

Reproductive disorders of dairy cows managed under intensive and semi-intensive production systems in three selected towns in southern Ethiopia

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Abstract

Reproduction and fertility, mainly affected by several reproductive disorders, are the two pillars of dairy production sustainability and profitability. A cross sectional survey was carried out in dairy farms of Hawassa, Arsi Negelle and Wolaita Sodo towns, southern Ethiopia to estimate the prevalence of reproductive disorders and assess the associated host and management related risk factors. Accordingly, a total of 236 recently calved and pregnant cows were managed in 74 randomly selected dairy farms, which were visited every other week. Besides, record exploration and face-to-face interview of farm owners/attendants were carried out. The results indicated that 82 (34.75%) of the examined cows were affected with one or more reproductive health disorders, which was 49.4% in Wolaita Sodo, 36.54% in Arsi Negelle and 21.78% in Hawassa, respectively. Retained fetal membrane (21.61%), uterine infection (19.49%), dystocia (11.44%) and abortion (7.63%) were the leading reproductive disorders encountered, followed by hypocalcemia, anoestrus, uterine prolapse, repeat breeder and vaginal prolapse. Among the considered host and management related risk factors, number of services per conception ($p=0.018$), previous history of reproductive disorder ($p=0.041$), geographic area ($p<0.001$), farm ownership ($p<0.001$), ventilation ($p=0.001$), presence of calving pen ($p=0.006$) and contact with dogs ($p=0.021$) were significantly associated with the occurrence of reproductive disorders. The study further indicated that retained fetal membrane, dystocia and abortion had statistically significant ($p<0.01$) contribution for the occurrence of uterine infection. In general, the problem is prevailing and is among the major bottlenecks for the development of dairy production in the areas. The observed reproductive disorders are highly interdependent with the cause-effect relationship and their occurrence are significantly influenced by several managerial/environmental factors than host factors. Therefore, further research work on the etiological factors of the observed reproductive disorders and enhancing the awareness of the owners/attendants are recommended to improve the management and hygiene of dairy cows and their environment at least during their partum and postpartum period.

Key words: Dairy cows, reproductive disorders, Ethiopia

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INTRODUCTION

The huge livestock resources of Ethiopia have been underutilized because of multi-factorial reasons including widespread infectious and non-infectious diseases, poor management system and unimproved genetic makeup coupled with poor nutrition and absence of well-developed market infrastructure (MOA, 1998). In general, reproduction and fertility are the two key pillars of dairy production profitability (LeBlanc, 2008). The incidence rate for reproductive disorders in dairy herds outnumbered the incidence rates of mastitis and locomotor disease (Gardner et al., 1990; Noakes et al., 2001). These problems, caused by infectious and non-infectious causes, are responsible for reduced milk yield and subsequent

reproductive performance of dairy cows (Rajala & Gröhn, 1998; LeBlanc et al., 2002; LeBlanc, 2008) and ultimately cause premature and forced culling of high producing dairy cows (Esslemont & Peeler, 1993).

Studies conducted so far in Ethiopia (Negussie et al., 1998; Shiferaw et al., 2003; Asseged & Birhanu, 2004; Lobago et al., 2006; Amene et al., 2011; Nuraddis et al., 2011; Dinka, 2012) revealed poor reproductive performance of dairy cows because of prevailing reproductive disorders and limited energy intake. For feasible intervention, the poor reproductive performance of dairy cows should

warrant investigation on the types and magnitudes of the existing postpartum problems associated with the reproductive issues. In this regard, a couple of researchers (Bitew & Prasad, 2011; Gashaw et al., 2011; Angesom et al., 2013; Getenet et al., 2014; Wujira & Nibret, 2016; Ambaw et al., 2017; Abuna et al., 2018) attempted to address this issue by employing questionnaire survey and observation in some parts of the country. However, the majority of the aforementioned studies were aimed at observing the study animals at a single point in time so that the probability of missing the variable of interest is high. Moreover, they were limited to certain reproductive disorders or on small study area. Perhaps, these limitations have underestimated the type and magnitude of the reproductive disorders in the dairy farms of Ethiopia. In contrast, the present study was based on regular visit of the study animals during the period the event of interest is most likely to occur. Thus, the chance of missing the events is very low. On the other hand, the existing literatures and the scope of reproductive health in the dairy industry demand more intensive investigation. Therefore, the present study was intended to identify and estimate the prevalence of the major clinically manifested postpartum problems and to assess the associated risk factors in dairy cows kept under intensive and semi-intensive dairy farms in selected towns of Southern Ethiopia.

