

Retrospective and current status of reproduction and Health Problems at Algae Dairy Farm, Central Ethiopia

Abstract

Study was conducted between November 2015 and March 2016 at Algae dairy farm. The objective of study was to evaluate ten years record and the current status of dairy farm. A total of 370 cow's record and 105 monitored dairy cows' were used for the study. The overall mean months of 27.68 ± 6.48 age at first service, 37.8 ± 6.88 age at first calving, 16.36 ± 5.2 calving interval, 6.93 ± 4.79 days open (DO) and 10.32 ± 2.84 lactation length (LL) observed. Increasingly, 1.38 ± 0.54 number of services per conception (NSC) and average daily milk yield of 8.22 ± 2.2 liters/day/cow were observed in the dairy farm. Average daily milk yield had a significant difference ($p < 0.05$) between Holstein and their crosses. Reproductive performance did not show difference between retrospective and longitudinal studies using Mann Whitney U – test. Similar health problems like abortion, dystocia, metritis, repeat breeder, retained fetal membrane, mastitis and pre-weaning calf mortality observed in both retrospective and longitudinal studies cows. Physical damage and infectious diseases were also common in the farm. In conclusion, this study revealed that the reproductive performance of the dairy farm was below the acceptable standard. Therefore, appropriate measures should be implemented at Algae dairy farm in order to leverage the existing poor reproductive performance of the farm.

Keywords: Dairy cow, health problem, reproductive performance, Algae, Ethiopia

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Introduction

Milk production and reproduction can be evaluated through milk production records and reproductive traits can be observed through time of conception, pregnancy success rate, etc. though other factors are difficult to ascertain.^{1,2} Reproductively high producing cow in dairy industry is influenced by multiple factors.^{3,4} Numerous variables indicated related to high milk yield; such as feed, infectious and non infectious disease, hormonal imbalance, cow' age, calving season and reproductive management have been associated with reproductive performance.⁵⁻⁷ Evaluating the reproductive efficiency of a given dairy farm is an essential element; whether the farm is running with profit.⁸ Important indicators have to be included during the monitoring and evaluation system. Parameters such as age at first service, age at first calving, calving interval, and service per conception and so on has to be included in order to evaluate day to day activity, monitor the progress, analyze and interpret farm status.⁹ Therefore, periodic review and regular evaluation is essential.¹⁰ Dairy producers profit most when cows calve first at 2 years of age, calve at approximately 12 months intervals, and have relatively long herd life.¹¹ Hence, the reproductive efficiency of a dairy herd can be measured based on the information available in the record.¹² The periodical evaluation will generate baseline information about the status of dairy farm to entrepreneurs, extension agents, researchers and policymakers in order to redirect the management, according to the problems reported. Therefore, the objective of this study design was to evaluate reproductive and productive performance and assess the occurrence of health problems at Algae dairy farm.

Material and methods

Study area

The study carried out between November 2015 and March 2016, at Algae Agricultural Technical Vocational and Educational

Training College, is located at 217 km South West of Addis Ababa, in the vicinity of Lake Abijata and Shala Lakes of the Ethiopian Rift Valley. The farm covers about 4,200 ha of land, is situated at $38^{\circ} 30' E$ longitude and $7^{\circ} 30' N$ latitude, with an altitude of 1600 m.a.s.l. The mean annual temperature ranges from a minimum of $11^{\circ} C$ and a maximum of $29^{\circ} C$. The mean annual rainfall varies from 700–900 mm. The rainy seasons are bimodal and consisted of the short rainy season that extended from March to June, the long rainy season, which extended from July to September, and dry season extends from October to February.¹³

Study population

The dairy cows in Algae centre was constituted by two types of breed (Holstein Friesian and crossbreed of Boran and Holstein Friesian). In this study, the record of Holstein Friesian and their crossbreed cows and heifers from June 2005 up to 2015 and the existing dairy cows during study period were used.

Herd management

Dairy cows were kept under intensive management system; where animals stayed indoors and were given concentrate and mineral supplement depending on their physiological status. The rate of provision of feed increases based on the milk yield of the lactating cow. Special attention is given also for the pregnant cow as well during middle pregnancy and at the end of pregnancy feeding style varies. Dry feed prepared in the form of hay from different species of plant that suits for haymaking. Alfalfa supplemented as a main green feed and water was available ad libitum. Milking is practiced by manual and milked twice per day. Newborn calves were isolated towards prepared pen and fed using a bucket. Reproduction was practiced using artificial insemination and sometimes they use natural mating. Detection of heat period was practiced twice per day morning when animals allowed to exercise and at dawn when animals move

towards their pen. Health status of dairy cows in the farm monitored routinely, through vaccination against infectious diseases and regular spray and drenching to control ecto-parasites and internal parasites.

