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Assessment on major reproductive health problems of dairy cattle in Boloso Sore, Southern Ethiopia

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The ultimate goal integrated herd health management is to lower calving interval, decrease the number of services per conception thereby increasing reproduction and production but reproductive health disorders affect the reproductive performance of the dairy cows, the number of potential replacement needed to maintain a constant herd size and the longevity of the cow in the herd. There was insufficiency research information in the particular situation in the area for dairy production intensification. Assessments were conducted to identify the major reproductive health problems of dairy cattle and associated risk factors at Boloso Sore, Ethiopia from November 2016 to April 2017. In the present study, smallholder dairy owners were interviewed using local language; data on dairy reproductive performances particularly history of reproductive health problems were collected. A total of 200 respondents were interviewed and the finding revealed that the most frequently encountered reproductive health problems were repeat breeding, dystocia, abortion retained fetal membranes, uterine prolapsed, and still birth: 17,16.5, 14.5, 5.5, 3.5, and 1% respectively were record. Overall, fifty two percent (n=104/200) of dairy owners responded to the presence of either one or more reproductive disorders history in their herd. In the present study the association of history of reproductive problems showed significant difference with respect to breed and parity of dairy cattle thus, Holstein cross breed dairy with increased parity was recorded to have history of reproductive health problem than others in the management system. Further studies should be conducted at different cross blood level, and awareness given to farm owners and attendants to improve dairy management with increased parity.

Key words: Abortion, Boloso sore**,** breed, dairy, parity, reproductive health problem.

INTRODUCTION

Ethiopia is believed to have the largest livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of the country and is still promising to contribute to economic development of the country. The Ethiopian total cattle population is estimated to be about 56.71 million. Out of this, the female cattle constitute about 55.45 and 98.66% of the total cattle in the country are local breeds and the remaining are crossbreed and exotic breeds that accounted for about 1.19 and 0.14%, respectively CSA, 2015). The livestock sector plays a vital role as source of food, income, services and foreign exchange to the Ethiopian economy (Ayele et al., 2003). For several years, Ethiopia ranked first in cattle population in Africa.

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(However, the dairy industry is not as developed as that of east African countries; the national milk production remains the lowest in the world even by African standard (Kassa and Lema, 2005).

Milk production in the country is mainly from indigenous cattle breeds, which are kept for multi purposes in the different agro ecology and production systems. The first attempt for the improvement of dairy cattle production in Ethiopia was founded in the late 1960s through the introduction of exotic dairy breeds and use of reproductive technologies (Ahmed et al., 2003). Cow regular breeding 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 and resume estrus 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 (Shiferaw et al., 2005).

Reproductive problems have been implicated to cause considerable economic loss to the dairy industry due to slower uterine involution, reduced reproductive rate, prolonged inter-conception period and calving interval, high cost of medication, drop in milk production, reduced calf-crop and early depreciation of potentially useful cows (Bekana et al., 1997). In addition, several studies indicate that reproductive disorders are the most frequent culling reasons (Stevenson et al., 1998). The major problems that have direct impacts on reproductive performance of dairy cow were abortion, dystocia, retained fetal membrane, metritis, prolapse, anestrus and repeat breeding (Lobago et al., 2006). For the production constraints, reproductive health problem (RHP) plays major part but, in the present area there is no study reported thus. The present study was conducted with objective to assess the reproductive health problems and associated risk factors with the reproductive health problem in the area.

