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Research Article

Breeding Practices, Reproductive and Productive Performance of Dairy Cows: The Case of West Wollega Zone, Gimbi District, Ethiopia

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ABSTRACT

The study was conducted from January 2018 to May 2018 with the objective of studying breeding practices, reproductive and productive performance of dairy cows in Gimbi district, west Wollega zone. A total of 120 dairy producers were randomly selected from four representative kebeles (Chuta Giyorgisi, Lelisa Yesus, Bikiltu Tokuma and Enango Dembali) and interviewed. A semi-structured questionnaire was employed to gather the required data and the collected data were analyzed by using statistical package for social science (SPSS Version 20). As the study result indicated about 89% of the households were used natural mating as method of breeding and only 3% of them were utilized AI but they perceived as it had no worth. The mean age at first service (AFS), age at first calving (AFC) and calving interval (CI) of local cows was 42.23 ± 7.4; 51.73 ± 6.97 and 15.03 ± 1.04, respectively. And 29.02 ± 2.65; 38.14 ± 5.43 and 14.48 ± 1.19 was the mean age at first service (AFS), age at first calving (AFC) and calving interval (CI) of crossbred cows, respectively in the study area. All the reproduction parameters included in this study were significantly different at ($P<0.05$) between breeds. Moreover, 1.18 ± 0.52 and 5.83 ± 0.28 liters were the daily milk yield of local and crossbred dairy cows, respectively. The indigenous dairy cow has 7.15 ± 0.13 months of lactation length, whereas 8.87 ± 0.18 months were the lactation length of crossbred dairy cow. Comparing with the recommended standard, the dairy cows of the study area were familiarized with poor reproductive and productive potential. Thus, the benefits derived from dairy cows were not commensurate with their number. Since genetic improvement of livestock has a major impact on animal productivity and reproductively, its effects are permanent, cumulative and usually highly cost effective; practicing advanced breeding methods (cross breeding though AI and sound estrus detection), upgrading genetic makeup of the animal (crossing local with Holstein Friesian) and practicing good management system in the study area is highly needed.

Keywords: Breeding practice; Dairy cow; Gimbi district; Productive; Reproductive

INTRODUCTION

Dairy production plays a vital role in economic development; especially in developing countries as both driving economic growth and profiting from it. It is used as an enterprise and economically viable and greatly contributes to poverty reduction, food security, increased family nutrition and income and job opportunity creation [1]. The share of animal products in total food budget increases faster than that of cereals due to relatively high-income elasticity of demand for animal products [2].

Ethiopia is endowed with large number of livestock species and ranked 5th on the world. According to Central Statistical Agency [3], the total cattle population of the country is 60.39 million, of which 12.39 million were dairy cows; and the annual milk production is 3.1 billion liters. Regarding breed groups, of this total cattle population, 98.24, 1.54 and 0.22 percent are indigenous, hybrid and exotic breeds, respectively [3-5]. Even though cattle production in general and dairy production in particular is the main component of agricultural growth in the country, the overall cost of keeping dairy cattle associated with the health care, nutrition and reproduction management, however, has not matched to their contribution to the livelihood and economy of the people. This may be because of poor reproductive performance and productivity of the animal, which are aggravated by such many factors as low genetic potential of the livestock and poor management [6]; seasonal availability of feeds, prevalence of diseases, poor nutrition and incorrect detection of estrus [7-9]; and improper breeding system

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[10]. These factors decrease reproductive efficiency, shortening the expected length of productive life and lowering milk production [11], which in turn increases the demand-supply- gap of milk and milk products.

Thus, to reduce the demand -supply- gap of milk and milk products in the country, it is very imperative to improve the genetic makeup of the indigenous dairy cows through utilizing advanced breeding systems and practicing good management system under the existing farming systems in the country in general and in the study area in particular. Moreover, it is skeptical to plan and design dairy production improvement strategy without considering the reproduction and production potential of dairy cows. In this regard, on farm evaluation of breeding practices, reproductive and productive performances of dairy cows are essential study that has not been investigated in the study area. Therefore, the current study was initiated with to fill this research gap.

