



# Reproductive Disorders in Dairy Cattle; Retrospective Study in Asella Town, Central Ethiopia



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## Abstract

A retrospective type of study was conducted to determine the prevalence of major reproductive problems and associated risk factors in dairy cows in Asella town, central Ethiopia, from November 2017 to April 2018. Face-to-face interviewing of the cow owners using a semi-structured questionnaire on the randomly selected dairy cows was employed to get the necessary information. A total of 310 dairy cows were studied, employing a questionnaire survey, out of which, 30.3% (n = 94) were affected by at least one or more clinical reproductive health problem. Dystocia, repeat breeder, retained fetal membrane, abortion; metritis, anestrus and uterine and vaginal prolapse were recorded with prevalence of 15.5%, 8.1%, 5.3%, 4.5%, 2.6%, 2.3% and 1.0%, respectively. The prevalence of clinical reproductive problems showed significant differences ( $P < 0.05$ ) with respect to parity, hygienic condition and age of an animal. The problems were more commonly reported in poor hygienic conditions, higher age groups and greater number of parities. This study indicated clinical reproductive problems, which included dystocia, repeat breeder, retained fetal membrane and abortion as the major factors responsible for the low reproductive performance of dairy cows in Asella town. Improvements in management systems, proper heat detection and proper selection of bulls for breeding could help in minimizing reproductive health problems and hence, improve the reproductive efficiency of dairy cows.

**Keywords:** Asella; Dairy cows; Prevalence; Reproductive disorders

## Introduction

Ethiopia has the largest livestock population in Africa with national herd consisting of about 55.2 million cattle, 29 million sheep and the same number of goats, 4.5 million camels and close to 50 million poultry that produces currently about 1,128 metric tons of meat, 174 million eggs and 5.2 billion liters of milk per year. In addition, it provides about 68 million tons of organic fertilizer and almost 617 million days in animal traction [1]. The livestock industry is an important and integral part of the agricultural sector in the country and contributes 12-16% of total and 35- 40% of agricultural Gross Domestic Product (GDP), respectively. It also contributes about 12-15% of total export earnings and is the second major sources of foreign currency earnings through export of hide, skins and live animals, namely cattle, sheep, camels and goats to major destination markets of United Arab Emirate (UAE), Kingdom of Saudi Arabia (KSA), Yemen and Egypt [2].

Ethiopia's population is growing at a tremendous rate that exacerbating poverty, leaving the population more vulnerable to hunger, disease, and famine [3]. The occurrence of these subsistence economic problems made the country to depend on livestock. Dependency on livestock by itself created a need

to expand livestock production, to help feed and support the growing population [4]. Dairying constitutes an important sub-sector of agricultural production which contributes towards filling in the large demand-supply gap for milk and milk products in urban centers. Urban dairying using improved dairy cattle is highly profitable. However, in rural areas the animals used by smallholder farmers are local breeds which aren't selected for milk production and animals are managed in a traditional way, meaning they mostly depend on natural pasture with no supplementary feeds and that the quantity of milk is low. Milk is mainly used for household consumption, not marketed and any surplus is usually converted into butter and sold in local markets. The situation is very different in more urban areas where farmers use crossbred, as well as high grade, dairy animals. They have access to artificial insemination, use more intensive systems, concentrate feeds and has access to animal health services. But these farmers account for only 1% of the dairy cattle population in the country. They supply milk to consumers in major urban centers, mainly through the informal market, though some are also sold to processing plants. But because this system uses such a tiny proportion of the dairy cattle population, milk supply is low [5,6].

Ethiopia holds large potential for dairy development due to its large livestock population. Out of huge cattle population in the country, 42% of total cattle for private holding are milking cows; however, milk production often does not satisfy the countries milk requirement due to the extensive and low input husbandry practice under which they are reared and widespread livestock disease [7]. Diseases commonly found in dairy cattle include bacterial infections, viral infections, Protozoal infections, internal parasites, Ectoparasites and other diseases such as acidosis, bloat, milk fever, ketosis, dystocia, retention of placenta, vaginal prolapse, traumatic reticuloperitonitis, nutrient deficiency, laminitis and urea toxicity [8]. In the last few decades, as the major epidemic disease was brought under control, emphasis has increasingly shifted to economically important diseases to the dairy producers and reproductive health disorders stand out as the most prominent [9].

