



## **Productive and Reproductive Performance of Indigenous Cows under Farmer's Management System in and around Walmera Distract, Oromia Regional State, Ethiopia**

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### **Abstract**

The study was conducted on 120 indigenous cows maintained under farmer's management condition in and around Walmera District, Oromia Regional State, Ethiopia. A total of 102 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), number of service per conception (NSC), days open (DO) and calving interval (CI) were  $42.23 \pm 7$ ,  $2.02 \pm 0.2$ ,  $7.64 \pm 2.65$  and  $15.03 \pm 1.04$  months for indigenous cows, respectively.  $6.11 \pm 1.53$  months of lactation length (LL) and  $2.02 \pm 0.8$  litres daily milk yield (DML) were also reported from the current study for local dairy cows. Comparing with the recommend standard, 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 in the study area.

**Keywords:** Productive, Reproductive performances, Indigenous cows, Walmera District

### **1. 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 59.5 million and the estimate of total cow milk production is about 3.1 billion liters. Out of this total cattle population, 98.20 percent of the total cattle in the country are local breeds. The remaining are hybrid and exotic breeds that accounted for about 1.62 percent and 0.18 percent, respectively (CSA, 2017).

In 2016/17, 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 1.37 litres (CSA, 2017). The per capita milk consumption was only about 19 kg/year, which is much lower than African and world per capita averages of 40 kg/year and 105 kg/year, respectively (PARI, 2015). The average lactation milk production of the indigenous cow ranges from 494–850 kg under optimum management (Haile *et al.*, 2009). 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 tropics, particularly in Ethiopia (Lobago *et al.*, 2007 cited by Niraj *et al.*, 2014). Since large volume of milk of the country is achieved mainly (98.20%) from indigenous breed (CSA, 2017), performance record of local cows is indispensable for scheming breeding as well as management strategies develop the dairy sector. Therefore, the objective of the current study was to study the productive and reproductive performance of indigenous cows in and around Walmera District, Oromia Regional State, Ethiopia.

## 2. Materials and Methods

### 2.1. Study area

The study was carried out in Walmera District of West Shoa Zone of Oromia, which is located 30km to the west along the main road to Ambo. Geographically, the district is found 9° 0' 0''-9° 10' 0' N latitude and 38° 25' 0''- 38° 30' 0'' E longitudes. The study area has an altitude of 2400m a.s.l and receives an average annual rainfall of about 1000mm. The mean minimum and maximum temperatures are 6 and 22 °C, respectively (WDLDFO, 2017). The mean relative humidity is 59%. The study area obtains short rainy season (March to May), long rainy season (June to September) and dry season (October to February) (Holleta Agricultural Research Center, 2008). The total human population of the district is 104,932 and cattle are the dominant livestock of the smallholder farmer in the area, although limited number of small ruminants and equines are kept (WDLDFO, 2017). Animals largely depend on natural grazing, which were supplemented with crop residues late in the dry season.

### 2.2. Sampling procedure and data analysis

A total of 102 smallholder dairy farmers were interviewed randomly with scheduled questionnaire

which was mainly based on the productive and reproductive performance of indigenous cows. A total of 120 local cows were included in this study were maintained under farmer's management system in and around Walmera District, Oromia (Ethiopia). The questionnaire was developed in accordance with the objective of the study and intended in a simple manner to get accurate information from local dairy producers. 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 sample size to collect data for this research was determined by using (Yemane, 1967).

$$n = N / 1 + N (e)^2$$

Where;

n =designates the sample size of the research uses;

N= designates total number of households in eleven kebeles.

e =designates maximum variability or margin of error 8 % ( 0.08);

1=designates the probability of the event occurring.

During the study period, about 300 households in the study area own milking indigenous dairy cows of any size.

Thus;

$$n = \frac{N}{1 + N(e)^2} = \frac{300}{1 + 300(0.08)^2} = 102,$$

this is the determined sample size for the study.

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, i.e., morning and evening milking frequency. Data were recorded like lactation length (LL) and daily milk yield (DMY) 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.