MATERIALS AND METHODS

Study area

The study was conducted from November 2016 to March 2017 in and around Boloso Sore District, Southern Ethiopia. Boloso Sore is located in the Wolaita Zone of the Southern Nations, Nationalities, and Peoples' Region, 300 km southwest of the capital city of Ethiopia, Addis Ababa. The area has a latitude and longitude of 7°05′N 37°40′E / 7.083°N 37.667°E and an altitude of 1350-2380 m above sea level. The rainfall pattern is bimodal; a short rainy season runs from March to May and long rainy season runs from June to September with average annual rainfall of 1300 mm and average daily temperature of 20.4°C The district is bordered by Boloso Bombe in the West, Hadaro Tunto of kembata Tembaro North West, Sodo zuria and Damot Sore South and Damota Gale in the East. An administrative center of the district, Areka was establish 1959, and Ethiopian Institute of Agricultural Research opened a research center since 1985 with the mandate as center of excellence with Enset root crop verification, Dorper sheep multiplication and to achieve the national research pillars through commodity base integrations on livestock, crop and natural resource management. Depending on the climatic condition, 80% was Woinadega (mid altitude) the remaining composed of Kola (Lowland) and small proportion was for Dega (Highland). According to Wolaita Zone Livestock And Fishery Resources office 2016 report, the livestock population of Boloso Sore district was estimated as 84,391 cattle, 57,331 ovine, 8,396 caprine, 7,321 equines and 91,375 poultry. The district have a total of 34 district Kebeles, of which four dairy potential kebeles (Dola, Xadisa, Hangada and Puxo) were sampled through multistage system in consultation with zone and district level of Biros of Livestock and Fishery Resources.

Study population

Based on the accessibility and dairy potentials in line with zonal dairy estrous synchronization program, four kebeles were purposively selected and using semi structured questionnaire randomly sampled smallholders were interviewed. The owners were interviewed by local language and data were collected on reproductive health problems, dairy reproductive performance and demographic situation of the smallholder in the area.

Study design and sampling procedures

A cross sectional study was conducted from November 2016 to March 2017 in and around Boloso Sore district. From the study, district through multistage sampling technique, four kebeles namely Dola, Xadisa, Hangada and Puxo were purposively selected based on their accessibility, and existing dairy potential in line with zonal dairy estrus synchronization program. Household's data list who own dairy cattle were captured from the kebeles administrative office, and individual owners for interview were taken by simple random sampling method using lottery system.

Sample size determination

In four kebeles, of the total households, 5080 dairy owners with herd size more than one dairy cows were considered and based on the formula, questionnaire survey sample size was calculated by using the formula given by Arsham (2002) which is: $N= 0.25/SE^2$, Where N= sample size, SE (standard error=5%). The sample size required for the questionnaire survey as per the above formula is 100 for the site. However, to include different risk factors in consideration of kebeles area coverage and large household size, and to increase the precision of the result, the number was increased double across the four kebeles and so a total of 200 individuals were interviewed.

Data analysis

The data were entered and managed in Microsoft Excel. SPSS version 20 software was used for the data analysis. The differences in parameters such as, breed, calving interval, parity and other factors on reproductive problems were analyzed by using $\chi 2$ (Chi-square) test, and the level of significance was set at 95% confidence interval.

RESULTS

In this study, a total of 200 smallholder dairy owners 68.5% male and 31.5% female were interviewed from the selected four kebeles based on smallholder number proportion; 49, 53, 44 and 54 respondents householders were used from Hangad, Puxo, Xadisa and Dola respectively in this data analysis (Table 1). Fifty two percent of the farm owners responded that their cows were affected by either one or more reproductive health problems. The major reproductive disorders in the district were repeat breeding, dystocia, retained fetal membranes, abortions, uterine prolepses and still birth.

Respondent's belongs to adult age group which indicates the consistency of the data generated for average age of 31.12±5 across the kebeles. Concerning the level of education, the highest percentage (54.5%) of the respondents were illiterate, followed by 37.5% which studied in elementary school, and 4.5% of the respondents had attended high school and 3.5% had college diploma education across the kebeles. Average family size in the area was about 4.81±1.75. With regards to the individual, and spouse occupation, 33.5% were actively involved in livestock rearing and the rest (66.5%) were involved in agricultural activities other than livestock keeping due to feed challenge and low initial investment capacity.