Reproductive efficiency of a dairy cow is a critical component of a successful dairy operation and acts as an important component of a profitable dairy farm, whereas, reproductive inefficiency is one of the costliest problems facing the dairy industry today. Reproductive problems occur frequently in lactating dairy cows and can dramatically affect reproductive efficiency in a dairy herd [10]. Despite the huge number of cattle and their economic importance in the country, the constraints such as diseases of different origin, low quality and quantity nutrition, poor management and poor performance of indigenous breeds also result in the poor reproductive performance of dairy cattle. The major problems that have direct impact on the reproductive performance of dairy cows are abortion, dystocia, Retained Fetal Membrane, metritis, prolapse (uterine and vaginal), anoestrus and repeat breeder. 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, increased cost of medication, drop in milk production and early depreciation of potentially useful cows [11,12]. The reproductive diseases tend to develop gradually and can be difficult to identify until well established in the herd. Since most reproductive tract problems lack additional outward manifestation, hence, examination of gross and microscopic lesions of the genital tract plays a central role in the identification of these problems. Most of these abnormalities can only be diagnosed when the animal is subjected to postmortem examination [13]. The differences in management (production) systems and environmental conditions under which cattle are maintained could greatly affect the occurrence of reproductive health problems [14].

In order to improve the low productivity of local cattle, selection of the most promising breeds and crossbreeding of these indigenous breeds with high producing exotic cattle has been considered as a practical solution [15]. Crossbreed dairy cattle (Arsi × Jersey) or (Arsi × Holstein-Friesian) is the most common breed in Arsi of Oromia region, Ethiopia, and are important sources of food and income, especially in

urban area such as in Asella town. However, the reproductive health problems are main constraints of the dairy farming in the area. Even though there are many dairy farms in Asella town, Central Ethiopia, few studies have been conducted on the reproductive health problems of dairy cows [16] and most of the studies conducted under the current title in Ethiopia were not comprehensive. Despite these, the objective of the present study was: to determine the prevalence of reproductive health problems and to identify possible risk factors of such reproductive health problems of dairy cattle in Asella town.

## Material and Methods

### Study Area

This study was conducted in Asella town which is the capital of the Arsi zone of the Oromia regional state, central Ethiopia. Asella town is located 175 km southeast of Addis Ababa. The town is characterized by mild sub-tropical weather with the maximum and minimum temperature of 18 °C and 5 °C respectively. The annual rainfall ranges from 1300 to 1500 millimeters [17]. Topographically, Asella town is located on the high land rising over 2,400 meters above sea level. Vegetation of the area changes with altitude and rainfall ranging from scattered trees and bushes to dense shrubs and bushes. Livestock is the major agricultural resources in the area and has a livestock population of 82,190 cattle, 51,292 sheep, 11,479 goats, 162,015 poultry, 11,716 camels and 22,055 equines [18].

### Study Population

The study population consisted of dairy cows that were managed under different management system assess the reproductive health problems of cows in the study area.

### Study Design

A retrospective type of study was conducted from November 2017 to April 2018 in Asella town to identify the major reproductive health problems of dairy cows. Both face-to-face interviewing of the cow owners using a semi-structured questionnaire and clinical follow-up on the randomly selected dairy cows were employed to get necessary information on the subject matter of the current study.

### Data Collection

Questionnaire survey: To get co-operation of the dairy owners and obtain reliable information about their animals, an explanation of the objectives of the study was given before the start of the interview. Then questions were asked about major reproductive health problems like Abortion, Dystocia, retained fetal membrane, Metritis, Uterine and/or Vaginal Prolapse, Anestrus, repeat breeder, management systems, breed, breeding technique, the age of the animals and parity.

### Sample Size and Sampling Techniques

The simple random sampling method was employed to select the study animals from dairy farms in the study area. The desired sample size for this study was calculated using the formula

given by Thrusfield [19] with a 95% confidence interval and at 5% precision. The overall expected prevalence (18.3 %) of the reproductive health problem in the study area was taken from a study on reproductive disorders of dairy cows in and around Asella town by Hunduma [16]. In the end, proposed sample size was calculated as follows;

$$N = z^2 * \frac{p_{exp}(1 - p_{exp})}{d^2}$$

Where,

N = sample size

d = Desired absolute precision at 95% confidence interval = 5%

p<sub>exp</sub> = expected prevalence = 18.3%

Z = 1.96

By substituting the data in the given formula above we can get the value of n = 230. But to increase the precision, the sample size was increased to 310.

### Data Analysis

The data were entered and managed in Microsoft Excel. SPSS version 20 software [20] was used for the data analysis. The differences in parameters such as age, body condition, parity, management system, hygienic status and breeding type on reproductive problems were analyzed by using  $\chi^2$  (Chi-square) technique, and the level of significance was set at p < 0.05.