MATERIAL AND METHODS

Description of the Study Area

The study was conducted from January 2018 to May 2018 in Gimbi district, west Wollega zone. Gimbi district is found at 441 km away from Addis Ababa, the capital city of the country to the west. It is located 9°10°-9°17° North latitude and 35°44°-36°09° East longitudes; and has a land area of 100,965 hectare (1009.65 km^2). The annual rainfall of the area is between 1400-1800 mm, whereas temperature ranges between 10°C and 30°C. Altitudinal, it is located at 1200 m-2222 m a.s.l. Mixed crop-livestock production is the principal farm activity carrying out in the study area. The study area is gifted with large number of domestic animals; 93,640 cattle, 46,115 sheep, 7,207 goats, 131 mule and 80,370 poultry [12,13].

Sampling Methods and Sample Size

The study district was purposively selected on the basis of presence of relatively large number of dairy cattle (indigenous and crossbred), high number of smallholder dairy producers, and accessibility to transport and marginality to most dairy technological interventions as compared to the neighboring districts of the zone. Based on aforementioned criteria of study area selection, two stages purposive sampling technique was used to select kebeles and targeted households. Accordingly, four representative kebeles (Chuta Giyorgisi, Lelisa Yesus, Bikiltu Tokuma and Enango Dembali) were purposively selected based on the extent and intensity of dairy cow production and reliable information drawn together to the study. Then a total of 120 household respondents (30 from each Kebele) were randomly selected and interviewed.

Sources and Methods of Data Collection

Both primary and secondary data sources were employed for this study to generate reliable information on the intended topic. Primary data were collected from household survey, focus group discussion (FGD) and key informant interview (KII). Semi-structured questionnaire was used to collect primary data on reproduction parameters such as age at first service, age at first calving and calving interval and production parameters like daily milk yield and lactation length. The questionnaires were pre-tested on 10 individual farmers and essential amendments were made accordingly. Whilst, secondary data were collected from zonal and districts agricultural offices, published journal articles, reports and other relevant documents. The reproduction and production parameters included in this study were not measured, but estimated based on the respondents' response.

Statistical Analysis

The data was checked, coded and entered in to Microsoft excel work sheet and was analyzed using SPSS software version 20. Descriptive statistics like percentage and mean were used to present the analyzed data, while Chi-square (χ^2) was used to compare the variation of reproductive parameters between breeds. In all the cases, 95% confidence level and 0.05 absolute precision errors were considered. A p-value ≤ 0.05 was considered statistically significant.

RESULTS

Breeding Techniques

Of the total dairy producers interviewed, 89% were breeding their cows by natural mating through their own bulls and bulls owned by their neighbor and very few of them (3%) use AI but they perceived as it had no worth; and the rest (8%) use both Natural mating and AI (Figure 1).

Reproductive Performance

Average age at first service (AFS) for local and crossbred females in study area was 42.23 ± 7.4 and 29.02 ± 2.65 months, respectively. While the results obtained indicated that age at first calving of local and crossbred dairy cows were 51.73 ± 6.97 and 38.14 ± 5.43 months, respectively (Table 1).

The result of the present study also depicted that the calving intervals (CI) of local and crossbred dairy cows were 15.03 ± 1.04 and 14.48 ± 1.19 months, respectively (Table 1).

Production Performance of Dairy Cattle

The mean daily milk yield per cow for indigenous and crossbred cow was 1.18 ± 0.52 and 5.83 ± 0.28 liters, respectively. 7.15 ± 0.13 and 8.87 ± 0.18 months were the average mean lactation length of local and crossbred cows reported in the study area, respectively (Table 2).

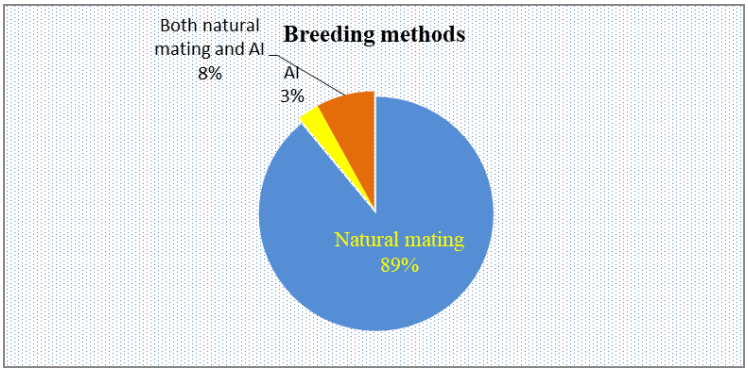

Figure 1: Breeding methods in the study area.

