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Original Article

Milk Production, Reproduction, and Calf Growth Performance Evaluation of Indigenous Afar Cattle Breed Maintained at Dubti Pastoral and Agro Pastoral Research Center: Preliminary Result

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ABSTRACT

The study was conducted at Dubti Pastoral and Agro Pastoral Research Center to evaluate the productivity performance of indigenous Afar cattle breeds and suggest optimum management practices. The overall mean and (standard deviation) of birth weight, 3-month weight, 6-month weight, 9-month weight, 12-month weight, 18-month weight, and 24-month weight of Afar calves were 22.3 (1.6), 49.3 (3.5), 77.7 (10.4), 107.8 (3.4), 116.3 (6.7), 139.7 (8.1), and 165.5 (8.6) kg, respectively. The mean birth weight was 23.7 kg for males and 21.4 kg for females, and the average weaning weight at 3 months was 52.3 kg for males and 47.5 kg for females. Mean weaning weights at 6 months and 9 months were 77.2 kg and 110.8 kg for males; and

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78.1 kg and 106.0 kg for females, respectively. The mean yearling weight (12-month weight) for males and females was 118.6 kg; and 115.0 kg, respectively. Furthermore, the 18-month and 24-month live body weight was 140.8 kg and 169.4 kg for males and 139.1 kg and 162.2 kg for females, respectively. The overall means ± SD for DMY, LMY, and LL were recorded to be 4.0±1.05 litter per cow per day, 917±207 litter per lactation, and 236.0±38.00 days, respectively. The overall average AFS, AFC, and CI of indigenous Afar cattle were 40.2±4.21 months, 50.4±7.4 months, and 15.6±2.7 months, respectively. The result indicated that promising growth, milk production, and reproductive performances of the Afar cattle breed in its local environment are favorably comparable in the literature to other indigenous cattle breeds evaluated in other parts of Ethiopia. However, due to limited number of parent stocks in the existing research farms, limited infrastructure, shortage of grazing pastureland at a research site, and unsuitable irrigation canal for the production of improved animal forage were major constraints during animal performance evaluation and less productivity of the animals were recorded in the study. Therefore, solving and improving the limited constraints mentioned above are paramount suggestions to evaluate the production, the productivity of the indigenous afar cattle breed can be completely improved and the research could be studied more comprehensively.
Keywords: Afar cattle, Growth, Performance, Milk production, Reproduction

INTRODUCTION

Ethiopia has the largest livestock population in Africa and estimates to be 65 million cattle, 40 million sheep, 51 million goats, 8 million camels, and 49 million chickens (CSA, 2021). Livestock is a major source of animal protein, power for crop cultivation, means of transportation, export commodities, manure for farmland and household energy, security in times of crop failure, and means of wealth accumulation. The Ethiopian livestock population is almost entirely composed of indigenous animals. Estimates showed that 97.8%, 1.9%, and 0.3% of cattle are indigenous, hybrid, and exotic breeds. The estimates for sheep are 99.6% and 0.3% for local breeds and hybrids, respectively (CSA, 2021). The livestock production system is predominantly extensive, with indigenous breeds and low-input/low-output husbandry practices. The productivity of livestock production is constrained by several factors, including poor genetics, low reproductive performance, poor quality and varying seasonal availability of feed, high disease incidence and parasite challenges, and low accessibility to services and inputs (Zeleke Mekuriyaw, 2021).

Although, there are about 32 identified indigenous cattle breeds in Ethiopia. They were selected for their multipurpose performance and ability to survive environmental stress and described as having considerable adaptability to the harsh climate, poor nutrition, and diseases endemic to their respective areas. Out of 32 indigenous cattle breeds, Ethiopia has five commonly used cattle breeds such as Borana, Fogera, Arsi,

