# Major reproductive disorders on Jersey breed dairy cattle at Adea Berga dairy farm, West Shewa Zone, Oromia Region, Ethiopia

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## Abstract

Reproductive efficiency of dairy cows is influenced by different factors including gene, season, age, production system, nutrition, management, environment and disease. This study was conducted with the objectives of determining the prevalence of reproductive disorders and evaluates reproductive performances of Jersey dairy cattle maintained at Adea berga dairy farm. The retrospective and longitudinal studies were employed through document revision; clinical and laboratory examination from 1996 to 2010 and from 2010 to 2014, respectively. All 97 cows from first to 10$^{th}$ parity which were kept under semi intensive management system in the farm were included in this study. The overall prevalence of reproductive health problems was 54.6% (n=53) and the major ones were found to be prolonged anoestrus, abortion, still birth and retained fetal membrane accounting for 48.5%, 28.9%, 14.4% and 5.2% prevalence, respectively. Of the considered risk factors, age, parity and body condition didn't show significant (P>0.05) effect on abortion and prolonged anestrous while found to significantly (P<0.05) affect still birth. However, season had a significant (P<0.05) effect on all disorders (abortion, prolonged anestrous and still birth). Pluriparus animal with no statistically significant difference (P>0.05) showed higher prevalence of abortion (29%), still birth (15.1%) and retained fetal membrane (5.4%) than uniparus ones which represented 25%, o%, o% prevalence for abortion, still birth and retained fetal membrane respectively. In contrast uniparus animals showed higher prevalence (50%) of prolonged anoestrus as compared to the pluriparus ones (48.4%) and no statistical significant difference was observed (P>0.05) among them. The parasitological, serological and bacteriological test results in this study showed a negative result, where all animals tested were found to be free from brucellosis, trichomonoiasis and other bacterial infections. In this study a mean value for AFS (age at first service), AFCA (age at first calving), ALS (age at last service), ALCA (age at last calving) and CI (calving inter-

val) were found to be (25.8 ± 0.76), (35.5 ± 0.71), (66.6 ± 3.2), (77.1 ± 2.6) and (17.7 ± 0.4) months respectively. While the mean value for parity, LN (lactation number), NSPC (number of service per conception) and days open were (4.16 ± 0.19), (3.09 ± 0.2), (2.25 ± 0.14) and (270.47 ± 14.17), respectively. From this study, it was concluded that the major reproductive disorders responsible for the altered reproductive performance of jersey dairy cows were prolonged anoestrus, abortion, still birth and retained fetal membrane. Routine and periodical examination of cows during postpartum period, awareness creation to farm attendants and employing improved dairy herd management should be implemented. Moreover associated economic losses in this dairy farm and cause of abortion should be exclusively investigated with other test methodologies for other entities.

**Keywords**: Adea berga, Jersey breed, Oromia region, Reproductive disorder, West Shewa,

## Introduction

Jersey breed dairy cattle are more efficient in converting feed into milk and they cost less to rise than other dairy cattle. However as any of the different breeds in the world this breed also suffers from different reproductive inefficiency due to different reproductive diseases (TAES, 1998). Therefore, good sanitation and vaccination programs can prevent many infections or diseases that lower reproductive performance and health (Raymond, 2009). Reproductive inefficiency of dairy cattle causes great frustration for dairy producers (Call and Stevenson, 1985). Even under optimal conditions, the reproductive process is less than perfect because of the multiple factors involved in producing a live calf. In contrary, reproductive efficiency involves successful management of not only the cows but also the people who milk, feed, house, inseminate and care for them (Jeffrey, 2001). Among the main parameters of reproductive performance, age at first service (AFS), age at first calving (AFC), the interval between successive calving (CI), days open till conception (DOC) and gestation length (GL) are the bases for profitable dairy farming (Hafez, 1993). Furthermore keeping cows healthy is one of the most important steps in maintaining fertility and high milk yield (Stevenson *et al*., 1988). Hence, the key to prevent losses due to reproductive disorders must be found in the prevention of such disorders, not in their treatment (Raymond, 2009).

