

Productive and Reproductive Performance of Local Cows under Farmer's Management in and around Mekelle, Ethiopia

Niraj Kumar^{1*}, Yemane Abadi¹, Berihu Gebrekidan¹ and Yohannes Hagos Woldearegay¹

¹(College of Veterinary Medicine, Mekelle University, Ethiopia)

Abstract: The study was conducted on 223 indigenous cows maintained under farmer's management in and around Mekelle, Ethiopia. A total of 72 small-scale dairy farm owners were randomly selected and interviewed with structured questionnaire to obtain information on the productive and reproductive performance of indigenous cows. The results of the study showed that the mean age at first calving (AFC) was 39.4 ± 1.7 months, number of services per conception (NSC) was 2.1 ± 0.1 , lactation length (LL) was 247.11 ± 22.64 days, lactation milk yield (LMY) was 464.34 ± 41.75 litres, days open (DO) was 185.82 ± 51.23 days and calving interval (CI) was 431.08 ± 78.03 days for indigenous cows.

Keywords: Productive, reproductive performances, local cows, Mekelle, Ethiopia.

I. Introduction

Ethiopian livestock sector has been contributing considerable portion to the economy of the country, and still promising to rally round the economic development of the country. The total cattle population for the country is estimated to be about 53.99 million and the estimate of total cow milk production is about 3.80 billion liters. Out of this total cattle population, 98.95 percent of the total cattle in the country are local breeds. The remaining are hybrid and exotic breeds that accounted for about 0.94 percent and 0.11 percent, respectively [1].

In 2012/13, the average lactation period per cow at country level was estimated to be about six months, and average milk yield per cow per day is about 1.32 litres/cow per day [1]. The per capita milk consumption was only about 16 kg/year, which is much lower than African and world per capita averages of 27 kg/year and 100 kg/year, respectively [2]. Although some improvement also reported in per capita consumption of milk and estimated it at 19.2 kg [3] but still production is lagging far behind the demand. The average lactation milk production of the indigenous cow ranges from 494–850 kg under optimum management [4,5]. This low per capita milk consumption is mainly emanated from poor genetic potential of local cattle for dairy traits.

The indigenous breeds of tropics are attributed to natural selection to the tropical environment and management. They are well known for their adaptability, hardiness, disease resistance, heat tolerance, low feed supply and low management level. To meet the ever-increasing demand for milk and milk products genetic improvement of the indigenous cattle has been proposed as one of the options. Genetic improvement of the indigenous cattle, basically focusing on crossbreeding, has been practiced in many developing countries. However, information is limited about the productive performance of dairy cows in smallholder urban and peri-urban dairy farms in the tropics, particularly in Ethiopia [6]. Performance record of local cows is essential for designing breeding as well as managemental strategies develop the dairy sector. The aim of the present study was, therefore, to investigate the productive and reproductive performance of local cows in and around Mekelle, Ethiopia.

II. Materials And Methods

2.1 Study area

The study was conducted in and 10 Km around Mekelle city of Tigray Region in the semiarid highlands of northern. Mekelle is the capital city of Tigray Region and located in the northern extremes of Ethiopia extending from $33^{\circ}25'$ to $39^{\circ}38'$ north latitude and from $36^{\circ}27'$ to $40^{\circ}18'$ east longitude at an average altitude of 2000 to 2200 meters above sea level. The mean annual rain fall ranges from 11.3mm to 39.1mm and the temperature varies from 12°C (in November and December) to 27°C (in January and March). Mekelle enjoys humid and hot climate and 783 km from Addis Ababa [7].

2.2 Sampling procedure and data analysis

A total of 72 smallholder dairy farmers were interviewed randomly with scheduled questionnaire which was mainly based on the productive and reproductive performance of local cows. A total of 223 local cows were included in this study were maintained under farmer's management system, located in a radius of about 10 kms in and around Mekelle (Ethiopia). The questionnaire was developed in accordance with the objectives of the

study and designed in a simple manner to get accurate information from the dairy farm owners. Each respondent was given a brief description about the nature and purpose of the study and the responses were recorded directly on the survey schedule.

The farmers under the study areas maintained cows under intensive management system in back-yard operation utilizing whatever space was available in the residential compound. The cows were managed in closed houses with different types of floor structure throughout the day. Cows were hand milked with twice per day milking frequency. Data were recorded like lactation length (LL) and lactation milk yield (LMY) as productive performance and number of services per conception (NSC), age at first calving (AFC), days open (DO) and calving interval (CI) as measures of reproductive performance. Descriptive statistics such as means and standard deviations were used.

III. Results And Discussion

3.1 Age at first calving

The results of the study showed that the mean age at first calving (AFC) was found to be 39.4 ± 1.7 months (Table-1). The mean AFC revealed in this study is shorter than the mean of 60 months in Begait breed, 53.4 months in Fogera breed and 53 months in Horro breed in Ethiopia [8]; 1729.9 ± 58.2 days reported in Boran cows at Tatesa cattle breeding center in Gurage Zone, central Ethiopia [9]; 47.16 ± 8.7 months in local cows in Chacha Town and nearby selected kebeles, North Shoa Zone, Amhara Region, Ethiopia [10]. Lower mean AFC is recorded as 33.8 months reported in Arsi breed in Ethiopia [11]. A substantial delay in the attainment of sexual maturity may mean a serious economic loss, due to an additional, non-lactating, unproductive period of the cow over several months [12]. The desirable age at first calving in local breeds is 3 years and 2 years in cross breed cattle. Prolonged age at first calving will have high production in the first lactation but the life time production will be decreased due to less no of calving. If the age at first calving is below optimum, the calves born are weak, difficulty in calving and less milk production in first lactation [13]. Different factors advance or delay AFC. Environmental factors, especially nutrition, determine pre-pubertal growth rates, reproductive organ development, and onset of puberty and subsequent fertility.