Horro, and Barka or Begait breeds. The performance characteristics of all these breeds are evaluated under on-farm and on-station research and/or teaching institutions of the country. Ethiopian Institute of Agricultural Research (EIAR) has been mainly involved in the performance evaluation of the indigenous cattle breeds of Ethiopia both on-station and on-farm research. To some extent, selection within indigenous cattle breeds on Borana, Fogera, and Horro was being undertaken in different ranches and research centers. The objective of conservation and improvement of the indigenous Boarna cattle breed in Adami Tulu and Abernossa cattle improvement ranch and while, Fogera cattle breed in Andassa livestock breeding ranch were achieved through selection, control breeding, and better management. The ranches had operated two distinct breeding units within indigenous cattle breeds, which undertook a selection and improvement operation on natural mating of indigenous cows, or heifers using superior pure breeding bulls while the crossbreeding unit, which operates crossbreeding of improved pure indigenous cows and heifers as a dam line, inseminated with superior exotic bull semen used a sire line. However, research conducted on genetic improvement and their productivity performance evaluation of five indigenous cattle breeds such as Boran, Fogera, Horo, Arsi, and Begait cattle were conducted under different research centers such as Holeta, Bishoftu, Bako, Adami Tulu agricultural research centers and Humera research center. Accordingly, research studies based on the above research centers and indigenous cattle breeds of Ethiopia, the Afar cattle breed is one of the Sanga cattle breeds, which inhabit the pastoral area of the Afar region where the afar pastoralists and agro-pastoralists mainly used for milk production, income source, meat production, social status, and draught purposes. According to the report (CSA, 2021), indigenous afar cows have an average daily milk off-take of about 1.8 liters under the pastoral management system, which is much lower than most tropical cattle breeds. The reason why afar cows have such a small milk output might be due to their poor genetic makeup or due to poor management including feed supply, controlled breeding, and health care. Like other indigenous cattle breeds of Ethiopia, the productivity performance of afar cattle breeds has not been evaluated under on-station and on-farm research studies. However, Afar Pastoral and Agro-Pastoral Research Institute and Dubti Pastoral and Agro-Pastoral Research Center have been researching research enhancing the productivity performance evaluation of indigenous afar cattle under optimum management conditions. Therefore, this study was conducted to evaluate productivity performance (milk production, reproduction, and calf growth performance traits) and suggest optimum management practices for indigenous afar cattle breeds.

MATERIALS AND METHODS

Location of the Study Site

The study was conducted at Dubti Pastoral and Agro pastoral research center (DPARC) which is found at a distance of about 12 km from Samara, the capital of the Afar National Regional State. It is located in Awsiresu (Zone-1) of the Afar National Regional State, Dubti Wereda. The research center lies between latitude 11^0 27' North, longitude 41^0 20' East, and an altitude of 382 m.a,s.l with an annual maximum temperature reaching 43.7 c^o and the rainfall is around 400mm. The types of soil in the study area are sandy loam soil. The major vegetation cover of the area is Prosopis species, acacia nilotica, and neam tree species. There are four major seasonal climates in the Dubti district (ANRS, 2010). Karma, the main rainy season, covering the period from late June to mid-September), Gillal (Short but cool dry season that occurs between (September and March), Sugum, a Short rainy season, that occurs from (March to April) and Hagai, a long and hot dry season, very hostile to the inhabitants, particularly to pastoralists, and their livestock, and runs from (May to June).

Animal and Herd Management

Fourteen-parent stock (Thirteen heifers and one breeding bull) within the range of 2.0 to 2.5 years of age were selected and purchased from the pastoralist herd themselves. During purchasing, the information of all animals identified through cattle herd owners with their history and pedigree information is based on the parent performance of the selected animals. All animals were transported and introduced to the Dubti livestock research station for on-station productivity improvement (milk production, reproduction, and calf growth performances) under optimum management conditions.

All animals were treated against internal and external parasites following the acquisition and kept separated both during day and night. The feeding practice was designed in such a way that it gives continuous growth, with feed being offered in-group and supplemented with mixed ration with a proportion of 60% concentrate (wheat bran (25%), Noug seed cake (Guizotia abyssinica) (30%) and molasses (5%)) and 40% roughage hay and fresh improved forage grasses (panicum antidotal and Rohdess grass which are adapted and promising in the research site was given as a basal diet. Experimental animals were allowed to graze freely during the daytime from 8:00 AM to 4:00 PM and sheltered in the barn during nighttime. The source of water was pure river water. Mating of the herd was natural mating in which a bull mated to all identified heifers or cows during breeding time. The bull was allowed to run with cows for two months. Mating was designed to have birth during the main rainy season (late June to mid-September) and the short rainy season (March -April) when there is enough forage. All animals were vaccinated against major diseases, de-wormed, and sprayed against internal and external parasites, respectively. The milking technique was partial suckling.