## Results

**Table 1:** Overall prevalence of reproductive disorders.

Reproductive Health Problems	Cows Affected	Overall Prevalence	Relative Frequency
Dystocia	48	15.5%	51.1%
Repeat breeder	25	8.1%	26.6%
Retained fetal membrane	18	5.3%	19.1%
Abortion	14	4.5%	14.9%
Metritis	8	2.6%	8.5%
Anestrous	7	2.3%	7.4%
Prolapse (Uterine and Vaginal)	3	1.0%	3.2%
Mixed	29	9.4%	30.9%
Total	94	30.3%	100%

Out of the total 310 dairy cows included in the study, 30.3% (n=94) were found to be affected by at least one or more reproductive health problems. Most commonly encountered reproductive health problems in the dairy cows during the study includes dystocia, repeat breeder, retained fetal membrane, abortion, metritis, anestrous and prolapse of the uterine and

vagina with the relative frequency of 51.1%, 26.6%, 19.1%, 14.9%, 8.5%, 7.4%, and 3.2% respectively. As the current finding shows, dystocia was the major dairy cow's reproductive problem with a frequency of 51.1% following mixed disorder (30.9%). Repeat breeder, retained fetal membrane, and Abortion was also a common problem at the current study area (Table 1).

**Table 1:** Association of risk factors with the occurrence of reproductive disorders.

Risk Factors	Classifications	No. of Cows Examined	No. of Cows Affected	Prevalence	P-value
Breed	Local	14	3	21.4%	0.459
	Cross	296	91	30.7%	
Management	Intensive	11	2	18.2%	0.553
	Semi-intensive	244	77	31.6%	
	Extensive	55	15	27.3%	
Hygiene	good	187	50	26.7%	0.004
	Satisfactory	81	24	29.6%	
	unsatisfactory	42	20	47.6%	
BCS	Good	197	58	29.4%	0.871
	Medium	68	21	30.9%	
	Poor	45	15	33.3%	
Parity	1	54	4	7.4%	0.0001
	2 and 3	107	23	21.5%	
	>3 times	149	57	38.25%	
Age	<5 years	96	22	22.9%	0.012
	5 to 7 years	98	30	30.6%	

	>7 years	116	42	36.2%	
Breeding	Natural service	46	9	19.6%	0.085
	Artificial Insemination	264	85	32.2%	

The current study revealed that the crossbreed included at the study was most frequently affected by reproductive disorders with a rate of 30.7% than a local breed that shows 21.4% prevalence. The dairy cows within semi-intensive management system were highly exposed for reproductive disease than that of extensive and intensive with the occurrence rate of 31.6%, 27.3%, and 18.2% respectively. The cows with poor body condition were affected by a rate of 33.3% that was slightly higher rate than the occurrence of the reproductive disorder in the cows with medium and good body conditions. As shown on the (Table 2) below, statistically no significant difference ( $P>0.05$ ) was found in the prevalence of reproductive health problems with respect to breeding type, body condition score, breed, and management system. The influence of hygienic status on the occurrence of the major reproductive health problems was also assessed and the result showed that there is statistically significant ( $P<0.05$ ) variation about different hygienic conditions. The highest prevalence was found in poor/unsatisfactory hygienic conditions with a rate of 47.6% flowing satisfactory (29.6%) and good (26.7%) hygiene. In the current study, the number of parity as well as age were observed to have a significant ( $P<0.05$ ) influence for the occurrence of reproductive problems (Table 2).

### Discussion

The overall prevalence of clinical reproductive health problems reported in this study 30.3% ( $n = 94$ ) was lower than earlier reports in Northeast Ethiopia by Dawit & Ahmed [21], in central Ethiopia by Getachew & Nibret [22], in Southern Ethiopia by Adane [23], in Borana by Ararsa & Wubishet [24], and in central Ethiopia by Hadush [25] who reported 40.25%, 37.1%, 43.3%, 47.7% and 44.3%, respectively, but higher than that of studies conducted by Hunduma [16] in Asella, Gizaw [14] in Adama, and Molalegne & Shiv [26] in Bedelle, South West Ethiopia who indicated 18.3%, 25.81%, and 26.5%, respectively. This variation in prevalence might be due to variations in environmental factors, breeds and in management system under different dairy farms in the areas. On the other hand, the current study was relatively in agreement with report from Jimma by Gashaw [27] who reported a prevalence of 33.59%.

The occurrence of dystocia in current finding was found to be 15.5% which was higher than the findings reported by Getachew & Nibret [22] in Debre Zeit town, Adane [23] in Southern Ethiopia, Mamo [28] in smallholder dairy cows in and around Debre Zeie, Zewdu [29] Debre Zeit, ILCA herd, Amene [30] at Alage dairy farm, Micheal [31] in smallholder dairy cows in and around Awassa, Tadelech [32] in Debre Zeit and Gebremariam [33] in Mekelle who recorded a prevalence of 3.3%, 5.9%, 5.79%, 2.2 to 4.4%, 3.1%, 9.7%, 5.8% and 3.7%, respectively. This wide variation in the prevalence of dystocia might be attributed to factors such as, the age and parity of the dam as well as breed

of the sire as a result of feto-pelvic disproportion i.e., Because of calf size or pelvic dimension of dam has been reported earlier [34-36].