MATERIALS AND METHODS

Study Area

The study was conducted in Hawassa, Wolaita Sodo and Arsi Negelle towns. These towns are known for their high potential in dairy production in Southern Ethiopia and are the major source of milk and other dairy products to the Southern Nations, Nationalities and Peoples Regional State (SNNPRS) as well as to the Sidama and Oromia Regions.

Arsi Negelle town is located in the West Arsi zone of the Oromia regional state at a distance of 232 km from Addis Ababa. The town is situated at an altitude of 2,000 to 2,400 m above sea level, and at a latitude of 7° 21' N and longitude of 38° 42' E. The average annual temperature of the area varies from 14 to 23 °C while rainfall ranges between 500 and 1000 mm (Mengistu & Solomon, 2015).

Wolaita Sodo town is an administrative capital for the Wolaita zonal administration in SNNPRS. It is located at 380 km south from Addis Ababa. The town is divided into 3 sub-cities and 11 kebeles (represent the lower administrative units). The town has a census projected population of 111,616 (Amha et al., 2018).

Hawassa is the capital city of Sidama region, which is located 275 km south of Addis Ababa along the Addis Ababa - Moyale highway. Hawassa is situated at an altitude of 1750 m above sea level between 6°83' to 7°17' N and 38°24' to 38°72' E. Hawassa receives an average annual rainfall of 955 mm with mean annual temperature of 20°C (BoFED, 2007).

Study Population and Management Practices

The study population constituted the dairy cows in the dairy farms found in Hawassa city, Wolaita Sodo and Arsi Negelle towns. The majority of dairy farms included in this study were market-oriented smallholder dairy farms with average herd size of ≥ 5 cows. There were also few governmental and private owned large (commercial) scale dairy farms with herd size of over 50 cows in Hawassa city and Wolaita Sodo town. Most of these farms rear crossbred dairy cows and heifers with a semi-intensive management system. Hay and concentrate (wheat bran, molasses and brewery byproducts) were the common types of feed used almost in all farms although, some owners in Hawassa provided mineral supplements (calcium powder) to their cows to prevent the occurrence of milk fever. The oestrus signs of the cows were mainly detected by the owners and attendants of the farm. Artificial Insemination (AI) was the primary breeding system practiced in the study areas. However, most of the owners opt for natural mating when their cows repeat more than two times following AI. In all the farms, there was no regular vaccination and deworming practices for the common infectious and parasitic diseases, respectively.

The study animals included in this study were reproductively active cows found during their prepartum, partum and postpartum periods. All pregnant cows and heifers at ≥ 4 months of gestation period found in the selected farms and expected to deliver during the study period were included for the study.

Study Design and Sample Size

A cross sectional study was carried out between November 2017 and May 2018 to identify the major reproductive disorders in dairy cows. Although the selected farms were visited at different points during the study period, the individual cows were examined for a particular outcome event only once. The sampling method employed was systematic random sampling where the study subjects (dairy cows) were selected if they fulfilled the selection criteria. A total of 74 dairy farms, with the herd size of ≥ 5 cows, were randomly selected from 222 intensive and semi-intensive dairy farms whose records were available in

Hawassa city, Arsi Negelle and Wolaita Sodo towns agricultural bureau (Table 1). From these farms, a total of 236 pregnant cows and heifers (in their first pregnancy) which were at 4th or more months of

gestation were selected and registered according to their ear tag numbers.

Table 1. Number of dairy farms selected and surveyed during study period

Geographic areas	No of farms selected	Proportion
Hawassa	25	33.80%
Arsi Negelle	26	35.10%
Wolaita Sodo	23	31.10%
Total	74	100%

Methodology

All selected cows were registered by their ear tag numbers and/or given name for ease of identification. Then, the required information mainly breeds, parity, body conditions, management system, methods of service and the current and previous prepartum and postpartum reproductive health problems were recorded. These factors were then defined and classified for ease of data coding and analysis. The body condition scores were estimated as described by Wildman et al. (1982) and grouped into three categories: poor (scores 1 and 2), medium (score 3) and good (score 4). The breeds of the animals were identified as local, cross breed and exotic (Holstein Friesian and Jersey) based on phenotype, history from owners and the available record. The management system was classified into intensive and semi-intensive. Any reproductive health problem encountered before calving, during calving and after calving were classified and recorded as prepartum, partum and postpartum events, respectively. The study animals and/or farms were visited every other week until the end of study period for any new case or events of interest. Moreover, additional unscheduled visits were made following a call from the farm owners to gather incidental evidences, to make thorough physical examination and hence to timely collect appropriate data on clinical cases. Any abnormality or terminal event that included normal birth, dystocia, still birth, uterine prolapse, metritis, hypocalcaemia and other events were recorded.