Methods of Data Collection and Management

Animals and their data sources were gathered from the ongoing research collected by indigenous afar cattle registration cards that cows were calved from 2017 to 2020 and performance record format maintained at Dubti cattle breeding research station. All the available data, which were compiled by individual cards and the casebook of the center, were filtered and crosschecked for consistency and informativeness. Those data targeted to milk production; reproduction performance and pre-weaning growth are further extracted and filtered for analysis. Detailed data record keeping of animals was taken at the study site on newborn calves' identification, cow id, bull id, birth date, calving date, and sex of calf and parity of cow. Performance traits such as birth weight, weaning weight, yearling weight, milk production, reproduction (age at first service of cow, age 1st calving and calving interval), and, Management practices like feeding, health care, occurrences of disease, and other relevant parameters were recorded and managed in a data record sheet and book. Finally, the required recorded data were transferred to software for analysis.

Statistical Analysis

Data on calf growth performance, milk production, and reproduction traits were used by simple descriptive statistical analysis, which was characterized by the following statistical parameters: percentages, mean, standard deviation, and variances calculated by SAS for Windows Version 9.4 (SAS, 2016). Analysis of variance (ANOVA) to be employed for the analysis of factors affecting the performance traits.

RESULTS AND DISCUSSION

Indigenous Afar cow calving level, number of calves born, and distribution

The research was initiated in 2016 at Dubti Livestock Research Station where thirteen (13) indigenous breeding Afar heifers and a single breeding bull were used to improve their production and productivity under optimal management conditions. The level of cow calving, number of calves born, and distribution by year of cow calving or year of calf birth in indigenous Afar cows are presented in (Table 1; Fig 2). The results of this study show that all cows in the studied farm gave birth in up to four calving periods, with 13 cows calving in the first calving, 11 cows calving in the second calving, 8 cows calving in the third calving, and 5 cows calving in the fourth calving in the different calving years. More calves were born in the first calving (calving year 2017) and in the second calving (calving year 2018) than in the other calving phases. This shows that the research farm is more focused on good and better treatment of all cows and calves. Moreover, the availability of faster breeding times, feeding, and health management practices occurred.

Number of calves born and distribution

The number and distribution of calves born in each birth year are presented in (Table 1 and Fig 2). About 37 calves (14 male calves and 23 female calves) were born from all fertile cows in different calving years at different levels of calving. Among the total calves born on the farm, the proportion of female calves (62%) was higher than the proportion (38%) of male calves. This shows that the selected bull breed is the best for production and productivity. The bull was selected from a productive sire and dam that produced a bull with a good body shape, a nice color type, a good temperament, and a prepupa sheath down (which allows him to produce more female calves with good and large udders and teats). The reason is that the cattle herder of pastoral communities has their traditional knowledge and skills in the selection of indigenous breeds of animals, that is, following modern science.

Table 1 : Number and distribution of cow calving of indigenous afar cattle by year of calving

Number of cows calving	Year of calving				
	2017	2018	2019	2020	Total
	N	N	N	N	N
Cows of first calving	6	5	2	0	13
Cows of second calving	0	6	3	2	11
Cows of third calving	0	0	4	4	8
Cows of fourth calving	0	0	0	5	5