Average cattle herd size at individual household level was found; about 3.39±1.8 head of cattle were recorded and the largest portion was local breed accounting for 80% followed by 20%; cross Holstein Friesian (HF) distribution was statistically significant across the kebeles. In this study, average lactation length, calving interval, and average age for heifers at first bull service was 9.2±2.7, 15.21±5.72 and 38.1±6.6 in month's respectively and were statistically significant across the kebeles. An average lactation length of 9.2±2.7 shows that, cows had the second pregnancy which was statistically significant across the kebeles. Actually, there should be about 45-60 open days gap between the calving to the next heat sign unless it will lead to the postpartum complication; this significant record difference indicated the presence of prevalent postpartum complication in the area reported in this study. In the present study, two potential sources for breeding animals origins were identified and overall, 71% of the animals originated through birth and 29% were through market purchase process and the respondent consent across kebeles were not statistically significant, which indicted that reproductive health problems were enzootic and could be mainly management related. For the breeding practice, 62% respondent use conventional bull service followed by 30.5% which use artificial insemination and 7.5% use other alternative and the respondent consent were found to be statistically significant. This could have emanated from inconsistence AI service delivery system, poor heat detection and letting dairy cows free grating in the pasture through mixed herding. For the respondent consent overall, 87.5% respondent had no regular vaccination for the herd for any communicable livestock disease in the area and responded that no vaccination calendar was set by the service delivery system.

In the present study, the history of reproductive health problem at household herd level were 52% (n=104/200) and the respondent consent were statistically significant across the kebeles. Based on the respondent consent, animal with increased parity stage (2.6±1.6) showed history reproductive disorder and to the type of reproductive health problem identified repeated, breeder syndrome, dystocia, abortion, retained fetal membrane, uterine prolapsed, mixed type and still birth were 17, 16.5, 14.5, 5.5, 3.5, 1.5 and 1% respectively based on their importance. 52% of the respondent knew no identified root cause on the occurrence of the reproductive health problem in the herd and the consent recorded statistically significant in the kebeles. Based on the consent, the herd level history abortion occurs during second half of gestation (5.78±1.72) and the responses were statistically significant for kebeles.

From Tables 2 and 3, herd size, parity stages, dairy breed and breeding service type were used to assess the association with the occurrence of the reproductive problems. In the present study, with the increase of herd size, the respondent consent indicate there was association of history of reproductive health problem occurrence in the herd by 66.7, 42.3 and 36% for larger, small and medium herd size respectively which was not significant statistically. Respondent consent for the association of breed to the history of reproductive health problem occurrence were found higher in cross breed than local by 59.1 and 34.5% respectively and were statistically significant (Table 4). Similarly, with the increase in number of parity have a significant influence the occurrence of reproductive problems that, the effect increased progressively from primiparous to multiparious (37% and 75.4% respectively) since postpartum complication and owner attitude towards dairy management are inversely related that, the production system was purely traditional and with the increase in exotic blood level condition like postpartum complication were increase.

DISCUSSION

Based on the overall respondents consent, 52% (n=104/200) herd level history of reproductive health problems were recorded which was higher when compared with 39.5% found by Wagari and Shiferaw (2016), and 24.8% by Bitew and Prasad (2011), Wujira and Nibret (2016), Madot and Nibret (2015) and Abebaw et al. (2009) who reported 35.5, 29 and 33.59% in and around Horro Guduru Wollega, Bedelle zone, Wolaita sodo, Jimma and Gondar town respectively. The differences were due to difference in dairy management and agro ecological. In the present study, repeat breeder

Table 1. Socio-demographic data of characteristics of households in the study district (Mean± SD, frequency and Chi-square values).

Parameter (%)	Study district kebels				Overall (N=200 hh)	χ^2
	Hangada (N=49 hh)	Puxo (N=53 hh)	Xadisa (N=44 hh)	Dola (N=54 hh)		
Sex of respondents						
Male	26	48	31	32	68.5	19.587**
Female	23	5	13	22	31.5	
Average age of respondents (year)	33.4±4	31.8±6	28.73±6	30.1±5	31.12±5	23.46 **
Marital status						
Single		1	4	6	5.5	8.546 ^{NS}
Married	49	52	40	48	94.5	
Family size of respondents (persons)	5.2±1.8	4.3±1.49	4.8±1.87	4.89±1.74	4.81±1.75	2.987 ^{NS}
Educational profile of respondents						
Illiterate	31	22	30	26	54.5	
Elementary school	14	31	9	21	37.5	31.654 **
High school	2		1	6	4.5	
College and other	2		4	1	3.5	
Respondent occupation						
Livestock rearing	18	25	3	21	33.5	
Agricultural activity other than livestock rearing	31	28	41	33	66.5	19.44 **

hh; =interviewed households; x^2=chi-square; Significant p<0.05**; non-significant; P >0.05