Table 1: IVF technique related parameters in both study groups.

Parameters	Mean ± SE (Months)	CV	LSD
AFS (Local)	42.23 ± 7.4[a]	54.69	7.4
AFS (Crossbred)	29.02 ± 2.65[b]	7.02	5.43
AFC (Local)	51.73 ± 6.97[a]	48.64	6.97
AFC (Crossbred)	38.14 ± 5.43[b]	29.5	5.27
CI (Local)	15.03 ± 1.04[a]	1.08	1.04
CI (Crossbred)	14.48 ± 1.19[b]	1.19	1.2

AFS=Age at First Service, AFC=Age at First Calving, CI=Calving Interval, SE=Standard Error of mean
Means in the same column with different superscripts are significantly different at P<0.05.

Table 2: Efficacy related parameters in both study groups.

Parameter	Breed	
	Local	Crossbred
Daily Milk yield (Litre)	1.18 ± 0.52	5.83 ± 0.28
Lactation length (Months)	7.15 ± 0.13	8.87 ± 0.18

DISCUSSION

Cattle Breeds

According to Gimbi District Livestock and Fishery Resources Development Office annual report (2017), in the current study area indigenous and crossbred cattle population were 93,538 (99.89%) and 102 (0.11%), respectively. This finding was almost in agreement with [3] report which states 98.24, 1.54 and 0.22 percent were local, hybrid and exotic breeds, respectively. Almost all cattle owned by the respondents are non-descriptive type, which do not belong to any specific breed and termed as indigenous cattle. However, as farmers participated in focus group discussion (FGD) indicated Horro breeds were the local animal predominantly available and have a long life story in the study area. During the study period, even though very few (5.5%) of the respondents had crossbred cattle (Holstein Frisian X Zebu) crosses distributed by Ministry of Agriculture, all the respondents and the result of FGD indicated Holstein Friesian crosses were highly preferred due to their color, adaptability to the local environment and high milk production. The same finding was reported by [14].

Season of Breeding

Even though cattle are non-seasonal breeder, their breeding (conception, calving) period is highly rely on seasons of the year. At the onset of rains, grasses and leaves of plants start to revive and the improved feeding situation initiate heifers and cows to be ready for breeding. Whereas, January to May is a dry period when there is feed shortage and poorly nutritive, particularly deficient in nitrogen content and environmental stresses as result in cattle do not come in heat. As a result, the time June to August marked the months of heightened breeding in the study area followed by September to December, although the intensity of breeding activity was reduced during the latter period.

Breeding Techniques

Natural mating and artificial insemination are the two major types of breeding practices in the study area. Natural mating is done by selected superior bulls from the local breeds, unknown pedigree available in the herd. The bull carries out heat detection, and cows in heat usually mated several times during each heat period. This result in poor performances of the sector and breeding management become an overall constraint (inbreeding) to dairy production system of the area. Some farmers who have superior bulls were not voluntary to give their bulls to their neighbor for breeding service because of the fear of loss of genetic superiority and transmittable diseases.

Of the total dairy producers interviewed, 89% were breeding their cows by natural mating through their own bulls and bulls owned by their neighbor and very few of them (3%) use AI but they perceived as it had no worth; and the rest (8%) use both Natural mating and AI (Figure 1). The current result was in line with the report of [15] from Abay Choman and Jimma Ganati, Eastern Oromia. But, this result was disagreeing with the report of [16] indicated that in North Gondar, Ethiopia about 43.0% of respondents have dairy cattle improvement strategy. Of these, 6.34%, 4.23% and 3.52% of respondents preferred straight breeding for milk test, milk fat, milk by product (especially butter), respectively. The rest 85.91% of the respondents exercised crossbreeding strategy to increase the amount of milk production per head of cattle. The lack of either AI service or selected superior bulls in the area leads to the inadvertently use of bulls with unknown pedigree which eventually poses threats of inbreeding. Therefore, work in areas of AI deserves more attention to reduce the reported low rate of AI uses by synchronizing the peak heat period and the time of insemination with advance services.