N= number of calves born

Fig. 1: Cattle Herd and weaned calves feeding green forages at a research farm

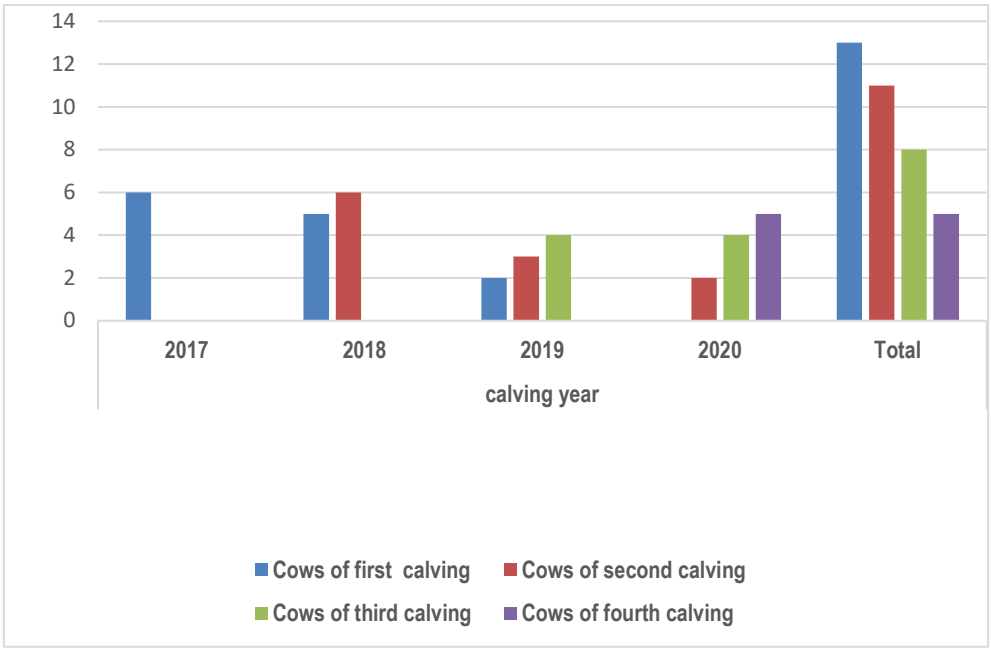

Fig. 2: Distribution of cow calving level

Table 2: Number and distribution of afar calves born at Dubti research station by year of birth

	Year of birth					
Sex of calves	**2017**	**2018**	**2019**	**2020**	**Total**	**Percent (%)**
Male	2	4	5	3	14	38
Female	4	7	4	8	23	62

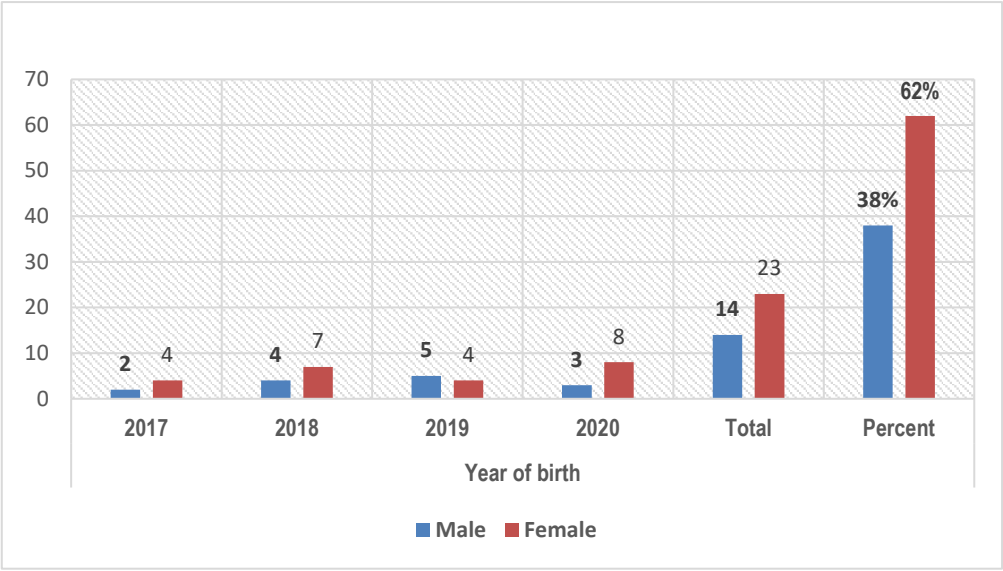

Fig. 3: Number of calves distributed by year of birth

Thus, the results of this study have made it possible to implement the above-mentioned selection processes for the bull breed in the afar herding community. There is a traditional Afar proverb entitled "*Afarabalek Moinob Yaimaenih Namabalek Ina Yaimaenih"* in the local Afar language, which means, "choose the father from the four legs and choose the mother from the two legs", which is a good way to select a dairy bull. In other words, the selection criteria related to the four legs represent the animals, while the selection criteria related to the two legs represent the people.

Achievements of Indigenous Afar Breeding Bull

On this basis, good results were obtained in this study by using the bull selection method mentioned above, which replaced the process of traditional breeding selection of the herding community by initiative. The indigenous bull breed shown in (Figure 4) is an indigenous bull breed selected by using traditional and modern breeding methods, and its productivity proved that it is an indigenous bull breed without reproduction problems. However, in this research study, it was confirmed that 37 calves were produced at Dubti Research Center at different breeding times. The peculiarity of this breed is that it gives birth to and produces more female calves than male calves. While the calves grew into heifers and young bulls at the research farm, the heifers and young bulls born at the station were distributed among the model Agro-pastoral communities.