Study design

A retrospective study was conducted based on record available at Algae dairy farm and compiled over 10 years (2005 to 2014). 20% (n=384) records were planned to sample out of 1920 records using a systematic random sampling technique at an interval of five records (N/n). During sampling, records with incomplete information was omitted and replaced by successive complete information. Similar sampling procedure continued in each page until the sample size attained. As the result three hundred seventy records were selected.

In the longitudinal study, a total of 105 dairy cows (85 cows and 20 pregnant heifers) were randomly selected and monitored for the study. Every week, selected animals were visited regularly and recorded data on reproductive performance and major health problems collected.

Data management and statistical analysis

Raw data generated from 10 years recorded and longitudinal monitored animals were entered into Microsoft Excel spreadsheet and summarized using descriptive statistics. The overall mean and

standard deviation of selected parameters in study, and prevalence of health problems were analyzed. Reproductive performance parameter and reproductive health problem were compared between primiparous and multiparous parity using the Mann Whitney U- test. To utilize the U test the following steps employed. In the first step, the hypotheses set $H_0 =$ the two population are equal; $H_1 =$ the two population are not equal.¹⁴ Then parameters measured in two populations were ranked starting from the smaller to the highest and the rank values assigned as R_1 and R_2 in two groups then two group rank record were added independently. Cross checked the sum of the rank (R_1+R_2) is equal to $n(n+1)/2$. Where n is number of given parameter observed in both group during study.

U_1 and U_2 computed as follows,

$$U_1 = n_1n_2 + n_1(n_1+1)/2 - R_1; U_2 = n_1n_2 + n_2(n_2+1)/2 - R_2$$

Thus, the test statistic was the smaller of U_1 and U_2

As a conclusion we don't reject H_0 if the smaller of U_1 and U_2 is greater than critical value at 95% confidence interval ($\alpha= 0.05$). Hence there is no significant difference between groups. We do reject H_0 if the smaller of U_1 and U_2 is less than the critical value from the table. Variables considered in this study were defined in Table 1.

Table 1 Parameters and their definition used to evaluate reproductive performance

Parameters	Definition
Age at first Service(AFS)	The number of days from birth to the date of animals at first service. In the study, all cows including heifers served were included.
Age at first calving (AFC)	The number of days from birth to the date of animals first calving. In this study, all cows that calved at least once were included.
No of services per conception(NSC)	The number of services (artificial or natural) required or successful conception.
Calving interval (CI)	The period between the last two consecutive calving. Only cows that calved at least two times were included.
Days open(DO)	The number of days between parturition and subsequent conception.

Results

Overall reproductive performance

In this study, 370 cows' from ten years record and 105 cows subjected to longitudinal studies were summarized to their age at first service and age at first calving. A comparison was made between Holstein Friesian and crossbreed the difference was significant

($p<0.05$) between the two breeds for age at first service and age at first calving. The average insemination per conception, days open and calving interval has no significant difference ($P>0.05$) between crossbreed and Holstein Friesian breeds. The average daily milk yield and lactation length were significantly different ($P<0.05$) between the two, where HF had higher average daily milk yield and longer lactation length than their crossbreeds Table 2.

Table 2 Summary of overall reproductive performance of dairy cows at Algae dairy farm

Parameters	Holstein Friesian	Cross with local breed	P-value
n	407	68	
AFS	27.68±6.48	30.02±9.47	0.05*
AFC	37.8±6.88	40.37±9.9	0.04*
NPC	1.38±0.54	1.48±0.65	0.19
CI	16.36±5.2	16.39±4.07	0.95
DO	6.93±4.79	7±3.64	0.88
LL	10.32±2.84	9.52±3.24	0.04*
Milk yield/day/cow	8.22±2.2	6.18±2.24	0.00*

*AFS, Age at first service (month); AFC, Age at first calving (month); NSC, Number of services per conception (number); CI, Calving interval (month); DO, Days open (month); LL, Lactation length (months); Cross, cross breed of HF and Boran; HF, Holstein Friesian