Upon closer examination of reproductive processes in the dairy cattle, the postpartum period is the most varied and vulnerable to problems (Radostits *et al*., 1994) and this results, in considerable economic loss to the dairy industry

(Fikire Lobago *et al*., 2006). But in dairy industry the reproductive goals to be followed are 12 months of calving interval, 85 days open, 1.6 services per conception rate and 85% of cows observed in estrus and recorded by 60 days fresh (Msangi *et al*., 2005). It is very difficult to diagnose those problems by one particular disorder or symptom because there is interrelation between predisposing factors such as management at calving, hygiene and parity, stage of gestation, nutrition and environment (Erb and Martin 1980; Arthur *et al*., 1989; Msangi *et al*., 2005).

In Ethiopia, despite the huge number of cattle, productivity is low due to constraints like disease, nutrition, poor management. These constraints result in poor reproductive performance of dairy cattle and lower economic benefit from the sector (Molalegn Bitew and Prased, 2011). Among the major problems that have direct impact on reproductive performance of dairy cows, abortion, dystocia, retained fetal membrane; repeat breeding and clinical endometritis are those mostly occurred which also have been classified as postpartum and prepartum problems (Forar *et al.,* (1995). On the other hand, dairy cow reproduction is affected by a variety of factors among which different aspects of management including nutrition and breeding become significant (Galina and Arthur, 1999). Previous study was not conducted on the reproductive herd health management problems identification on Jersey breed at Adea berga dairy farm. Hence, this study is designed to assess the existing reproductive herd health problems of Jersey breed dairy cattle at Adea Berga dairy farms, West Shewa Zone, Oromia Regional State.

## Materials and Methods

### Description of the study area

The study was conducted at Adea berga dairy farm which is found in Adea berga district, West Shewa Zone, Oromia region, Ethiopia which is located at $9^0$ 16'N latitude and $38^0$ 23'E longitude. In this district, the rainfall pattern is bimodal, with a short rainy period from March to May and a long rainy season from June to September and the rest of the months are dry. The annual temperature and rainfall ranges from 18°C to 24°C and 1000 to 1225 mm, respectively. The farming system is semi intensive where the animals pass their time mostly by grazing and practice also an indoor feeding in their respective barn.

## Description of the farm

Adea berga dairy farm was established at Adea berga wetland in 1986 for commercial milk production under government state farm by using introduced 400 pure Jersey pregnant heifers and 2 sires (foundation stock) from Denmark (Driba Hunde, 2016, personal communication). The farm has a total of 400 hectare of land and the rest of land is being utilized for grazing and hey production. The whole pasture land is protected during rainy season for hey production and also all animals were confined to the barn during this period. The farm had been engaged in the production and rearing of pure Jersey breed from the foundation stock for milk supply for dairy development enterprises and also serve as a bull dam station for the national artificial insemination center (NAIC). Then the farm was transferred to Holeta Agricultural Research Center for genetic improvement research program since 2007.

## Study animal

The study was conducted on all 97 dairy cows from first to $10^{th}$ parity and kept under semi intensive management system

## Study design and data collection

Document based retrospective study design from 1996-2010 and a longitudinal study design by a clinical examination on all 97 cows in the farm as well as laboratory examination on randomly selected 67 animals (50 cows) in addition to (17 bulls) from 2010 to 2014 was conducted to determine the prevalence of reproductive disorders and to evaluate reproductive performances of Jersey dairy cattle maintained at Adea berga dairy farm. Individual data was collected from the records maintained at the farm and disease investigation tools, methods and procedures were employed to recognize and follow the abnormalities. The records were also used to analyze age at first service, age at first calving, calving interval, number of calving and days open. Postpartum transition period by monitoring herd health and cleanliness which included appropriate vaccinations against prevalent diseases, good husbandry practices to prevent parasites, to prevent mastitis (good dry cow treatment program), foot problems (regular hoof trimming) and good sanitation at calving were also conducted as a good intervention strategy.

### Clinical examination

Cows were followed for any peri-parturient reproductive abnormality. General clinical examination of each cow including rectal palpation was conducted. Cows calved within the last 45 days for postpartum, cows inseminated and cows that are not detected in estrus by the time of desired breeding (anestrus) or suspected to be not pregnant, cows having history of an abnormality of the reproductive organs were considered. Speculum was used accordingly to observe internal reproductive organ perior to cleaning of the vulval lips and perineal area.

