

## **Productive and reproductive performance and reproductive health problems of Begait breed cows under farmers' management in and around Seharti Samre, South East zone of Tigray regional state, Ethiopia**

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**Target audience:** Ministry of Agriculture, Researchers, Dairy producers, Dairy professionals

### **Abstract**

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*A survey was carried out on productive and reproductive performance and reproductive health problems of Begait cows under farmers' management in and around Seharti Samre. Accordingly, 93 farmers were selected randomly for interview, and 123 Begait breed cows at parity one and two were selected to assess productive and reproductive performance as well as reproductive health problems. Data were obtained from the farmers by using pre-tested, structured questionnaire. Majority (96.8%) of the farmers were males with farming experience from 1-10 years (58.1%) All (100%) of the farmers were engaged in mixed crop-livestock production, and crop production was found to be the main source of income for 92.5% of them. The reproductive performances were: age at first service ( $27.12 \pm 0.387$  months), age at first calving ( $36.27 \pm 0.424$  months), number of services per conception ( $1.07 \pm 0.24$ ), calving interval ( $18.54 \pm 0.569$  months) and days open ( $9.97 \pm 0.54$  months). The productive performances were: lactation milk yield ( $605.85 \pm 20.793$  liters) and lactation length ( $6.96 \pm 0.126$  months). The reproductive health problems were: calf mortality (92.5%), anestrus (82.8%), repeat breeding (74.2%), uterine prolapse (62.4%), dystocia (57%), abortion (55.9%) and retained placenta (44.1%).*

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**Keywords:** Begait cows; Productive performance; Reproductive performance; Reproductive Health problems; Seharti Samre

### **Description of Problem**

Ethiopia is believed to have the largest livestock population in Africa. This 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 (1). Of the total cattle population in the country, 98.95 percent of the total cattle in the country are local breeds and remaining are hybrid and exotic breeds that accounted for about 0.94 percent and 0.11 percent, respectively (2).

Despite the largest cattle population, the productive and reproductive performance is very low. Feed shortage (Both in terms of quantity and quality), lack of access to land, diseases prevalence, low level of management, lack of proper follow up, poor breeding management such as lack of accurate heat detection and timely insemination might have contributed considerably to long days open (Postpartum anestrus), late age at first calving, long calving interval, short lactation length and low milk production (3).

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 (4).

Begait breed cattle are among the different breeds of cattle found in Ethiopia, and they are used for both milk and meat production (5). These breed of cattle are characterized by their large udder size, long teats and relatively high milk yield compared with the other cattle breeds in the Northern part of the country (6).

Since the last few years, the demand for Begait breed cattle is increasing due to their better milk and meat production performance. Accordingly, they are being distributed to various poverty-prone (ex-situ) sites (7).

Despite the current information on the productive and reproductive performance of the different cattle breeds in the country, there is scarcity of reliable information on productive and reproductive performance of Begait breed cattle at different agro-ecology and production systems in Ethiopia. Previous study conducted by (1) revealed relevant information on productive and reproductive performance of local breed cattle under farmers' level management in and around Mekelle city. However, the study was not solely focused on Begait breed cattle. Moreover, another study conducted by (8) investigated the reproductive performance of Begait breed cattle at their in-situ and ex-situ sites (Humera and Wukro, respectively). However, this study did not include the productive performance of Begait breed cattle. Besides, both studies did not report on the reproductive health problems of Begait cows.

Therefore, this study was conducted with the following objectives:

- To assess the productive and reproductive performance and major reproductive health problems of Begait breed cows at ex-situ site (Seharti Samre)
- To compare the productive and reproductive performance of Begait breed cows at the present study area with previous similar studies conducted at in-situ and ex-situ sites
- To compare the productive and reproductive performance of Begait breed cows with other breeds of cows in Ethiopia from previous study results

## **Materials and Methods**

### **Description of the study area**

The study was conducted from November, 2018 to February, 2019 in and around Seharti Samre. Seharti Samre is located at latitude of 12° 30' to 18° 20' N and longitude of 38° 59' to 39° 26' E. The average altitude of the area ranges from 1470-2370 meters above sea level (masl). The mean annual rainfall ranges from 351-870mm and the average temperature is 22.5°C. The livestock population of the area is cattle, 13,210 (5.25%), goats, 151,321 (60.17%), sheep, 69,808 (27.76%) and equines, 17,135 (6.81%). The major crops grown in the area are Teff, Sorghum, Maize, Sesame, millet and others (SSWBoARD, 2018, unpublished data).