Table-1: Productive and reproductive performance of local cows under smallholder condition in Mekelle Town.

Parameter	Mean \pm S.E
Age at first calving (months)	39.4 ± 1.7
Number of services per conception	2.1 ± 0.1
Days open (days)	185.82 ± 51.23
Calving Interval (days)	431.08 ± 78.03
Lactation length (Days)	247.11 ± 22.64
Lactation milk yield (Liters)	464.34 ± 41.75

3.2 Number of service per conception

The results showed that the mean age at first calving (AFC) was found to be 2.1 ± 0.1 (Table-1). The NSC revealed in the present study was close to 2.2 ± 0.2 in local cows of Gondar city of Ethiopia [14]. Lower mean AFC is reported to be 1.6 ± 0.6 in Boran cows at Tatesa cattle breeding center in Gurage Zone, central Ethiopia [9]. NSC higher than 2 should be considered as poor [12]. The differences could be attributed to differences in management practices and agro-ecology of the respective areas. Appropriate and in time heat detection and insemination could be attributed to lower or higher number of service of per conception [15].

3.3 Days open and calving interval

The results showed that the days open (DO) and calving interval (CI) was found to be 185.82 ± 51.23 days and 431.08 ± 78.03 days respectively (Table-1). The averages DO and CI in this study is higher than the optimum values desirable for profitable milk production. DO of about 60 days is considered optimum. This result of estimated DO was higher than that of 165 days in Arsi breed in Ethiopia [11]. Estimated DO in this study is lower than the mean of 340.3 ± 15.8 days reported in Boran cows at Tatesa cattle breeding center in Gurage Zone, central Ethiopia [9]. Feed shortage, silent estrus and lack of proper heat detection might have other contributory factors for long DO reported in this study.

The mean CI in the present study is more or less in accordance with 439 days reported in Arsi breed in Ethiopia [11]. Estimated CI in this study was lower than that of 24.94 ± 4.1 months in local cows in Chacha Town and nearby selected kebeles, North Shoa Zone, Amhara Region, Ethiopia [10]; 666 days in local cows in Ginch watershed in Ethiopia [16]; 622.6 ± 15.3 days in Boran cows at Tatesa cattle breeding center in Gurage Zone, central Ethiopia [9] and 527 days in Horro breed, 525 days in Fogera breed and 458 days in Begait breed [8]. CI of 365 days is usually considered ideal [17]. It is more, profitable to have one calf yearly in cattle. If the calving

interval is more, the total no. of carvings in her life time will be decreased and also total life production of milk decrease. Factors contributing for long CI are age of cows, breed of cows, calving season and forage availability in any particular year have to be considered as other impact factors [9].

3.4 Lactation Length

The mean LL in the present study was found to be 247.11 ± 22.64 days (Table-1). In this study, the estimate of average lactation length in crossbred cows were shorter than the standard lactation period (305 days) which might be due to poor genetic makeup of local cow. The mean LL in this study was larger than the mean of 211.1 ± 7.2 days in Boran and 234.9 ± 6.5 days in Horro cows in Ethiopia [18] and 184 days in Begait breed and 173 days in Horro breed in Ethiopia [8]. The mean LL of this study was smaller than the mean of 9.13 ± 2.63 months in local cows in cows in Chacha Town and nearby selected kebeles, North Shoa Zone, Amhara Region, Ethiopia [10] and 272 days in Arsi cows in Ethiopia [11]. Genetic group and parity has significant effect on LL [19].

3.5 Lactation milk yield

The mean LMY in the present study was found to be 464.34 ± 41.75 litres (Table-1) in the present study which in accordance with 457.887 ± 86.4 litres reported in local cows in Chacha Town and nearby selected kebeles, North Shoa Zone, Amhara Region, Ethiopia [10]. The mean LMY of this study was larger than the mean of 238 litres reported in local cows in Yerer watershed Adalibeb woreda, Oromia region, Ethiopia [20] and 270 litres reported in Fogera breeds [8]. The mean LMY of this study was smaller than the mean of 809 litres reported in Arsi breed [11]; 947 ± 42.3 litres in Boron and 1201 ± 37.9 litres in Horro breeds in Ethiopia [18] and 550 litres in Horro breed and 645 litres in Begait breed [8]. Variation in LMY is mainly due to genetic and various non genetic causes. Genetic group, herd size, season of calving and parity has significant effect on LMY [19].

IV. Conclusion

The dairy sector of the study area is characterized by a poor productive and reproductive potential of indigenous cows. This calls for a planned technical and institutional intervention for improved support services for appropriate breeding programmes, improved cows and adequate veterinary health services. Improvement and expansion of crossbred dairy cattle production at smallholder level in the study areas should be encouraged. Moreover, in line with this, a sustainable extension service to improve animal feed resources management and animal health care also deserve due attention.

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