### Sample collection and laboratory analysis

Vaginal discharge, fetus and fetal membrane were collected for parasitological and microbiological (bacteriological) investigation, respectively. Samples of vaginal discharge were collected by aspiring via an attached rubber bulb/ syringe and examined under microscope according to the procedure by Urquhart *et al.* (1998). Serological investigation was also conducted; Serum sample was screened using Rose-Bengal Plate Agglutination Test. Serum of 30 µl was mixed with an equal volume of antigen on a white tile or enamel plate to produce a zone approximately equal to 2 cm in diameter. The mixture was rocked gently for four minutes at ambient temperature and then observed for agglutination. Any visible reaction was graded positive and otherwise negative as indicated by (OIE, 2003). Sample collection, submission and analysis for serological and bacteriological analysis were done as per the recommendation by (Quinn *et al*., 1994).

## Data analysis

Data was entered in to excel sheet and descriptive statistics was used to determine the prevalence and Chi-Square ($x2$) test was employed for risk factor analysis. The data was analyzed using statistical packages software IBM SPSS statistics for windows Version 20.

## Results

### Reproductive performance evaluation

In this study the average Age at First Service (AFS), Number of Service Per Conception (NSPC), Age at First Calving (AFCA), Age at Last Service (ALS), Age at Last Calving (ALCA), Calving Interval and Days Open were 25.81 (SE=0.763) months, 2.25 (SE=0.149), 35.52 (SE=0.716) months, 66.6 (SE= 3.241) months, 77.1 (SE= 2.6) months, 17.76 (SE=0.465) months and 270.47 (SE=14.171) days respectively (Table 1).

**Table 1: Mean values of reproductive parameters for Jersey breed dairy cattle at Adea berga dairy farm (N=97)**

| Reproductive parameters | Mean | Standard error of mean |
|---|---|---|
| AFS (Month) | 25.81 | 0.763 |
| AFCA(Month) | 35.52 | 0.716 |
| ALS(Month) | 66.60 | 3.241 |
| ALCA(Month) | 77.10 | 2.600 |
| NSPC | 2.25 | 0.149 |
| CI (Month) | 17.76 | 0.465 |
| days open | 270.47 | 14.171 |

### Evaluation of reproductive disorders

The present study revealed that from a total of 97 animals examined 54.6% (n=53) were affected by either one or more reproductive disorders (Table 2).

**Table 2: Overall prevalence of reproductive disorders on Jersey breeds dairy cows at Adea berga dairy farm**

| Status for reproductive disorders | Frequency | Percent (%) |
|---|---|---|
| Positive | 53 | 54.6 |
| Negative | 44 | 45.4 |
| Total | 97 | 100.0 |

The highest to lowest recorded prevalence in the present study were prolonged anoestrus 48.5% (n=47) followed by abortion 28.9% (n=28), still birth 14.4% (n=14) and retained fetal membrane 5.2% (n=5) (Table 3).

**Table 3: Prevalence of specific reproductive disorders on Jersey breeds dairy cows at Adea berga dairy farm**

| Reproductive disorders | Frequency | Percent (%) |
|---|---|---|
| Abortion | 28 | 28.9 |
| Prolonged anoestrus | 47 | 48.5 |
| Retained fetal membrane | 5 | 5.2 |
| Still birth | 14 | 14.4 |
| Total | 97 | 100.0 |

The present study with no statistically significant difference (P>0.05) has showed also that the prevalence of abortion (29%), still birth (15.1%) and retained fetal membrane (5.4%) in pluriparus animal was higher than in primiparus ones which have represented 25%, o%, o% prevalence for abortion, still birth and retained fetal membrane respectively. However the primiparus animals had higher prevalence (50%) of prolonged anoestrus as compared to the pluriparus ones (48.4%) and no statistical significant difference was observed (P>0.05) among them (Table 4).