Table 2. Dairy reproductive and productive performance (Mean± SD, frequency and Chi-square values).

Parameter (%)	Study district kebels				Overall (N=200 hh)	χ^2
	Hangada (N=49 hh)	Puxo (N=53 hh)	Xadisa (N=44 hh)	Dola (N=54 hh)		
Average herd size	3.22±1.7	3.3±0.9	3.22±1.4	3.75±2.6	3.39±1.8	3.231 ^{NS}
Average milking cows number in the herd	0.72±0.74	0.58±0.57	0.91±0.68	0.96±1.15	0.79±0.83	16.571 ^{NS}
Breed of dairy cows						
Local	35	46	42	37	80	14.7986**
Cross HF	14	7	2	17	20	
Average lactation length (LL/month)	8.92±2.03	9.1±1.8	8.4±2.9	10.1±3.5	9.2±2.7	53.319**
Average Calving interval (CI/month)	12.34±2.6	14.6±4.9	17.2±6.3	16.8±6.9	15.21±5.72	40.637**
Average age for heifer at first bull service (month)	38.6±5.6	38.5±7.2	37.8±4.6	38.13±6.64	38.1±6.6	42.280**

RFM= retained fetal membrane; RHP=reproductive health problem; hh = interviewed households; $\chi 2$ = chi square; significant P<0.05**; non-significant; P >0.05.

Table 3. Reproductive health problems in the study area (Mean± SD, frequency and Chi-square values).

Parameter (%)	Study district kebeles				Overall (N=200 hh)	χ^2
	Hangada (N=49 hh)	Puxo (N=53 hh)	Xadisa (N=44 hh)	Dola (N=54 hh)		
History of RHP						
No	28.6	50.9	61.4	51.9	48	11.063**
Yes	71.4	49.1	38.6	48.1	52	
Parity stage with history of RHP	3.4±1.2	3.1±1.3	2.4±1.6	2.1±1.7	2.6±1.6	25.817^{NS}
Record history on major RHP type						
Dystocia record	-	7.5	27.3	31.5	16.5	25.269**
Abortion record	18.4	24.5	6.8	7.4	14.5	9.176**
Uterine prolepses record	-	1.9	9.1	3.7	3.5	6.264^{NS}
RFM record	4.1	5.7	4.5	7.4	5.5	3.439^{NS}
Still birth	-	-	2.3	1.9	1	2.146^{NS}
Repeated breeder syndrome (RBS)	6.1	11.3	20.5	29.6	17	11.797**
Mixed	-	-	-	5.6	1.5	11.768^{NS}
Respondent consent on identifying cause of RHP						
Yes	14	27	27	28	48	11.063**
No	35	26	17	26	52	
Abortion history and gestation length (month)	5.82±1.84	7.34±1.51	4.72±1.85	5.24±1.56	5.78±1.72	14.026**

RFM= retained fetal membrane; RHP=reproductive health problem; hh = interviewed households; $\chi 2$ = chi square; significant P<0.05**; NS, non-significant; P >0.05.

syndromes, dystocia, abortion, RFM and uterine prolapse were found to be the major reproductive health problem identified in the area. The higher occurrence for repeated breeding syndrome (RBS) by 17% were factored by use of sub fertile bulls, management practices like insemination timing, faulty heat detection and inconsistence breeding services delivery system which agree with the repot in the country by Ararsa and Wubishet (2014); Adane et al. (2014); 10.3 and 13.08% respectively in and around Borena Oromia and Hossana town are also contributing factors and the portion of dystocia, may be due to parity of the dam as well as the breed of the sire (Arthur et al., 2001). Also, the present record for RBS was higher than the study report in the country, 3.87% by Dawit and Ahmed (2013); 2.9% by Bitew and Prasad (2011) and 1.3% by Abebaw et al. (2009); this high report was due to the synchronization program intervention by individual cow's physiological response difference to prostaglandin injection.