### **Study Design and Sample size determination**

A cross sectional study design was conducted from November, 2018 to February, 2019 to study the productive and reproductive performance as well as reproductive health problems of Begait cows in and around Seharti Samre. The map of the study area is depicted in figure 1.



Figure1. Map of Tigray and the study area (indicated by arrow)

### Data Collection and Sampling Technique

A total of 93 farmers who owned Begait cattle were interviewed randomly with pre-tested structured questionnaire. The questionnaire was mainly focused on the productive and reproductive performance as well as reproductive health problems of Begait breed cows. A total of 123 Begait breed cows at parity one and/or two were included in this study.

Data 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 were recorded. Moreover, data on reproductive health problems such as calf mortality, anestrus, repeat breeding, uterine prolapse, dystocia, abortion and retained placenta were recorded.

### Data Management and Analysis

The collected raw data were entered into an Excel sheet, cleaned, coded, imported and analyzed using a Statistical Package for Social Sciences (SPSS) version 20. Accordingly, descriptive statistical analysis was conducted to compute frequency and percentages for the qualitative data, and mean, standard error and standard deviation for the quantitative data.

### Results and Discussion

#### Respondents demographic and socioeconomic characteristics

According to the findings, majority (96.8%) of the respondents were males and at the elementary level of education (54.8%). Besides, 58.1% of them had Begait breed cattle farming experience of 1-10 years. It was revealed that, 100% of the respondents were engaged in mixed crop-livestock production, and crop production was found to be the main source of income for 92.5% of them.

Moreover, the dominant production system in the study area was semi-intensive (94.6%) as reflected in Table 1. This value indicates the intensification of Begait breed cattle farming in the area that is highly encouraging, and this might be due to high value of Begait breed

cattle (less availability, expensive price, and better productive and reproductive performance) compared with the native cattle breeds of the area. Furthermore, shortage of grazing area for extensive production could be another probable reason.

**Table 1. Socioeconomic and demographic characteristics of respondents**

Parameters	Category	Frequency	Percent (%)
Sex	Male	90	96.8
	Female	3	3.2
Marital status	Married	88	94.6
	Single	5	5.4
Level of education	Illiterate	31	33.3
	Elementary	51	54.8
	Secondary	9	9.7
	Certificate	1	1.1
	Diploma and above	1	1.1
Farming experience	<1year	2	2.2
	1-10years	54	58.1
	10years	37	39.8
Farming activity	Mixed crop-livestock	93	100.0
Household's main source of income	Crop	86	92.5
	Livestock	0	0.0
	Others	7	7.5
Owned land size in ha	<2ha	19	20.4
	2-3ha	58	62.4
	>3ha	16	17.2
Area	Urban	42	45.2
	Peri-urban	51	54.8
Production system	Intensive	1	1.1
	Semi-intensive	88	94.6
	Extensive	4	4.3

### Productive and Reproductive Performances of Begait Cows

The productive and reproductive performance of Begait cattle in the study area at farmers' management level is described in Table 2.

#### Age at first service

The current study result showed that the average age at first service (AFS) of Begait breed cattle at farmers' level management was found to be  $27.12 \pm 0.387$  months (Table 2). This result is significantly lower than the AFS of Begait breed cows (40.5 months) at extensive mixed crop-livestock production

system by Humera and Wukro (8). The authors have also reported that reproductive performance of Begait breed cattle varies at pastoral, agro-pastoral, intensive and mixed crop-livestock production systems. This great variation in AFS of Begait breed cattle might be due to differences in agro-ecology, feed availability, and production systems of the

respective areas. Furthermore, according to the current study, majority (94.6%) of the respondents were keeping their Begait breed cattle in semi-intensive production system, while the animals lose less energy for searching feed and also get supplementary roughage and agro-industrial byproduct feeds.

### **Age at first calving**

According to this study, the average age at first calving (AFC) was found to be  $36.27 \pm 0.424$  months (Table 2). The average AFC of Begait cattle— is relatively shorter than the report of (1) who gave the average AFC of local cows under farmers' management in and around Mekelle to be  $39.4 \pm 1.7$  months. Moreover, the average AFC of Begait cattle in the current study is by far shorter than the average AFC of 60 months in Begait breed cattle, 53.4 months in Fogera breed cattle and 53 months in Horro breed cattle in Ethiopia (9).