*Statistically significant test

The average results of three hundred seventy dairy cow records of 10 years data from 2005 to 2015 and 105 dairy cows longitudinal study record were compared to their corresponding variable mean using Mann Whitney U test, The total number of reproductive performance parameters observed in both groups during the study period was fourteen. Therefore, based on the formula given for U test, U_1 and U_2 computed as follows,

$$U_1 = n_1 n_2 + n_1(n_1+1)/2 - R_1 = 7(7) + 7(8)/255 = 22$$

$$U_2 = n_1 n_2 + n_2(n_2+1)/2 - R_2 = 7(7) + 7(8)/250 = 27$$

Therefore test statistic value was $U_j=22$. Hence we didn't reject H_0 because $22 > 8$. We did not have sufficient evidence to conclude

the reproductive performance differ between two observations. Hence, reproductive performance observed in both retrospective and longitudinal study depicts similarity; the mean value for each parameter didn't have significant difference ($p > 0.05$).

Major reproductive health problem

Out of 475 sampled, 70.74 % of dairy cows have experienced one or more reproductive health problems including mastitis and pre-weaning calf mortality. The major reproductive problems recorded in the dairy farm were retained fetal membranes, dystocia, abortions, metritis, repeat breeding, mastitis and preweaning calf mortality Table 3.

Table 3 Comparison of major reproductive health problems between primiparous and multiparous cow using Mann Whitney U test

Parity status				
Rep. problems	Primiparous (R ₁)	Multiparous (R ₂)	R1 rank	R2 rank
Abortion	5	30	4	10
Dystocia	3	13	2	6.5
Mastitis	13	36	6.5	13
Repeat breeder	4	15	3	8
RFM	6	31	5	11
Mastitis	20	127	9	14
Calf mortality	1	32	1 R1=30.5	12 R2=74.5

RFM, retained fetal membrane; R1, rank of primiparous; R2, Multiparous

The health problem observed were compared between primiparous and multiparous cows and tested for the difference using the Mann Whitney U test as follows. Accordingly, the null (H_0) hypothesized as there was no difference between the two population and (H_1) there was a difference between the two population at a 95% confidence interval ($\alpha=0.05$).

Mann Whitney U test used for comparison; the test statistic U, computed using the formula given in the methodology. The critical value from the table was 8 and the decision rule was reject H_0 if $U < 8$. Therefore, U test followed the Mann Whitney test procedures. Thus, U_1 and U_2 computed using given formula:

$$U_1 = n_1 n_2 + n_1(n_1+1)/2 - R_1 = 7(7) + 7(8)/250.5 = 46.5$$

$$U_2 = n_1 n_2 + n_2(n_2+1)/2 - R_2 = 7(7) + 7(8)/254.5 = 2.5$$

Hence, as the rule test statistic was $U=2.5$ since it was the smaller of the two U.

As the result, H_0 rejected because of 2.5 less than critical value of 8. We have sufficient evidence to conclude that reproductive health problem differs between two groups. Multiparous dairy cows had significantly ($p < 0.05$) affected by reproductive health problems than primiparous dairy cows.

Reproductive performance and abortion prevalence among parity

The dairy cow kept in the farm mainly dominated by young groups; where the majority of them had less than three parity records. Abortion case dominates in the first three parity stage than above five parity stage as shown in Table 4. In general, the finding of average calving interval, day's open and services per conception were under the category of poor performance in all parity groups as shown in Table 4 when compared to the acceptable level.

Table 4 Reproductive performance and abortion problem comparison among parity stage in Algae dairy farm

Parity	n	Abortion (%)	CI (range)	DO (range)	SPC (range)
1	80	5(6.3%)	13.9(11-24.7)	142.7(56-465)	1.5(1-5)
2	155	10(6.5%)	18.8(11-12.3)	265.7(60-818)	1.4(1-4)
3	98	13(13.3%)	16.4(11-29.1)	216.4(65-594)	1.4(1-5)
4	68	9(13.2%)	15.6(11-32.5)	194(72-471)	1.4(1-5)
5	32	1(3.2%)	15.6(12-21.8)	1902(80-378)	1.4(1-2)
6	20	1(0.5%)	15.6(11-72.0)	194(72-376)	1.5(1-2)
7	12	1(0.8%)	15.25(14-17.8)	180.6(108-258)	1.36(1-2)

Table Continued...

Parity	n	Abortion (%)	CI (range)	DO (range)	SPC (range)
8	6	1(16.6%)	15.7(13-16.8)	195.5(117-228)	1.35(1.25-1.5)
9	2	0(0)	16(14-18)	207(143-271)	1.35(1.1-1.5)
10	1	1(100%)	14.8	167	1.09

CI=average calving interval in month, DO= average day's open, SPC= average number of service per conception.