### 3. Results and Discussion

#### 2.3. Reproductive Performance

##### 2.3.1. Age at first calving

The results of the study showed that the mean age at first calving (AFC) was found to be  $42.23 \pm 7.4$  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 (Rege *et al.*, 2006). Lower mean AFC is recorded as 33.8 months reported in Arsi breed in Ethiopia (Gabriel *et al.*, 1983). A sizeable setback 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. 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 (Kumar and Tkui, 2014). Environmental factors, especially nutrition, disease, stress and etc. determine pre-pubertal growth rates, reproductive organ development, and onset of puberty and subsequent fertility.

**Table-1:** Productive and reproductive performance of indigenous cows under farmers' management in the study area

Parameters	Mean $\pm$ S.E
Age at first calving (AFC) (months)	42.23 $\pm$ 7.4
Number of services per conception(NSC)	2.02 $\pm$ 0.2
Days open days (OD) (months)	7.64 $\pm$ 2.65
Calving Interval (CI) (months)	15.03 $\pm$ 1.04
Lactation length (LL) (months)	6.11 $\pm$ 1.53
Daily milk yield (DMY) (Liters)	2.02 $\pm$ 0.8

##### 2.3.2. Number of service per conception

The results showed that the mean number of service per conception (NSC) was found to be  $2.02 \pm 0.2$  (Table-1). The same result,  $2.2 \pm 0.2$  for local cows was reported by Kumar *et al.* (2014) in Gondar city of Ethiopia. Number of service per conception (NSC) higher than 2, should be considered as poor (Mukasa, 1989). 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.

$22.19 \pm 7.73$  in Dandi district, West Shewa. The poor feeding practices, adversely affect the synthesis and secretion of hormones responsible for ovarian follicular development and function leading to extended CI in cows.

##### 2.3.3. Calving interval and Days open

The calving interval is the period between two consecutive parturitions (the gap between two successive calving), and ideally should be 12 to 13 months. The CI overall mean and SD of local dairy cow was  $15.03 \pm 1.04$ . In contrast, Belay *et al.* (2012) reported prolonged overall calving interval (CI)

The days open (DO) average mean and standard deviation of local dairy cow in the study area was  $7.64 \pm 2.65$  in months (Table. 1). The current value of DO was longer than that reported for crossbred cows (2.47 months in urban and 3.33 months in pre-urban areas) in Gondar town (Nibret, 2012) and shorter than that reported by Assaminew and Ashenaf (2015) in Central Highland of Ethiopia 5.07 and 5.87 months in urban and pre-urban, respectively. The averages DO in this study are higher than the optimum values desirable for profitable milk production. DO of about 60 days is considered optimum. Feed shortage in terms of quality and quantity, silent estrus and lack of proper heat detection might have other contributory factors for long DO reported in this study.

## 2.4. Productive Performance

### 2.4.1. Lactation Length

Lactation length refers to the time of period from when a cow starts to secrete milk after parturition to the time of drying off. The lactation length overall mean and standard deviation of local dairy cows was  $6.11 \pm 1.53$  (Table 1). The current estimated average lactation length was shorter than the ideal lactation length of 305 days defined by Foley *et al.* (1972). This might be due to the extended utilization of the farmers for more milk production which is responsible for extended calving interval.

### 2.4.2. Milk Yield

The mean daily milk yield in the present study was found to be  $2.02 \pm 0.8$  litres (Table 1). Comparing with current study, Bayisa *et al.* (2017) reported the lowest overall average daily milk yield of local dairy cow  $1.42 \pm 0.15$  in Gindeberet and Abuna-Gindeberet. The better daily milk yield in the study area compared to other part of the country might be, due to the improvement of dairy cows' management and husbandry practice of the farmers and experienced good in dairy cows management systems. In general, the variation in milk yield is mainly due to genetic and various non genetic causes. Genetic group, herd size, season of calving and parity has significant effect on length of milk yield.

## Conclusion and Recommendation

Comparing with the recommend standard, 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 in the study area. 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 supported by continuous training to improve animal feed resources and animal health care also be worthy of due consideration.

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