Moreover, average AFC of  $57.663 \pm 1.94$  months was reported in Boran breed cows at Tatesa cattle breeding center in Gurage Zone, central Ethiopia (10). Similarly, an average AFC of  $47.16 \pm 8.7$  months was reported in local cows in and around Chala Town, North Shoa Zone of Amhara Region (11).

However, the average AFC of Begait breed cows in the current study finding is longer than what was reported in Arsi Breed (33.8) in Ethiopia(112). Similar studies have reported that the AFC of Raya-Sanga was 53.1 months (13), Wegera and Fogera breed cattle (54.7 and 53.4 months) (14). Several studies showed that longer average AFC of cows' results significant economic loss, by increasing non-lactating and unproductive period of the cows for several months (15).

Studies have also indicated that prolonged AFC results high milk yield in the first lactation but it decreases the life time production due to less number of calving. Moreover, if the AFC is below optimum, the

calves born are weak and difficulty in calving is also another complication (16). Prolonged AFC could be due to different environmental factors, such as nutrition which determines pre-pubertal growth rates, reproductive organ development, and onset of puberty subsequent fertility.

### **Number of services per conception**

According to this study, the number of services per conception (NSC) of Begait cows was found to be  $1.07 \pm 0.24$  (Table 2). This result is lower than the NSC of local cows ( $2.1 \pm 0.1$ ) in and around Mekelle reported by (1). Similar studies by (16) in local cows of Gondar city showed that the NSC was  $2.2 \pm 0.2$ . Average NSC of  $1.6 \pm 0.6$  was also reported in Boran breed cows at Tatesa cattle breeding center in Gurage Zone, central Ethiopia (10). Studies showed that NSC higher than 2 are considered as poor (15). Generally, the NSC of Begait breed cows in the current study area was found to be lower than previous reports of studies conducted at different districts of Ethiopia. This variation in NSC could be attributed to differences in management practices, agro-ecology of the respective areas and breed of the cows. Different previous studies have also reported that appropriate and on time heat detection and insemination could be attributed to lower or higher NSC (17).

### **Lactation length**

The average lactation length (LL) of Begait breed cows was found to be  $6.96 \pm 0.126$  months (Table 2). This result is lower than the average LL of Boran breed cows ( $7.03 \pm 0.24$  months) and Horro breed cows ( $7.83 \pm 0.216$  months) (18), and Arsi breed cows (9.067 months) (12). According to the report of (19), genetic and parity have significant effect on LL of cows.

### **Lactation milk yield**

In this study, the average lactation milk yield (LMY) of Begait breed cows was found

to be  $605.85 \pm 20.793$  liters. This result is significantly higher than the LMY of local cows ( $457.887 \pm 86.4$  liters) under farmers' level management in and around Mekelle city (1). This variation could be attributed to the differences in breed, agro-ecology, feed availability, production and management systems of the respective areas. The LMY of Begait breed cows in the present study are lower than the LMY of Boran breed cows ( $947 \pm 42.3$  liters) and  $1201 \pm 37.9$  litres in Horro breeds in Ethiopia (18) and 645 litres in Begait breed (9). Studies showed that, variation in LMY is mainly due to differences in genetic group, herd size, season of calving and parity (1).

#### Days open and calving interval

Results of this study showed that the average days open (DO) and calving intervals (CI) of Begait breed cows are  $9.97 \pm 0.54$  and  $18.54 \pm 0.569$  months, respectively (Table 2). The average DO and CI observed are longer than the report of (1) who reported average DO and CI of  $6.17 \pm 170$  and  $14.37 \pm 2.60$ , respectively in local cows in and around Mekelle city. Studies indicated that averages

DO of two months are considered as optimum in cross breed cows. Moreover, the average DO in the current study is longer than the report of (12) who reported average DO of 5.5 months in Arsi breed cows. However, it is lower than average DO of Boran breed cows ( $11.33 \pm 0.526$ ) at Tatesa cattle breeding center in Gurage Zone, central Ethiopia (10) Previous studies suggested that long DO could be attributed due to feed shortage, silent heat and lack of appropriate heat detection (1).

Similar studies conducted at different parts of Ethiopia showed average CI of Boran breed cows ( $20.753 \pm 0.51$  months) (10), 17.5, 17.567 and 15.267 months in Fogera, Horro and Begait breed cows, respectively (9). Studies suggested that CI of 12.167 months is considered as optimum (20). 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 (10).