Other health problems encountered in Algae dairy farm.

Diseases other than reproductive health problems were reported in Algae dairy farm, of these tuberculin test positive reactors were the highest prevalent followed by hip joint dislocation as summarized in Table 5. There was no significant difference ($p>0.05$) between breeds. In this study, 17% ($n=81$) of the sampled cattle were affected by either one or more of diseases problems in the farm as shown in Table 6.

Table 5 Prevalence of common diseases reported in Algae dairy farm

Common diseases	Breed s of cattle		
	HF (%)	Cross (%)	Total (%)
Anthrax	7(1.72)	1(1.47)	8(1.68)
Heart water	10(2.46)	1(1.47)	11(2.32)
Hip joint dislocation	11(2.7)	2(2.94)	13(2.74)
Tuberculin reactor	34(8.35)	6(8.82)	40(8.42)
Traumatic reticulopericarditis	5(1.23)	0	5(1)
Total	71(17.44)	10(14.7)	81(17)

Discussion

Reproductive performance of dairy cattle

Age at first service (AFS)

In this study, the overall mean of AFS in pure and cross breeds was in agreement with previous reports^{10,15} as observed in Sebeta and Eastern Zone of Tigray, but it was higher than reports in Jimma, Asella, Holetta and Mekelle; with the value of 24.30 ± 8.01 , 24.9 ± 3.8 , 24.4 ± 0.5 and 25.2 ± 1.1 , respectively.¹⁶⁻¹⁹ The finding was lower than the previous study in the same farm with the mean of 33.4 ± 0.9 months of AFS.¹³ Environmental factors and poor herd management could determine prepubertal growth rates, reproductive organ development, and the onset of puberty and subsequent fertility are the most likely reasons or longer AFS.¹¹

Age at first calving

The overall mean age at first calving of the current study corresponded with value of 39.6 ± 0.4 , 36.41 ± 0.9 and 36.2 ± 1.03 months, among crossbreed in Eastern Zone of Tigray, North Gonder and Dire Dawa, correspondingly,^{15,20,21} whereas, lower value of 32.4 months recorded in Gonder town.²² A study conducted at Asella showed 30.2 months,²³ which was lower than the current findings. However, all the findings had a longer period as compared to the acceptable profitable margin of 24 months.³ The finding in this study signifies that there was at least one calf and 305 milking days were lost per cow. The total net loss per day for a cow is 231€ on poorly managed farm; which is $305*231$ is about 70,455€ annual loss per cow without including calf crop.⁸ This is mainly depend on management, climatic stress and inadequate feed supply that affect

prepubertal growth, consequently stunted heifers do not reach puberty at right time.^{24,25} A similar finding of wide interval age at first calving observed in Hawassa and DebreBiran cities smallholder dairy farm.²⁶ Such a pieces of information in different part of the country indicate, dairy farms are managed poorly in Ethiopia. The profitability of dairy farm especially in smallholders needs attention.

Days open

The overall average days open in the present study for Holstein Friesian and their crossbreeds,; which was closely agreed with reports in Holleta bull dam station and Genesis farm in crossbreed and pure Holstein Friesian.⁶ In Mekelle Ethiopia has reported similar information.⁴⁰ The current finding was higher than the report in Asella, around Gondar, Addis Ababa milk shade and Jimma town.^{17,18,27,28} A previous study at Asella in zebu and cross breed indicate 110 days' which is higher than the good managed dairy herd.²³ The information in this study, as well as studies across the country in Ethiopia, indicates a long duration as compared to the desired standard of two months days open in a profitable dairy farm. The problems may be associated with feed shortage, silent estrus, the problem of heat detection and use of improper inseminating techniques and late insemination time might have contributed for such long open days. The average day's open in a good situation is 83(67-130) in a most standard dairy farm.⁸ This study shows all parity group of the cow had above 142 days "day's open" which ranges from 56 to 818 days. The finding indicates very poor production performance. Net cost per day by increasing calving interval for average and poorly managed dairy farm is 0.57 and 0.70€. ⁸ In this study, the day's open difference with good managed was 59 days. Therefore, the net loss due to average and poorly managed cow is immense in this observation.