Reproductive Performance

Average age at first service (AFS) for local and crossbred females in study area was Average age at first service (AFS) for local and crossbred females in study area was 42.23 ± 7.4 and 29.02 ± 2.65 months, respectively. The present result was slightly similar with the results of [17] where the AFS of local and crossbred dairy cows were 46.16 ± 0.5 and 27.03 ± 2.11months, respectively in Dawa Chefa District, Amhara Region, Ethiopia. Average age at first service (AFS) was significantly different at (P<0.05) between breeds. AFS is either advanced or delayed by such factors as environmental particularly nutrition inferences overall reproductive processes. The largest age at first service in the present study might be due to low level of management and poor feeding of calves and heifers at earlier stages.

The results obtained indicated that age at first calving of local and crossbred dairy cows were 51.73 ± 6.97 and 38.14 ± 5.43months,

respectively. Age at first calving was significantly different at (P<0.05) between breeds. This value was in approximate to the results of 55.2 ± 0.8 months for age at first calving of local heifers and disagreed with 52.0 ± 0.6 months reported by [16] for age at first calving of crossbred cows in Chenchera and Kutcha district, Southern Ethiopia. The current result is also longer than 3.926 years reported for age at first calving of local cows in Wolaita Zone, Southern Ethiopia [18]. These differences might be due to differences in feeding management, breeding decision, environmental status and health care. The desirable age at first calving in local breeds is 3 years and 2 years in cross bred cattle [19]. The highest age at first calving observed here might be related to environmental conditions and husbandry practices which may affect the cattle growth. Hence, good husbandry practices especially in dry seasons can improve age at first calving.

The result of the present study depicted that the calving intervals (CI) of local and crossbred dairy cows were 15.03 ± 1.04 and 14.48 ± 1.19 months, respectively (Table 1). This result falls within the range of calving interval for Ethiopian zebu cattle of 12-22 months reported by Mukasa-Mugerwa (1989) cited by [20] it is more profitable to have one calf yearly in cattle. Calving intervals was significantly different at (P<0.05) between breeds. Nevertheless, age and breed of cows, calving season and availability of forage may contribute prolong calving interval [21].

Production Performance of Dairy Cattle

Even though indigenous dairy cows are regarded as low milk producers, however they are the major (98.24%) source of milk in Ethiopia [3] in general and they contribute 99.89% for milk production in the study area. For the purpose of this study, the lactation length and milk yield per day per cow of local and crossbred was not measured, but estimated based on farmers' response.

The mean daily milk yield per cow for indigenous and crossbred cow was 1.18 ± 0.52 and 5.83 ± 0.28 liters, respectively (Table 2). Similarly, [12] reported 1.2 and 6 liters daily milk yield per cow for local and crossbred, respectively from Western Oromia. Also the present result was almost similar comparing with national average of 1.37 liter/day/cow [3]. The reason for low daily milk production in the study area might be primarily due to genotype followed by poor husbandry and breeding practices of the animal.

7.15 ± 0.13 and 8.87 ± 0.18 months were the average mean lactation length of local and crossbred cows reported in the study area, respectively. The average lactation length reported in the present study (Table 2) was disagreed with the lactation lengths of 10 months that commonly accepted as a standard in most modern dairy farms. However, the average value observed in the present study was longer than that reported at national level (6 months) for indigenous cattle [3].

CONCLUSION AND RECOMMENDATION

From this study it can be concluded that, almost all cattle owned by the respondents are non-descriptive type, which do not belong to any specific breed and termed as indigenous cattle. Natural mating (89%) was the main breeding practice under gone by dairy producers and only 3% of the respondents were used AI for breeding but they perceived as it had no worth. Generally, comparing with the recommended standard, the dairy cows of the study area were familiarized with poor reproductive and productive potential. This might be due to low genetic potential of the livestock, poor nutrition and incorrect detection of estrus; and improper breeding system (uncontrolled mating). Thus, the benefits derived from dairy cows were not commensurate with the number of dairy cows available in the study area. Because of genetic improvement of livestock has a major impact on animal productivity and reproductively, its effects are permanent, cumulative and usually highly cost effective; practicing advanced breeding methods (cross breeding though AI and sound estrus detection), upgrading genetic makeup of the animal (crossing local with Holstein Friesian) and practicing good management system in the study area is highly essential.

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