**Table 2. Productive and Reproductive Performances of Begait cows (n=123)**

Parameters	Mean± S.E
Age (in months)	78.43 ± 1.980
Age at first service (in months)	27.12 ± 0.387
Age at first calving (in months)	36.27 ± 0.424
Number of services per conception	1.07 ± 0.24
Parity	2.71 ± 0.119
Lactation length (in months)	6.96 ± 0.126
Milk yield/day (in liter)	2.88 ± 0.082
Milk yield/lactation (in liter)	605.85 ± 20.793
Calving interval (in months)	18.54 ± 0.569
Days open (in months)	9.97 ± 0.54

#### Reproductive Health Problems

This study showed that the major reproductive health problems of Begait breed

cows were found to be calf mortality, anestrus, repeat breeding, uterine prolapse, dystocia, abortion and retained placenta (Figure 2).

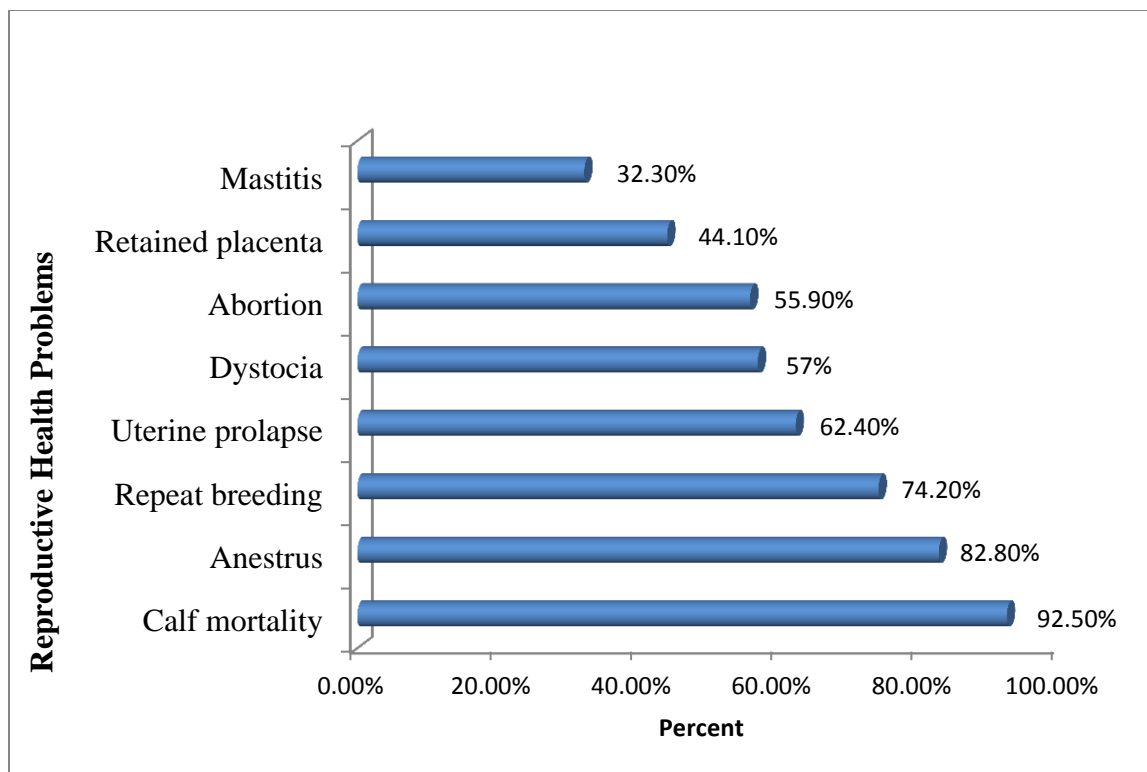


Figure 2. Reproductive Health Problems of Begait cows

### Conclusion and Application

1. The productive and reproductive performance of Begait cows at the study area were assessed
2. Calf mortality, Anestrus and Repeat breeding were found to be the major reproductive health problems ranked as first, second and third, respectively
3. Due to lack of record, cows purchased from other owners were excluded from this study.
4. Adequate veterinary services should be in place to prevent and control reproductive health problems of Begait breed cows in the study area
5. Training on record keeping of productive and reproductive performance of Begait breed cows should be given to the farmers

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**Conflict of Interest:** The authors declare that they have no conflict of interests.

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