Fig. 4: Selected indigenous breeding Afar bull produce 37 calves from 13 breeding cows in the breeding tract

Growth Performance Traits

The growth performance characteristics of the Afar calves kept at the Dutti Research Center are shown in (Table 3 and Fig 5). The overall mean and standard deviation of birth weight, 3-month weight, 6-month weight, 9-month weight, 12-month weight, 18-month weight, and 24-month weight were 22.3 (1.6), 49.3 (3.5), 77.7 (10.4), 107.8 (3.4), 116.3 (6.7), 139.7 (8.1), and 165.5 (8.6) kg, respectively. The average live weights of male and female calves in the present study were 23.7 kg, 52.3 kg, 77.2 kg, 110.8 kg, 118.6 kg, 140.8 kg, 169.4 kg, and 21.4 kg, 47.5 kg, 78.1, 106 kg, 115 kg, 139.1 kg, 162.2 kg, respectively (Table 3 and Figure 4). The mean birth weight obtained in the current study was comparable to the birth weight of other indigenous Ethiopian cattle breeds such as Borana calves (22.9 kg), Adisu *et al.* (2010) for Fogera calves (21.4), Begait calves (22.6) and Horro calves (19.9 kg) in a research station. Birth weights obtained in the present study are lower than those reported for previous work on Borana calves in Ethiopia: 26.6 kg by Yohannes *et al.* (2001b), 23.7 kg by Amsalu (2003), and 23.3±0.36 kg by Aynalem et al. (2010),

The live weight results of the Afar calves were higher than the live weights of the Horro calves, which were reported to be 69.8, 117.7, 129.4, and 150.0 kg, respectively, at the Gudure Cattle Improvement and Research Center (Hundie *et al.,* 2013). The values were higher compared to other breeds such as the Boran breed (Demeke *et al.* 2003; Aynalem *et al.,* 2010), Fogera breed (Bitew *et al.,* 2010), Sheko breed (Bayou *et al.,* 2015), Horro breed (Demeke *et al.,* 2003, Hundie et al., 2013), Aynalem *et al.,* 2010) and Begait breed (Aynalem *et al.,* 2010) and lower than the previous report by Birhanu and Beshir (2019) for Borana breed. The high result of calf growth performance in the present study can be attributed to the type of calf management, the amount of milk received from the mothers and the concentrate supplementation of the mothers during the lactation period, and the growth potential of the calves. While the lower values compared to other research studies might be due to the differences in the optimum management of growing calves and the nature of the breed. The growth performance traits of male calves were heavier by 2.3 kg at birth weight, 4.8 kg at 3-month weight, 4.8 kg at 9-month weight, 3.6 kg at 12-month weight, 1.7 kg at 18-month weight, and 7.2 kg at 24- month weight than female calves while female calves were slightly higher weaning weights at 6- month weights by 0.9 kg (Figure 4); which might be due to the physiological difference between male and females calves.

Table 3: Descriptive statistics of the growth performance traits of Afar calves maintained at Dubti Research Center

	Growth performance traits									
Variables	**N**	**Birth weight, kg**	**3-month weight, kg**	**6-month weight, kg**	**9-month weight, kg**	**12-month weight, kg**	**N**	**18-month weight, kg**	**N**	**24-month weight, kg**
Overall	37	22.3	49.3	77.7	107.8	116.3	27	139.7	24	165.2
SD	37	1.6	3.5	10.4	3.5	6.7	27	8.1	24	8.6
CV,%	37	7.0	7.1	13.3	3.3	5.8	27	5.8	24	5.2
Min	37	18.0	39.5	54.6	98.0	103.0	27	123.5	24	143.5
Max	37	25.0	56.5	95.0	114.6	134.0	27	155.5	24	176.8
Sex										
Female	23	21.4	47.5	78.1	106	115	17	139.1	14	162.2
Male	13	23.7	52.3	77.2	110.8	118.6	10	140.8	10	169.4

N= Number of records, SD= standard deviation of the mean, CV= coefficient of variation, Min = minimum, Max = maximum