Number of insemination/services per conception (NSC)

The overall mean of NSC for this study for Holstein Friesian and their crossbreeds were in line with the values of 1.3 ± 0.6 , 1.52 ± 0.9 , 1.56, 1.62, 1.67, 1.72 insemination per conception as reported in cross breeds in and around Gondar, Asella town, Jimma town, central highlands and around Ziway, accordingly.^{22,17,5,18,29,30} However, lower in Eastern zone of Tigray, North Gonder and Dire Dawa Ethiopia.^{15,20,21} Another study at Asella dairy farm showed 2 ± 1 above the expected.²³ This high report might be due to frequent uterine infection, poor insemination technique and heat detection as well as giving more attention for lactation might have played a significant role in poor service per conception. In general according to this study indicates dairy management not in a good situation, which has to be 1.16 and for the average and poor situation, number of service per conception is 1.6(1-4) and 2.27(1-6), respectively.⁸

Calving interval (CI)

It is the period between successive parturitions and should ideally be 12 months.³¹ Days open is included in calving interval and it is the one affects the CI, but can be improved in good management. In this study the overall mean values of CI for Holstein Friesian and their crosses, correspondingly were closely agreed with 15.5, 15.4, 15 ± 0.3 , 15 ± 0.32 and 14months in dairy farm in the central highlands, Holletta,

Genesis farm, Tigray, Stella dairy farm of Ethiopia.^{16,18,29,32,33} Whereas, the finding was shorter than 17.8, 21.36±3.84, 18 months in Dire Dawa, Jimma and Abernossa Ranch.^{17,20,34} In contrast, it was longer CI than the value of 13.4±5.1, 13.6, 13.0±2.1 and 13.8±1.9 months; in Gondar, Zeway and Bishoftu and Akaki towns; respectively.^{6,30,35} The finding was longer than the optimum values (12 months) desirable for profitable production performance. The average annual reproductive performance of cow categorized in three scenarios (Good, average and poor). Average calving interval in a good situation is 362 days after the first AI 10.5 weeks post parturition on average. The average calving interval deteriorates to 407 and 507 days for the 'average' and 'poor' scenario, respectively; then a reproductive performance of the cow compromised. The current calving interval was 492, which is near to poor management category. Milk production reduced as calving interval increased which affect the economic gain of the calf and milk amount.^{8,36} In this study calving interval in all parity groups were under the average and poor scenario, which is below the good situation and infers the poor management status of a dairy farm.

Average daily milk yield

The average daily milk yields per cow for Holstein Friesian and their crosses was in agreement with the central zone of Tigray and Jimma town.^{17,33} However, the finding was lower than the report in Bishoftu,³⁵ but greater than the reports in Akaki area,³⁷ who reported an overall average yield of 5.35±1.23 liters' per day per cow; such differences could be described due to differences in production system, environmental factors, herd management, quality and quantity of feed given to the animals. The other reason could be being exotic breed might have affected their productivity due to susceptibility to disease. The overall average milk yield per day per cow was lower than the acceptable standard for a productive dairy farm in both pure and their crosses.^{8,35} Milk productions can severely be affected by the health status of a cow, nutrition, genetic and other related herd management.^{36,39}

Average lactation length

In most modern dairy farms, a lactation length of 305 days is commonly accepted as a standard profitable period.⁴² The average lactation length in this study for Holstein Friesian and their crosses, respectively was in agreement with values of 9.13±1.99, 9.1, 9.2±1.5, 9.5±0.8 and 10.0±3 months, in Jimma, Debre Tabor, Bishoftu and Akaki, Holleta Bull Dam farm and Genesis farms, respectively.^{16,35,40,41} However, the findings were lower than the result of 11.5±0.4 months in Mekele¹⁹ but higher than 6.60±3.20 and 7.48±1.69 months for exotic and crossbred dairy cattle, in the central zone of Tigray.²⁶ The estimated lactation lengths for both breeds were almost comparable to the standard lactation length of 305 days.⁴² However, the findings were not directly related to the acceptable range of calving interval; the majority of the farmers focused on milk production without inseminating that resulted for long days open. The study also indicates that there was long calving interval and poor milk yield, despite having acceptable lactation length.