**Table 4: Prevalence of reproductive disorder on pluriparus and uniparus Jersey breed dairy cows at Adea berga dairy farm**

| Reproductive disorder | Parturation status (n=97) | | | P-value |
|---|---|---|---|---|
| | Pluriparus (%) | Primiparus (%) | Overall (%) | |
| Abortion | 29 (n=27) | 25 (n=1) | 28.9 (n=28) | 0.673 |
| Still birth | 15.1 (n=14) | 0.0 | 14.4 (n=14) | 0.53 |
| Retained fetal membrane | 5.4 (n=5) | 0.0 | 5.2 (n=5) | 0.806 |
| Prolonged anoestrus | 48.4 (n=45) | 50 (n=2) | 48.5 (n=47) | 0.66 |

n= number of observation

## Risk factor analysis for the occurrence reproductive disorders

Age, parity and body condition didn't show a significant (P>0.05) effect on abortion and prolonged anestrous while season had highly significant (P<0.05) effect including on the occurrence of still birth (Table 6). However, all factors showed a significant (P<0.05) effect on the occurrence of still birth.

**Table 6: Effect of different risk factors on the reproductive disorders**

| Effect | Reproductive disorder | Chi-Square | df | Sig. |
|---|---|---|---|---|
| Age category | Abortion | 0.5128 | 1 | 0.4739 |
| | Still birth | 7.7734 | 1 | 0.0053 |
| | Prolonged anoestrus | 0.1166 | 1 | 0.7327 |
| Parity | Abortion | 0.2321 | 9 | 0.6300 |
| | Still birth | 5.6056 | 9 | 0.0179 |
| | Prolonged anoestrus | 0.0877 | 9 | 0.7672 |
| BC | Abortion | 2.5745 | 2 | 0.2760 |
| | Still birth | 8.3901 | 2 | 0.015 |
| | Prolonged anoestrus | 0.6164 | 2 | 0.7348 |
| Season | Abortion | 96.0000 | 2 | <.0001 |
| | Still birth | 97.0000 | 2 | <.0001 |
| | Prolonged anoestrus | 89.2392 | 3 | <.0001 |

### Laboratory examination result

Serological screening test for brucellosis was performed for a total of 67 animals (50 cows and 17 bulls) randomly selected from the herd and all animals (100%) were negative. On the other hand six (6) aborted fetus and placenta samples and 15 cow's vaginal discharge were tested bacteriologically and parasitologically (for trychomoniasis) where all of them (100%) were found to be negative.

## Discussions

The average age at first service (AFS) was 25.81 month (SE 0.716) which is higher than the observation of Niraj *et al*. (2014) who found (428.11$\pm$64.32 days)= (14.63 month) on Holstein Friesian cross breed and 722.24 days (SE=36.4) (24.07) months on Jersey breed by Habtamu Lema *et al*., (2010). According to Hafez (1993) and Ibrahim Mohamed and Zemmelink (2000), the average AFS for cattle on recommended level of nutrition is 24 to 25 months. Furthermore, Meyer *et al*. (2005) reported standard of AFS of 24 months in their native conditions. The late age at first service in this study as compared to some of the previous reports could be due to irregularities in feed supply and changes in management conditions throughout the years.

This study revealed an average number of service preconception of 2.25 (SE=0.149) which is higher than the finding of Niraj *et al*. (2014) who found (2.2±0.2) on indigenous, (1.5±0.3) on Holstein Friesian and by Habtamu Lema *et al*., (2010) 1.79 (SE=0.06) on Jersey breed dairy cows. The average Age at first calving encountered in this study was 35.52 (SE=0.716). Similar result was reported by Habtamu Lema *et al*., (2010) who indicated an average AFCA of 1035.21 days (SE=12.59) = (34.5 month). In this study, the mean calving interval was 17.76 month (SE=0.465) which is higher than the finding of Habtamu Lema *et al*., (2010) and De Silva and Sathasivampillai (1975) who reported a mean calving interval of 450.09 days= (15 months) and value of 16-17 months respectively. However, Roberts (1986) indicated that, CI of a well managed dairy herd should be between 12-13 months which is far better than our finding.

The reason for longer calving interval in this study might be due to the higher nutritional requirement for growth in addition to milk production and maintenance, which could delay the onset of postpartum heat of the cows. Hafez & Hafez (2000), in their study indicated that, the time taken for post partum heat can be influenced by a number of factors such as parity status of the cow, abnormal parturition like dystocia and retained placenta, mild uterine infections, pyometra, the degree of contamination of the genital tract and the level of milk production. Suckling and the plane of nutrition also delay the time of the first ovulation in cows. The average mean value of days open encountered in the present study was 270.47 month (SE=14.171) which is higher than the finding of Niraj (2014) who reported an average of days open of 116.52±42.51. This study revealed also mean of (66.6 ± 3.21) and (77.1 ± 2.6) months for ALS, ALCA.