After delivery, cows were regularly examined for the presence of retained fetal membrane, any systemic signs, and if any abnormal vaginal discharge occurred during postpartum period. With the exception of 13 cows that delivered on the last months of our study, all the cows were followed for one month post delivery. During each visit, rectal temperature of cows with rough hair coat, depression and reduced appetite

was measured by digital veterinary thermometers (Microlife VT1831; Measurement accuracy of $\pm 0.1^\circ\text{C}$). Each postpartum cow was visually inspected for the presence of any discharge on the vulva, perineum or tail. Moreover, after cleaning the vulva, a clean and sterile vaginal speculum was slowly inserted into the vagina of the cows and then the cervix and vagina were thoroughly inspected with illumination from a penlight. The type and nature of the vaginal discharge was differentiated from cows with normal delivery. The nature of discharge was classified as clear mucus, predominantly clear mucus with flecks of pus, muco-purulent (approximately 50% pus and 50% mucus), purulent (>50% pus) but not foul-smelling, or purulent or red-brown and foul smelling according to LeBlanc et al. (2002). Retained fetal membrane was defined as failure to pass the fetal membrane within 24 h postpartum (Khair et al., 2013). Cows or heifers that failed to conceive for three or more consecutive services were considered as repeat breeders (Robert, 1986; Shiferaw et al., 2003). Anoestrus was defined as the failure of the cow to show clinical heat signs for 90 days or more after parturition (Arthur et al., 1992; Bekana et al., 1994). Moreover, abortion was defined as the expulsion of a dead fetus of recognizable size at any stage of gestation (Robert, 1986; Ball & Peters, 2004).

Data Management and Analysis

The data obtained during regular visits were carefully entered into Excel spreadsheet and then coded and analyzed using Stata 14.2 version (Stata Corp, College Station, TX USA). The association of different risk factors such as breed, management system, body condition scores and methods of breeding with overall prevalence of reproductive problems was analysed by using χ^2 (Chi-square) test and values of $p < 0.05$ were considered as significant.

RESULTS

Out of the 236 cows examined, 82 (34.75%) of them encountered at least one of the major reproductive health problems. Relatively higher incidence risk of reproductive disorders was recorded from dairy farms in Wolaita Sodo (49.40%), followed by Arsi Negelle (36.54%) and Hawassa City (21.78%) (Table 2).

Retained fetal membrane (21.61%), uterine infection (19.49%), dystocia (11.44%) and abortion (7.63%) were the leading reproductive disorders encountered followed by hypocalcemia, anoestrus, uterine

prolapsed, repeat breeder and vaginal prolapse. The study further identified that retained fetal membrane (11.88%), uterine infection (8.91%) and abortion (5.94%) were the leading reproductive disorders in dairy farms of Hawassa City. Whereas, retained fetal membrane (25%), uterine infection (17.31%) and anestrus (13.46%), were the leading reproductive disorders in Arsi Negelle and uterine infection (33.73%), retained fetal membrane (31.32%) and dystocia (21.69%) in Wolaita Sodo towns (Table 2).

Table 2. Major reproductive problems encountered during the 7 months follow-up period

Type of reproductive Problems	Number (%) affected			
	Hawassa (n=101)	Arsi Negelle (n=52)	Wolaita Sodo (n=83)	Total (n=236)
Retained Fetal Membrane	12(11.9)	13(25)	26(31.3)	51(21.6)
Dystocia	4(4.0)	5(9.6)	18(21.7)	27(11.4)
Uterine infection	9 (8.9)	9(17.3)	28(33.7)	46(19.5)
Abortion	6(5.9)	6(11.5)	6(7.2)	18(7.6)
Hypocalcaemia	4 (4.0)	0(0.0)	3(3.6)	7(3.0)
Anestrus	0(0.0)	7(13.5)	0(0.0)	7(3.0)
Uterine prolapsed	4 (4.0)	0(0.0)	1(1.2)	5(2.1)
Repeat breeder	0(0.0)	3(5.8)	0(0.0)	3(1.3)
Vaginal Prolapse	0(0.0)	0(0.0)	2(2.4)	2(0.9)
Over all RPP*	22(21.8)	19(36.5)	41(49.4)	82(34.8)