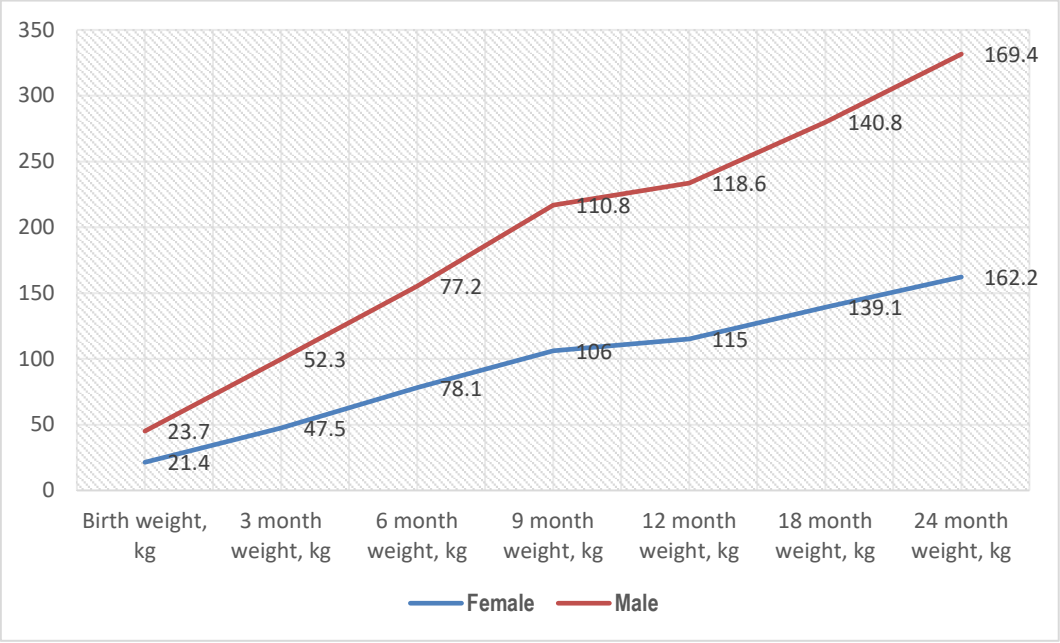

Fig 5. Growth performance traits of Afar calves by the effect of sex category

Milk production performance

The overall mean ± SD of daily milk yield, lactation milk yield, and lactation length of indigenous Afar cows are summarized in Table 4. The result from the analysis of variance indicated that the overall means ± SD for DMY, LMY, and LL recorded to be 4.0±1.05 L/cow/day/ 917±207 L/cow/Lac and 236.0±38.00 days, respectively.

Significance Differences in DMY of indigenous Afar cows were observed among the parity of cow ($p<0.05$) and calving year ($p<0.01$). A highly significant difference in LL was observed among the parity of cows, but no significant effect during the calving year. Lactation milk yield of Afar cows across parity of cow and calving year was no significant differences. The highest daily milk yield of Afar cows was observed for the third (4.8±0.8 L/d) and fourth (4.2±1.20 L/d) parity and the 2019 calving year (4.3 ± 1.0 L/d). Lower daily milk yield for 2017 and 2018 calving years. The average daily milk yield reported in this study (4.0 L/d) is higher than the reports of Weldegebrial *et al.* (2020) for indigenous Afar cows (2.6 L) at Werer Agricultural Research Center and Addisu *et al.* (2010) for Fogera cattle (0.99 L). The mean lactation length reported in this study (236 days) is higher than the reports of IAR (1991) for Horro cattle (229 days), and Birhanu, and Beshir, (2019) for Borana cattle (210 days) in Ethiopia.

Table 4: Means ± Standard deviation of daily milk yield (DMY), lactation milk yield (LMY), and lactation length (LL) of indigenous Afar Cattle by the effect of parity and calving years

Variables	N	DMY (L/d)	LMY (L/lac)	LL (days)
Overall mean	37	4.0±1.05	917.0±207.00	236.0±38.00
CV%		23.6	22.0	12.4
R^2		0.23	0.13	0.46
Parity of cow	N	*	Ns	***
1	13	3.7±1.0	903±1.0	247.3±29.4
2	11	3.5 ± 0.9	871±187.0	248.0±27.0
3	8	4.8±0.8	886±83.0	188.1±35.9
4	5	4.2±1.20	1101±350.0	257.0±19.6
Calving years	N	**	Ns	Ns
2017	6	3.2 ± 0.8	754±141.0	243.4±32.2
2018	11	2.9 ± 0.6	732 ± 161.0	251.4±19.8
2019	9	4.3 ± 1.0	882± 95.0	211.1 ± 42.6
2020	11	3.8 ± 1.1	823.± 189.0	225,3 ± 40.1