In the present study, 54.6% (n=53) of dairy Jersey cattle in the farm were affected by either one or more reproductive disorders. The finding of this study is less than the previous reports of 40 % by Dawite and Ahmed (2013), 44.3% by Angesom Hadush *et al*. (2013) and greater than 18.5% by Hunduma Dinka (2013) in Assela town and 26.5%, by Molalegne Bitew and Shiv (2011) in Bedelle. This difference might be due to sample size, production system, study methodology and breed of animals as well as environmental factors. This study revealed that a prevalence of prolonged anoestrus 48.5% (n=47) followed by abortion 28.9% (n=28), still birth 14.4% (n=14) and retained fetal membrane 5.2% (n=5). The prevalence of prolonged anestrous observed in this

study (48.5%) is not in line with the results by Angesom Hadush *et al*. (2013), who reported 12.9% in dairy cattle in Debre Zeit. This variation might be due to the age, faulty heat detection, breed and management system differences. The prevalence of RFM (5.4%) in recent study is lower than 8.6% reported by Molalegn Bitew and Shiv (2011) and 19.2% by Gashaw Abebaw *et al*. (2011). Very low to low prevalence of abortion 2.23%, 9.05%, 13.9% and 14.6% were reported by Merga Bekana *et al.,*(2011), Dawite Tesfaye and Ahmed Shambel (2013), Molalegn Bitew and Shiv (2011) and Hunduma Dinka (2014) respectively when compared to the prevalence (28.9%) in this study.

The present study with no statistically significant difference (P>0.05) has showed also that the prevalence of abortion (29%), still birth (15.1%) and retained fetal membrane (5.4%) in pluriparus animal was higher than in primiparus ones which have represented 25%, o%, o% prevalence for abortion, still birth and retained fetal membrane respectively. However the uniparus animals had higher prevalence (50%) of prolonged anoestrus as compared to the pluriparus ones (48.4%) and no statistical significant difference was observed (P>0.05) among them. This result agree with the finding of Angesom Hadush, *et al*., (2013) who found higher prevalence of reproductive disorders in pluriparus animals than primiparus ones. This might be possibly due to repeated exposure of pluriparous genital tract to environmental risk factors.

Age, parity and body condition didn't show a significant (P>0.05) effect on abortion and prolonged anestrous while season had highly significant (P<0.05) effect including on the occurrence of still birth. However, these factors showed significant (P<0.05) effect on still birth which is not in agreement with the finding of Adane Hayele *et al*. (2014) who found body condition and parity had significant effect on the overall prevalence of reproductive disorders like repeat breeder, anoestrus, retained fetal membrane, dystocia, abortion and uterine prolapse. On the other hand, Getachew Eshete *et al*., (2014) indicated that the degree of association of risk factors was assessed and parity was found to be directly associated and the association was not significant on the overall prevalence of reproductive disorders which is similar with our finding for the case of abortion and prolonged anoestrus. However, according to the finding of the same authors, body condition scores and age had significant differences on the occurrence of reproductive disorders which is not similar with our finding except for the case of still birth.

Serological screening test for brucellosis was performed for a total of 67 animals (50 cows and 17 bulls) randomly selected from the herd and all animals (100%) were negative. On the other hand six (6) aborted fetus and placenta samples and 15 cow's vaginal discharge were tested bacteriologically and parasitologically (for trychomoniasis) where all of them (100%) were found to be negative.

## Conclusion

The reproductive problems in the farm were multi factorial. Prolonged anoestrus, abortion, still birth and retained fetal membrane were found to be some of the reproductive disorders mostly affecting the reproductive performances of Jersey breed dairy cattle maintained at Adea berga dairy farm. From our observations on routine activities conducted in the farm there was lack of periodical examination for abnormalities, heat detection and artificial insemination (AI) of cows during postpartum period. Hence awareness creation, improved post partum management including proper feeding, accurate heat detection, AI service as well as health management should be improved to minimize the occurrence of reproductive problems and associated economic losses in this dairy farm and cause of abortion should be exclusively investigated with other test methodologies for other entities and nutritional analysis should be done periodically focusing on both macro and micro nutrients.

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