Prevalence of repeat breeding in the present study agrees with the finding of Putnam [37] who reported 5-18% range, but lower than finding of Getachew and Nibret [22] in Debre Zeit, Adane [23] in Southern Ethiopia, Micheal [31] in and around Hawassa and Hadush [25] in central Ethiopia who reported 15.9%, 13.08%, 13%, and 11.42% respectively. Repeated breeding can be caused by several factors, including sub-fertile bulls, endocrine imbalance, malnutrition, reproductive tract infections and poor management practices such as wrong time of insemination or faulty heat detection, inappropriate semen handling and insemination techniques [38]. Retained fetal membrane in the present study was 5.3% which was lower than the findings of the earlier works by Gashaw [27], Dawit & Ahmed [21], Gizaw [14], Molalegn & Shiv [26], Adane [23], Haile [39] in different locations of the country who reported prevalence of 19.2%, 7.32%, 12.9%, 8.6%, 7.18% and 14.7%, respectively. However, there are researchers reported less prevalence than the present study like Zewdu [29], Ebrahim & Gebremariam [33,40], 2.2-4.4%, 4.3%, and 3.7%, respectively.

The prevalence of abortion in the present study was 4.5% which was higher than the findings of Berisha [41] around Addis Ababa, and Ebrahim [40] in and around Kombolcha, Adane [23] in Southern Ethiopia, Bekana [42] in Nazret. Furthermore, Bekele [43] found out that abortion rate at a range of 1.7-20.2% in their study to establish the rate of abortion in three state dairy farms in central high lands of Ethiopia and Zewdu [29] a range of 1.5-7.8% in ILCA herd, Debrezeit. However, the present finding is lower than the findings by Getachew and Nibret [22] in Debre Zeit town, Gebremariam [33] at Mekelle, Dawite & Ahmed [21] in Kombolcha, Yoseph [44] in Holleta, central high lands of Ethiopia, Molalegn, Shiv & Hunduma [16,26] who reported an abortion rate of 5.5%, 6.1%, 9.05%, 11.11%, 13.9%, and 14.6%, respectively. The lower prevalence rate of abortion may be attributed to the increasing practice of artificial insemination in the study area where the semen is collected from bulls free from brucellosis, in addition, management system especially feeding and sanitation differences can be taken as sources of differences in the prevalence of abortion [27].

The prevalence of metritis in our current work is lower than findings of different researchers including Gebremariam, Yoseph, Ebrahim, Zewdu, Molalegn and Shiv, & Shiferaw [11,26,29,33,40,44] who recorded prevalence rates of 16.6%, 25.5%, 16.7%, 18.7%, 3.1-9.9%, 16.9% and 15.5%, respectively. The prevalence of anestrus was 2.3% that agreed with Molalegn & Shiv [26] who reported 1.66%. However, Yoseph, Adane, Hadush, Amene & Shiferaw [11,23,25,30,44,45] reported higher

prevalence of anoestrus as 38.5%, 12.26%, 12.9%, 10.2% and 38.6%, respectively. These researchers proposed that the high rate of anoestrus was due to genital infections. This variation might be associated with faulty heat detection, breed, and management system differences. Prevalence of uterine and vaginal prolapse in the current study was like the finding of Molalegn & Shiv [26] in and Around Bedelle, Dawite, Ahmed & Hadush [21,25] who reported 1%, 1.24%, and 1.95%, respectively, but lower than the 3.44%, and 5.2% reported by Adane & Kidusan [23,46] respectively. This variation might be due to management system, feeding, and breed of animals.

In the current study, the number of parity as well as age were observed to have a significant influence ( $P < 0.05$ ) for the occurrence of reproductive problems, where cows with a greater number of parties were seen to show reproductive problems more frequently than lower parties. Those variations might be due to the repeated exposure of the genital tract of greater parity cows to environmental risk factors that can impart uterine infection. Aging cows and their reproductive systems probably involve more complex and permanent uterine changes than those cows with lower age groups [46]. This finding agreed with earlier reports by Dawit and Ahmed [21] in Northeast Ethiopia, Getachew & Nibret [22] in central Ethiopia and Adane [23] in Southern Ethiopia.

## Conclusion and Recommendation

The present study revealed that reproductive disorders in dairy cows particularly of dystocia, repeat breeder, rented fetal membrane, abortion, metritis and anestrus were the major causes of low reproductive performance in dairy farms in Asella. Possible risk factors responsible for the occurrence of reproductive health problems identified include hygienic conditions, parity, and age of cows. Thus, conducting a more systematic and comprehensive study to assess the problem in depth and improvements in management systems (such as housing, feeding, and health care), proper heat detection and proper selection of bulls for breeding are recommended.

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## Conflict of Interest

The authors declare that there is no any conflict of interest regarding the publication of this article.

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