3.0)	4(5)	14(3.4)
Mastitis	73(22.2)	14(17.5)	87(21.3)
Abortion	40(12.2)	10(12.5)	50(12.2)
RFM	25(7.6)	6(7.5)	31 (7.6)
Uterine prolapse	10(3.0)	1(1.25)	11(2.7)
Repeat breeder	42(12.8)	0(0)	42(10.3)
Anestrus	42(12.8)	0(0)	42(10.3)
Total	242(73.6)	35(43.75)	277(67.7)

and Prased (2011), who reported prevalence of 6.2%, 3.87% and 3%, respectively in different areas of Ethiopia. The incidence recorded in the present study is lower than the report of Micheal (2003) who found 13% in and around Hawassa, southern Ethiopia. This variation was related to level of malnutrition, time of insemination, method of heat detection and communal use of a bull for natural service, endocrine imbalance, and reproductive tract infections.

The rate of anestrus (10.3%) in the present study was similar with the finding of Amene (2006), who reported a prevalence of 10.2% at Alage Dairy Farm, but lower than the result of Befekadu (2007) in Debre-Zeit, Ethiopia (16.4%). This might be due to the differences in breed, nutritional status and other management system.

Retained Fetal Membrane was one of the major reproductive health problems identified in the present study with a incidence rate of 7.6%. This was relatively comparable with the study of Bitew and Prased (2011). This incidence in this study was lower than the findings of Tadelech (2004), Amene (2006) and Gashaw et al. (2011), who reported 14.3%, 26.6% and 19.2% respectively from different areas of Ethiopia. Retention of fetal membrane is related to infection, dystocia and its predisposing factors, as well as management difference especially feeding and sanitation.

The prevalence of dystocia obtained in this study (3.4%) was lower than the previous reports (Mamo, 2004; Gizaw et al., 2007; Bitew and Prased, 2011; Dawit and Ahmed, 2013). 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 prolapse of uterus and vagina reported in this study (2.7%) was in line with the research of Bitew and Prased (2011) and Ebrahim (2003), who reported the incidence as 1.7% and 1.3%, respectively. This is fairly related to case of dystocia and its related factors.

In this study, abortion and the stage of gestation had direct proportionality and shown a significant difference ($p<0.05$) between the stages (**Table 3**).

Table 3: Abortion at different stages of gestation in Borena Zone.

Stages of gestation	No. of abortion (%)	χ^2	p-value
1st trimester	4(8)		
2nd trimester	11(22)	61.094	0.001[*]
3rd trimester	35(70)		
Total	50(100)		

[*]Significant

The prevalence rate of abortion as increased with the stage of gestation which was in agreement with that of Bitew and Prased (2011) who reported high rate of abortion in third trimester. This might be due to differences in environmental condition and disease of brucellosis obtained in the present study at a rate of 2.91%.

The study indicated that with increasing age and parity, there was increased reproductive problems of dairy cows, but the difference between the factors was non-significant ($p>0.05$). Poor and good body condition animals showed higher prevalence of reproductive problems than medium body condition of animals. The origin of animals (studied district) did not have any significant effect on incidence of the problems ($p>0.05$) (**Table 4**). An increased rate of reproductive health problems with increased age and parity of cows was due to the fact that frequency of exposure to reproductive health problems with increased age and parity, decreased defense mechanisms and lack of uterine tone and slow involution of the uterus at higher parities. High prevalence of reproductive health problems in poor and good body condition and less in medium condition in the present finding was in contradiction with the report of Gashaw et al. (2011), who reported a low prevalence of the problems in body condition score as 0, 1 and 5. These finding realized the fact that poor body condition animals were susceptible to the problems due to weakness preventing expulsion of the fetal membrane, leading to secondary complications and poor defense mechanism that increase rate of

Table 4: Prevalence of reproductive problems with its association risk factors.

Risk factors	No. of cows examined	No. of cows with reproductive problems (%)	χ^2	*p*-value
District			0.508	0 .476
Yabello	198	98 (49.5)		
Arero	211	97 (46.0)		
Total	409	195 (47.7)		
Age in Years			1.537	0.464
3-5	109	48 (44.0)		
>5-8	189	89 (47.1)		
>8	111	58 (52.3)		
Total	409	195 (47.7)		
Parity			0.396	0.820
1-3	187	86 (46.0)		
4-5	145	71 (49.0)		
>5	77	38 (49.4)		
Total	409	195 (47.7)		
Body condition			5.666	0.59
Poor	120	58 (48.3)		
Medium	191	81 (42.4)		
Good	98	56 (57.1)		
Total	409	195 (47.7)		

infection and a fat cow was more susceptible to metabolic problems and infections and is more likely to have difficult at calving, retained placenta 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 troubleshoot problems and improved the health and productivity of the dairy herd; whereas, medium body condition animal was in perfect condition to meet performance needs.

Table 5: Laboratory test result against brucellosis and mastitis using RBPT and CMT.

Name of the disease	Test applied	No. of cows examined	Positive cases (%)
Brucellosis	RBPT	412	12(2.91)
Mastitis	CMT	402	275(68.41)

*Rose Bengal Plate Test (RBPT), California Mastitis Test (CMT)

Based on laboratory findings, brucellosis and mastitis had great roles in dairy cows' reproductive health problems of the study area, and indicated the prevalence as 2.91% and 68.41%, respectively (**Table 5**). The prevalence rate of brucellosis in the present study was lower than previous report of Bedane et al. (2012a) within the same study area (5.9%). This might be due to difference in management of the herds considered. The prevalence of mastitis was comparable with the report of Zeryehun et al. (2013) and Mekibib et al. (2010); but

higher than the reports of Sori et al. (2005), Bedane et al. (2012b) and Lemma et al. (2001) in different parts of Ethiopia. This variation was due to difference in breed considered, management of cows and its environment as well as awareness level of communities on disease of mastitis in the study area. Therefore, further investigation is required on the root cause of reproductive health problems of cows and awareness creation to communities on its control and prevention of the problems in the study area.

CONCLUSION

This study revealed a high prevalence of reproductive health problems, out of which mastitis, abortion, repeat breeder, anestrus and RFM were the most prevalent problems of dairy cows in Borena zone. High prevalence of such interrelated problems require further study to identify the most important one as to design control strategy and community awareness on its early control and prevention activities in the study area.

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