*At least one of the reproductive problems

The association of different host and management related risk factors with the occurrence of reproductive disorders were assessed. Accordingly, among the host related risk factors, number of services per conception (NSC), breed and history of previous reproductive disorder had statistically significant association ($p < 0.05$) with the occurrence

of reproductive problems. Moreover, among the considered managerial risk factors, study sites, ownership, ventilation, floor type, presence of calving pen and contact with dogs had statistically significant association ($p < 0.05$) with the occurrence of reproductive disorders (Table 3 and 4).

Table 3. Host factors associated with the occurrence of major reproductive problems

Factors	Category	No cows examined	Cows affected, No (%)	χ^2	p value
BCS	Poor	18	5(27.78)	1.68	0.432
	Medium	52	15(28.85)		
	Good	166	62(37.35)		
NSC	One	114	34(29.82)	5.60	0.018
	\geq Two	94	43(45.74)		
Parity	One	81	30(37.04)	5.35	0.148
	Two	53	19(35.85)		

	Three	39	10(25.64)		
	≥Four	44	22(50.0)		
Breed	HF	64	10(15.63)	18.96	0.000
	HF cross	137	61(44.53)		
	Jersey	17	8(47.06)		
	Jersey Cross	16	3(18.75)		
History of rep. problem	Yes	41	21(51.22)	4.17	0.041
	No	162	55(33.95)		

BCS=Body condition score, NSC=number of services per conception for the current pregnancy, HF= Holstein Friesian

Table 4. Management Factors associated with the occurrence of major reproductive problems

Factors	Category	No cows examined	Cows affected, No (%)	χ^2	p value
Geographic area	Hawassa	101	22(21.78)	15.42	0.000
	Arsi Negelle	52	19(36.54)		
	Wolaita Sodo	83	41(49.46)		
Source of cows	Raised in the farm	179	63(35.19)	0.07	0.797
	Purchased	57	19(33.33)		
Ownership	Government	43	25(58.14)	21.89	0.000
	Private	133	30(22.56)		
	Cooperative	36	7(19.44)		
Management	Semi- intensive	62	25(40.32)	1.21	0.271
	Intensive	172	56(32.56)		
Ventilation	Poor	71	14(19.72)	14.80	0.001
	Medium	86	42(48.84)		
	Good	77	25(32.47)		
Floor type	Soil	12	1(8.33)	3.86	0.049
	Concrete	222	80(36.04)		
Graze Outside	Yes	47	21(44.68)	2.63	0.109
	No	187	60(32.08)		
Calving pen	Yes	85	39(45.88)	7.49	0.006
	No	149	42(28.19)		
Contact with dogs	Yes	144	58(40.28)	5.3	0.021
	No	90	23(25.55)		
Service Used	Natural	84	30 (35.71)	0.12	0.94
	AI	138	48 (34.78)		
	Both	13	4 (30.77)		

The attempt made to evaluate the association of uterine infection with the other reproductive disorders revealed that retained fetal membrane (RFM), dystocia and abortion had statistically significant

association ($p < 0.05$). However, hypocalcemia, uterine and vaginal prolapses were not significantly associated ($P > 0.05$) with uterine infection (Table 5).

Table 5. Association of uterine infection with the other reproductive disorders of cows as a predisposing factor

Predisposing factors	Number of cows	of Cows with uterine infection	Cows without uterine infection	χ^2	p-value
RFM	51	35(76.1%)	16(8.4%)	100.1	0.000
Dystocia	27	15(32.6%)	12(6.3%)	25.27	0.000
Abortion	18	8(17.4%)	10(5.3%)	7.73	0.005
Hypocalcemia	7	3(6.5%)	4(2.1%)	2.51	0.113
Uterine prolapse	5	2(4.3%)	3(1.6%)	1.37	0.24
Vaginal prolapse	2	1(2.2%)	1(0.5%)	1.19	0.27

RFM=Retained Fetal Membrane

DISCUSSION

The present study revealed that 34.8% of the cows observed had one or more of the aforementioned reproductive problems. The current prevalence is comparable to the previous reports from central Ethiopia (33.6%) (Angesom et al., 2013), Wolaita Sodo (35.5%) (Wujira & Nibret, 2016) in Ethiopia and a similar study from India (33.85%) (Khan et al., 2016). In contrast, prevalence as low as 9.2% (Ambaw et al., 2017) and as high as 54.6% (Tamirat et al., 2016) were also reported from South Wollo zone and Adea Berga dairy farm (located in West Shewa zone) in Ethiopia, respectively. The difference in the prevalence of the problem among the different towns/city considered in our study and among the current and previous reports could be explained by the variations in the level of owners' awareness and herd management practices among the different farms (Gashaw et al., 2011).