In this study, an abortion history most commonly occurs during their second half of gestation which is 5.78±1.72 in month and was statistically significant across kebeles. The occurrence of abortion in this study was about 14.5%, which strongly agrees with the findings of Kifle and Moges (2016) who reported 19.7% in and around Gondar town and Adane et al. (2014) who reported 13.08% in and around Hosanna town. This study shows that abortion in dairy cattle was found to be more common in pluriparous cows at advanced pregnancy stage. The possible predisposing condition of abortion was identified as both mechanical and infectious cause but, need further investigations to identify the etiology. The record for retained fetal membrane (RFM) (5.5%) agrees with the report of Ayana and Gudeta (2015) in selected sites of central zone of Tigrai region, northern Ethiopia reporting an occurrence of 8.3 and 7.18% in Hossan town

Table 4. Association between history of RHP and putative risk factors (Frequency and Chi-square values).

Risk factors (%)	History of RHP		χ^2
	Yes	No	
Herd size			
Small herd size(1-3)	42.3	57.7	1.108^{NS}
Medium herd size(4-10)	36	64	
Large herd size(>10)	66.7	33.3	
Breed of dairy cows			
Local	34.5	65.5	3.96^{**}
Cross HF	59.1	40.9	
Service type			
Artificial insemination	50	50	1.868^{NS}
Bull	34.8	65.2	
Parity type			
Single parity (primiparous)	37	63	6.988^{**}
Multiple parity (multiparious)	75.4	24.6	

RHP=reproductive health problem; χ^2 = chi square; significant P<0.05**; NS, non-significant; P >0.05.

(Adane et al., 2014). The much incidence of RFM might be linked to the low incidence of abortion a known predisposing factor for RFM. Other factors such as year of calving, season of calving, parity of dam, calving difficulty and fetal presentation have all been shown to affect the incidence of RFM (Arthur et al., 2001).

The higher occurrences of reproductive problems in crossbred cattle (59.1%) than local breed (34.5%) may be due to the fact that European breeds are less adapted to tropical conditions of high temperature and humidity, disease and low feed quality than zebu cattle Mukasa-Mugerwa (1989) making them more susceptible than indigenous zebu. 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 (Tekelye et al., 1991).

Significantly higher occurrence of reproductive health problems observed in multiparous cows (75.4%) in this work is in agreement with those of previous findings by Micheal (2003) which is possibly due to the repeated exposure of the genital tract of pluriparus cows to environmental risk factors that can impart uterine infection. It can also be due to older cattle are not as such good in feed intake capacity and decrement in natural immunity as age increases. Even though the service type (AI or natural mating) of the study animals did not influence the occurrence of reproductive health problems in the present study, that is statistically non-significant, It was high in those which use artificial insemination (50%) than (34.5%).

Conclusions

The present study revealed a high occurrence of reproductive health problems, of which repeat breeder, dystocia, abortion and retained fetal membrane were found the most common problems of dairy cows identified in the area. Also, this study indicates that the association of history of reproductive problems showed significant difference with respect to breed and parity of dairy cattle thus; Holstein cross breed dairy with increased parity was recorded to have history of reproductive health problem than others in the management system. Further studies should be conducted at different cross breed level, and awareness should be creation to farm owners and attendants to improve dairy management with increased parity. Many small holders' farms are run as a sideline business and are often victimized with improper management thus; putative risk factors responsible for the occurrence of reproductive health problems were breed, service type and parity stage. Therefore, improving management like herd health care, heat detection and proper selection of bulls for breeding will minimize the problems and hence increase reproductive efficiency of dairy cows in the area.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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