Reproductive health problems

Various important health problems encountered during the study period. The prevalence of abortion was in agreement with 6.4% in Mekelle and 5.9% in Ada'a District,^{28,43} but higher than 2.6, 1, 5.3 % reported in Hosanna, Jimma and Bako Livestock Research centre, respectively.^{4,3,52} A proportion of 16% abortion case recorded in Hawassa and Debrebrihan.⁴⁴ High abortion cases was reported in multiparous than primiparous cows. This could be due to repeated exposure for the external environment in multiparous cows coupled

with the reproductive disease might have contributed to the occurrence of abortion. A prevalence of 3.4% dystocia was consistent with the results of 3.3%, and 3.4% reported in Ada'a District and Borena, correspondingly;^{28,9} whereas it was lower than 11.6%, 5.9%, and 6.7% reported in Mekelle, Hosanna and Bako Livestock Research center, in their respective order.^{43,4,52} A prevalence of 10.32% metritis was higher than other the reports in the different study area in Ethiopia.^{43,28,3,52} High metritis cases reported in multiparous than primiparous cows could be due to frequent exposure for the reproductive problems such as abortion, dystocia and retained fetal membrane in multiparous cows might be the reason.¹⁴ Repeat breeder was observed with a prevalence of 4% that was in line with Bako livestock research center, where reported 3.5%,⁵² but lower than the values of, 13.1%, 10.3%, 15.9%, 27% and 21% as reported in Hosanna, Borena, Ada'a District, Asella town and Mekelle accordingly;^{4,9,28,34,43} whereas it was higher than 1.3% reported in Jimma town.³ The incidence of repeat breeder could be due to a number of factors such as endocrine imbalance, malnutrition, reproductive tract infections and poor management practices such as poor heat detection, time of insemination or inappropriate semen handling and the ability of insemination techniques.

Retained fetal membrane had a prevalence of 7.8% in the present study and it was consistent with 7.6%, 7.18% and 8.3% as reported in Borena, Hosanna and Bako Livestock Research,^{9,4,52} whereas lower than 11.5% and 19.2% in Mekelle and Jimma town, consecutively;^{43,3} but higher than 0.8% in Ada'a District.²⁸ Retained fetal membranes was more in multiparous than primiparous cows might be frequent exposure to reproductive problems or other health problems and nutritional deficiencies. Dystocia, retained placenta, metritis has a significant effect on milk production, and their negative impact varied across parities. Retained placenta, metritis, and ovarian cyst were a risk factor for conception rate; where 14%, 15% and 21% reduction in conception occurs, respectively.²⁹ The prevalence of mastitis was 30.95% which was higher than 21.3% and 6% reported in Borana and around Asella town;^{9,34} but it was relatively comparable with the finding of 35.2% in Jimma Town dairy cattle.¹³ The prevalence of mastitis could be associated with poor hygienic practices, such as the absence of udder disinfection and dry cow therapy. The problem was more prevalent in multiparous cows which may be associated with repeated milking activities.³⁰

The overall prevalence of calf mortality was 6.9% which was less than 9.3% in smallholder dairy farms in Hawassa.¹¹ It was much lower than 17.4% and 16% reported in smallholder production system in Selalle and Jimma town, accordingly;^{24,13} but it was higher than the prevalence of 2.16%, 1.73%, 1.04% in Hilat Kuku, Alrudwan and Alseleit dairy farms in Khartoum Sudan.¹ Among the common diseases other than reproductive problems were recorded in the dairy farm, positive reaction for tuberculin test had the highest prevalence of 8.42%, that was higher as compared with prevalence of 1.56% and 4.3% in dairy cattle of Yeki District in Southern Ethiopia and in Dilla town,^{47,27} but much lower than with the prevalence of 51.4% in Jimma town.⁵⁴

Hip joint dislocation observed with a prevalence of 2.74%. This finding was similar to the prevalence of 1.5% reported in the milk shed areas of Bangladesh.⁴⁸ Heart water disease had a prevalence of 2.32% which was lower than 5.6% in dairy cattle in Jimma town.¹³ The environment is a contributing factor for tick and tick-borne diseases in both areas. The study has also revealed a prevalence of 1% traumatic reticuloperitonitis/pericarditis in the farm and the finding was lower compared with the prevalence of 4.99%, 19.49% and 23.29% in Kars Province, Sudan.^{36,37,38} Such a difference could exist as result of feeding management in study area.

In conclusion, the current finding shows that there was low reproduction performance than expected when compared with well managed dairy farms elsewhere in the world. Age at first calving, calving interval, days open, number of service per conception and milk yield per day per cow were below the accepted standard profitable margin in Algae dairy farm. Therefore this farm needs to be improved promptly. The finding enlightened policy makers, decision makers and other stakeholder in order to act a necessary measure.

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