Based on the current study, retained fetal membrane (RFM) was the leading reproductive problem. The prevalence of RFM (21.61%) recorded in the current study is comparable to the reports of Gashaw et al. (2011), who reported 19.2% from Jimma town. However, the current report is considerably higher than other reports from different parts of Ethiopia *viz* 3.7% from Bishoftu town (Abuna et al., 2018), 0.8% from Ada'a district (Esheti & Moges, 2014), 8.6% from Bedelle area (Molalegn & Shiv, 2011) and 12.91% from Adama town (Gizaw et al., 2007). In developed countries, RFM affects 5–10% of calvings (LeBlanc, 2008). The variation in the prevalence of RFM among the different studies are majorly attributed to variation in nutritional and management factors which are commonly accepted as predisposing factors for its occurrence. Loss of uterine tone, stress, abortion, late or premature birth, dystocia, twinning, infections, seasonal and hormonal disorders, vitamin and mineral deficiencies have been identified as

causes of RFM (Beagley et al., 2010; Bizuayehu & Wale, 2016). Moreover, the difference in the definition of RFM (particularly on the cutoff period) used by the researchers might contribute to the observed difference in the prevalence of RFM among the aforementioned studies.

During the study period, uterine infection, the second most frequently encountered reproductive problems, was detected in 19.5% cows examined in the form of endometritis, metritis or pyometra. According to the existing literatures, the prevalence of uterine infection in different parts of Ethiopia is highly variable and ranges from relatively low (1.2%) (Esheti & Moges, 2014) to higher prevalence (31.6%) (Getenet et al., 2014). In developed countries, uterine infection affects about 20% of lactating dairy cows, with the incidence ranging from 8% to more than 40% (Goshen & Shpigel, 2006; LeBlanc, 2008; Mendonca et al., 2014). The variation in the prevalence of uterine infections among the studies could be associated with the occurrence of other reproductive disorders (Lewis, 1997; LeBlanc et al., 2002). However, the cleanliness of the calving area and hygiene during assisted calvings are generally thought to significantly affect the incidence and outcome of uterine infections (Olson et al., 1986; Youngquist et al., 1988).

Dystocia was the third frequently encountered reproductive problem in the current study with a prevalence of 11.4%. It was widely reported from different parts of Ethiopia with prevalence ranging from 0.79% in Wolaita Sodo (Getenet et al., 2014) to 11.6% in Mekelle (Mekonnin et al., 2015). Results comparable to the current finding were also reported from different countries abroad (Berry et al., 2007; Mee, 2008; Linden et al., 2009; Atashi et al., 2012). Several factors related to genetic, environmental, and management conditions are known to affect the incidence of dystocia (Adamec et al., 2006; Mee, 2008). Dystocia is a leading cause of calf death at or shortly after birth and leads to more retained placentas

and uterine infections with the concomitant reduction of milk yield and reproductive performance (Tenhagen et al., 2007; Lopez de Maturana et al., 2007; Atashi et al., 2012). It can also incur huge veterinary costs and in extreme cases, injury to or death of the dam (Dematawewa & Berger, 1997).

The prevalence of abortion (7.63%) recorded in this study is quite higher than the report of Adane et al. (2014) and Tulu & Gebeyehu (2011), who reported 2.56% from Hosanna and 2.9% from Jimma Horro district, respectively. However, it is lower than the 9.05%, 13.9% and 14.6% prevalence reported by Dawite & Ahmed (2013), Molalegn & Shiv (2011) and Hunduma (2013), respectively. The observed difference in the prevalence of abortion among the aforementioned studies could be explained by the difference in the breed composition of the examined herds, prevalence of diseases known to cause abortion, farm management activity specially feeding and sanitation, the study methodology used and the geographical location (Gashaw et al., 2011; Adane et al., 2014). Apart from the presence of several infectious and non-infectious causes (Hutchinson, 2009), the etiologic diagnosis of abortion in cows is difficult and often complicated by numerous factors (Tagesu, 2018).