N= number of records, CV, = coefficient of variation, R^2 = coefficient of determination, DMY = daily milk yield, LMY= lactation milk yield, LL = lactation length, L/d = litter per day, L/lac = litter per lactation, *= significant at ($p<0.05$), ** = ($p<0.01$), *** = ($p<0.001$), Ns = non-significant at ($p>0.05$)

The performance of indigenous Afar cows at different calving years showed wide variations that may be due to differences in rain distribution across the year that affected the availability of feed in which the evaluation of the experiment was conducted under the research station. In the current study, the average daily milk yield and lactation milk yield of Afar cows are higher than the report of Birhanu and Beshir, (2019), EARO (1999), and Haile *et al.* (2009a) who found the average

lactation milk production of the indigenous cows' ranges from 480–825 L under optimum management.

Reproduction Performance

Age at first service (AFS) is the age at which heifers attain body condition and sexual maturity for accepting service for the first time (Giday. 2001). Age at first service signals the beginning of the heifer's reproduction and production and influences both the productive and reproductive life of the female through its effect on her lifetime calf crop. Age at first service is influenced by genotype, nutrition, and other environmental factors (Zewdie, 2010). The overall mean age at first service of indigenous Afar cattle was 40.2±4.21 months (Table 5). Significant differences in AFS were observed among parity of cow ($p<0.001$) and calving year ($p<0.05$) respectively. AFS of Afar cattle was shorter than compared to the reports of 48.9 months for the local Horro cattle breed (Demissu *et al.*, 2013), 44.8 months at the Andassa research center (Giday, 2003), and longer than the report of 38.8 months at Gonder research station (Mekonnen & Goshu, 1987) for Fogera cattle breed. The overall mean age at first calving (AFC) of the indigenous Afar cattle breed maintained at Dubti research center was 50.4±7.4 months. Significant differences in age at first calving (AFC) of indigenous Afar cattle were observed among the parity of cow ($p<0.01$) and calving year ($p<0.05$) (Table 5).

Table 5: Means ± Standard deviation of Age at first service (AFS), Age at first calving (AFC), and Calving interval (CI) of indigenous +++Afar Cattle by the effect of parity and calving years

Variables	N	AFS (mo)	AFC (mo)	N	CI (mo)
Overall mean	37	40.2 ± 4.21	50.4 ± 7.4	24	15.6 ± 2.7
CV%	-	8.5	13.1.	-	18.1
R^2	-	0.40	0.26	-	0.01
Parity of cow	N	***	**	N	ns
1	13	37.0±4.0	50.3 ± 3.7	11	15.8 ± 3.8
2	11	40.0±2.0	45.8 ± 9.8	8	15.2 ± 0.9
3	8	44.0±5.0	51.6 ± 5.7	5	15.7± 2.2
4	5	43.0± 3.0	55.6 ± 5.0	-	-
Calving year	N	*	*	N	ns
2017	6	39.0 ± 2.0	45.5±4.3	6	16.9±4.9
2018	11	37.0 ± 4.0	47.9±7.1	9	14.8
2019	9	41.0 ± 4.0	54.8±6.6	5	14.7±1.3
2020	11	42.0 ± 4.0	51.9 ±7.7	4	16.4±1.5

N= number of records, CV, = coefficient of variation, R^2 = coefficient of determination, AFS = Age at first service, AFC= Age at first calving, CI = Calving interval, *= significant at ($p<0.05$), ** = ($p<0.01$), *** = ($p<0.001$), Ns = non-significant at ($p>0.05$)

The age at first calving of Afar cattle was considered too late compared to reports of 48.39 months (Birhanu and Beshir, 2019) for Ethiopian Borana cattle, 47.6 months (Addisu, 1999) for Fogera cattle at Metekel Ranch, but shorter than 59.7 months (Hundie et al., 2013) for local Horro cattle breed at on-station research. However, a longer calving interval of 56.85 months (Yifat et al., 2012) was reported in Ethiopian Borana cattle than in the present study. The study of this Indigenous Afar cattle breed has been under control mating, and those heifers, which failed to come to heat or did not conceive during the breeding time, were delayed until the next mating time, and this is expected to have contributed to the late average age at first calving. Furthermore, the prolonged age at first calving of indigenous Afar cows in our study compared to literature results of other indigenous breeds could be attributed to factors such as poor nutrition and different management practices. With good nutrition, it is expected that heifers would exhibit fast growth and attain higher weights at a relatively younger age leads to prevent delayed puberty.