The present study further indicated that cows with a previous history of any reproductive problems were more likely and significant ($p=0.041$) to encounter one or more of the reproductive disorders observed. In line with this, cows with four or more parities were more frequently affected by these reproductive problems than cows with fewer parities. These findings are in line with the previous studies (Dinka, 2012; Haile et al., 2014; Bizuayehu & Wale, 2016) and could be explained by the fact that the likelihood of infectious and/or mechanical damages and formation of scar tissue on the uterus and ovaries progressively increase with the subsequent increase in the parities of the cows. Similarly, cows bred two or more times with AI and/or bull service before conception were more significantly ($p=0.018$) affected with reproductive disorders than those cows with only a single service.

There was a statistically significant association ($p<0.00$) of reproductive disorders with the study sites and the ownership of the farms considered. The reproductive disorders were more frequent in dairy farms in Wolaita Sodo town (49.46%) and in government owned farms (58.14%). The observed differences could be associated with the differences in the level of awareness among owners and less

commitment of the farm attendants and managers in the government owned farms.

The presence of calving pen ($p=0.006$) and contact with dogs ($p=0.021$) have statistically significant effect on the occurrence of reproductive disorders, the higher prevalence being recorded in cows delivered in a calving pen (45.88%) and in cows that had contact with dogs (40.28%). Pathogens can easily accumulate in and rapidly disseminate in the area when unhygienic calving pen is used and dogs are allowed to roam freely in and around the farms, respectively.

The study further indicated that cows with dystocia, retained placenta and abortion were more likely to develop metritis/uterine infections. Several studies conducted abroad using path analysis and risk assessment indicated consistently that dystocia, retained placenta, nutrition, and metabolic conditions like ketosis and hypocalcemia increased the likelihood that a cow would develop metritis (Lewis, 1997; Földi et al., 2006; Dubuc et al., 2010; Galvao, 2013; Vieira-Neto et al., 2016). In the current study, about 76% of the cows with retained placenta developed uterine infection. This is comparably higher than the studies conducted abroad that found some 25% to 50% of retained placentas having associations with metritis (LeBlanc, 2008; Bonneville-Hébert et al., 2011). The higher infection rate in the current study could be partly explained by the poor hygiene of the calving pen and hands of the assistants and the overall husbandry practices.

Milk fever/hypocalcemia, was not significantly associated ($p>0.05$) with the occurrence of uterine infection. The absence of association between hypocalcemia and uterine infection could be due to the smaller number of cases encountered and the age (parity) of the study animals. Studies indicated that cows with several parity are quite frequently exposed to hypocalcemia and concomitantly with uterine infections (Lewis, 1997; LeBlanc, 2008). In this regard, over 55% of the cows examined in the current study were in their first or second parity, where calcium absorption and mobilization is not theoretically a problem. Conversely, five out of seven cows with hypocalcaemia were in their third or more parity. Studies also suggest that as parity exceeds three there will be reduced ability to mobilize calcium from bones, a decline in intestinal transport of calcium and the reduced ability to produce calcitriol (Horst, 1986; Chiwome et al., 2017).

The degree of contamination and trauma on the uterine wall increase during the aforementioned predisposing factors and/or reproductive disorders (Silva et al., 2008; Getnet et al., 2018). Following parturition, mainly during associated complications, a wide range of microorganisms (mainly bacteria) ascend from the environment, invade the birth canal and colonize the uterus of dairy cows and

CONCLUSIONS

The prevalence of reproductive disorders recorded in the current study suggests that the problem is among the major limiting factor on the dairy production in the area with a presumed reduction on the reproductive efficiency, profitability and sustainability of dairy production. Among others, retained fetal membrane and uterine infections were the two leading reproductive disorders detected in all the three towns. The study revealed that number of services per conception, previous history of reproductive disorder, geographic area, ownership, presence of calving pen and contact with dogs had statistically significant effect on the occurrence of the reproductive disorders. Moreover, cows with retained fetal membrane, dystocia and abortion were significantly exposed for uterine infection. Therefore, awareness should be created among the farm owners and/or attendants in order to improve the management and hygiene of dairy cows and their environment at least during their partum and postpartum period with ultimate goal of reducing the impact the aforementioned reproductive disorders on the sustainability of dairy production and profitability. Also, further research on the etiological factors of the observed reproductive disorders is recommended.

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