The overall calving interval of indigenous Afar cows was 15.6 ± 2.7 months, which is within the estimated calving interval for zebu cattle ranging from 12.2 to 26.6 months (Gebrekidan *et al.,* 2012). The result of the present study was in agreement with the reports of Azage, (1981) and Mekonnen, (1987), who reported lower calving intervals of 15.83 and 15.35 months at Abernossa ranch, respectively. In the present study, no significant difference was observed among the parity of cow and calving years. A shorter calving interval of Afar cows was recorded for the year 2018 than in 2019. On the other hand, Yifat *et al*. (2012) reported a longer calving interval of 20.47 months for Borana cows at the Tatesa cattle breeding center. Furthermore, the shorter calving interval of indigenous Afar cows in our study compared to literature results of other indigenous breeds could be attributed to factors such as good nutrition and other management practices while longer calving interval might be poor nutrition, limited rainfall distribution and feed resource availability across the year.

CONCLUSION AND RECOMMENDATION

The study was conducted at Dubti Pastoral and Agro Pastoral Research Center to evaluate the productivity performance of indigenous Afar cattle breeds and suggest optimum management practices. The results of the present study show that all cows in the production farm gave birth in up to four calving periods, with 13 cows calve in the first calving, 11 cows calves in the second calving, 8 cows calves in the third calving, and 5 cows calves in the fourth calving. More calves were born in the first calving (calving year 2017) and in the second calving (calving year 2018) than in the other calving phases (Table 1 & Figure 1). There are about several 37 calves (14 male calves and 23 female calves) born from all fertile cows in different calving years at different levels of calving or parity of cows. Among the total calves born on the farm,

the proportion of female calves born (62%) was higher than the proportion (38%) of male calves born.

The mean birth weight was 23.7 kg for males and 21.4 kg for females, and the average weaning weight at 3 months was 52.3 kg for males and 47.5 kg for females. Mean weaning weights at 6 months and 9 months were 77.2 kg and 110.8 kg for males; and 78.1 kg and 106.0 kg for females, respectively. The mean yearling weight (12-month weight) for males and females was 118.6 kg; and 115.0 kg, respectively. Furthermore, the 18-month and 24-month live body weight was 140.8 kg and 169.4 kg for males and 139.1 kg and 162.2 kg for females, respectively.

The overall means ± SD for DMY, LMY, and LL were recorded to be 4.0±1.05 litter per cow per day, 917±207 litter per lactation, and 236.0±38.00 days, respectively. Significance Differences in DMY of indigenous Afar cows were observed among the parity of cow ($p<0.05$) and calving year ($p<0.01$). A highly significant difference in LL was observed among the parity of cows, but no significant effect during the calving year. Lactation milk yield of Afar cows across parity of cow and calving year was no significant differences. The overall average AFS, AFC, and CI of indigenous Afar cattle were 40.2±4.21 months, 50.4±7.4 months, and 15.6±2.7 months, respectively. Significance differences of AFS were observed among parity of cow ($p<0.001$) and calving year ($p<0.05$) respectively. Significant differences in age at first calving (AFC) of indigenous Afar cattle were observed among the parity of cow ($p<0.01$) and calving year ($p<0.05$). There is no significant effect of the calving interval observed among the effect of parity of cow and calving year.

The result of the present study could be concluded that the promising growth performance, milk production, and reproduction performances of the Afar cattle breed in its local situation are favorably comparable in the literature to other indigenous cattle breeds evaluated in different locations of Ethiopia. However, due to the limited number of parent stocks in the existing research farms, limited infrastructure, shortage of grazing pastureland at a research site, and unsuitable irrigation canal for the production of improved animal forage were major challenges faced during animal performance evaluation and fewer productivity of the animals was recorded in the study. Therefore, solving and improving the limited constraints mentioned above are paramount suggestions to evaluate the production, the productivity of the indigenous afar cattle breed can be completely improved and the research could be studied more comprehensively.

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AUTHOR'S CONTRIBUTION

All authors equally contributed to the data collection, analysis, interpretation of the result, and write-up of this research manuscript. The authors read and approved the final manuscript.

CONFLICT OF INTERESTS

The authors declare that no conflict of interest concerning the research, authorship, or publications of this research article.

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