Milk Production Performance Indicators of *Begait* Cattle in Western Zone of Tigray, Ethiopia

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ABSTRACT

*The purpose of this study was to estimate some milk production performance indicators of Begait cattle kept in Kafta and Setit Humera Woredas of Tigray Region, Ethiopia. Purposive sampling of study villages (Kebeles) keeping Begait cattle and random sampling of Begait cattle owning households and animals were used for data collection. Primary data were collected from 368 Begait cattle sampled from six Kebeles and 180 households. Cattle herd sizes in the study area were about 97 and 27 heads in the large and small scale farms, respectively. Pure Begait cattle account for about 90% of the cattle herd, while the rest were classified as Arado, Begait*Arado crosses and other genotypes. The body frame of Begait cattle looks like that of the temperate dairy cattle. Begait cattle were observed to have relatively large udder size, wide hind quarter, long naval flap (8.6±0.28 cm), thin and long neck (45.5±0.35), and no (if any in females) or small humps (15.4%). Age at first mating was estimated to be 3.4 (±0.5) years for bulls and 3.1 (±0.6) for heifers. The reproductive lifetime was estimated to be 4.6 (±1.3) for bulls, and 10.3 (±1.3) for cows during which they produce an average of 7 (±1) calves. The average daily milk off-take of random Begait cows and old Begait cows were 2.8 (±0.3) and 2.6 (±0.4) liters during average lactation lengths of 6.4 (±0.9) and 6.1 (±1.0) months, respectively. However, daily milk off-take was as high as 6.68 liters at the Humera Agricultural Research center, indicating the highly considerable dairy potential of Begait cows with better management. The lactation length of Begait cows kept under on farm extensive management in both small scale and large scale farms ranged from 144-225 days indicating a wide scope for selection and genetic improvement. It is, therefore, recommended that appropriate community based breeding program should be developed for Begait cattle in order to improve their overall dairy performance in their potential niche area.*

***Key words**: - Begait cattle, dairy performance, Ethiopia, herd size, milk production indicator*

INTRODUCTION

Characterization information is essential for planning farm animal genetic resources management at local, national, regional and global levels (FAO, 2011b). Ethiopia has massive livestock genetic diversity; however, breed level characterization is inadequate (Workneh *et al.*, 2004). DAGRIS (2009) also highlighted the need to report on current breed performance indicators as an input for planning conservation of existing genetic diversity. Almost all (98.2%) of the cattle populations in Ethiopia are indigenous types (CSA, 2016/17). Tigray Regional State has seven indigenous cattle breeds which consist of Raya-Azebo, Irrob, Abergele, Adwa, Arado, *Begait* and Medense. Arado cattle are the most populous cattle in the highland parts whereas *Begait* cattle are dominant in the lowland parts of the Regional State (Merha, 2006).

Cow milk constitutes most of the national milk production (FAO, 1993; CSA, 2008/09), even though average daily milk off-take remains as low as 1.5 to 2 liters (ILCA, 1991; CSA, 2012/13; 2015/16 and 2016/17). The Ethiopian Institute of Biodiversity Conservation (IBC, 2004) reported *Begait*

cattle as one of the recognized indigenous cattle breeds of Ethiopia. *Begait* cattle are categorized under the breed group classification of Zebu; the breed population belongs to the North Sudan Zebu sub-group, maintained for milk and beef production mainly by the Beni-Amir tribes in the lowlands of Eritrea but also in the neighboring areas of the Sudan and Ethiopia (Zerabruk *et al*., 2007; DAGRIS, 2014). DARIS (2007) report also declares that *Begait* cattle are grouped under the large East African Zebu cattle breeds and are characterized by their active disposition.

Begait cattle have been known for adaptation to hot and dry environments (heat tolerant breed). They are used for both milk and meat production. They are known as relatively good milk producers, and some available information suggests that they have promising dairy type attributes. However, there exists very little farm level dairy performance information except the recent work of Ftiwi and Tamir (2015). Thus, this study was conducted to generate information on dairy performance indicators of the breed in its niche area in Western Zone of Tigray Region, North Western Ethiopia.

MATERIALS AND METHODS

The Study Area

The study was conducted in Kafta Humera and Setit Humera districts which are considered the niche areas of *Begait* cattle in the Western Zone of Tigray Regional State, Ethiopia. The area is located about 600 Kilometers (km) west of Mekelle city and 954 km north of Addis Ababa. Kafta Humera lies at $13^0$40'and $14^0$27'N of latitude, and $36^0$27'and $37^0$32'E of longitude with an altitude ranging from 515 to 1863 meter above sea level (masl). The annual rainfall ranges from 449 to 1,100 mm (Kafta Humera OoARD, 2015, unpublished), with annual temperatures of 33^{o}C to 41.7^{o}C in the lowlands and 17.5^{o}C to 22.2^{o}C in the highlands (Niguse and Aleme, 2015). Setit Humera is located at $14^0$16' N of latitude and $36^0$37'E of longitude and has an altitude of 611 masl.

Sampling Method and Data Collection

Both Kafta Humera and Setit Humera districts were purposively selected from the Western Zone of Tigray for being niche areas of *Begait* cattle population. All the six hot spot Kebeles for *Begait* cattle in Kafta Humera and Setit Humera and large scale farms were purposively sampled. Random sampling was employed to select small scale farms and the animals for characterization.

Types of data collected included dairy performances of selected cows as recalled by owners, livestock holdings of households, and some qualitative and quantitative traits of *Begait* cattle. The quantitative traits measured were body length, chest girth, height at withers, neck length, pelvic width, rump length, backline length, teat length, ear length, horn length, muzzle circumference, dewlap width, navel flap width, hock circumference, scrotal circumference, preputial sheath and tail length. Hump presence, hump size, face profile, udder and hind quarter sizes were the qualitative traits observed. The quantitative data were measured using measuring tape whereas the qualitative data were taken via thorough observation of the body parts. Body length was measured from the thurl bone to the point of shoulder.

Primary data were collected through household interviews of 63 large scale and 117 small scale farms, and via morphometric measurement and observation on some qualitative traits on a sample of 368 mature *Begait* cattle. Large scale farms are farms which are owned by individual investors but not by

organizations and/or cooperatives. The 368 mature *Begait* cattle were sampled from animals kept by large and small scale farms, and Humera Ranch under extensive production system. Moreover, two years data on milk off-take and lactation length were taken from *Begait* cows (N=10) kept under moderate intensive production system at Humera Agricultural Research Center (HuARC). Mature animal morphometric and qualitative traits were taken following the global indicators and guideline presented in FAO (2012). Field data collection was carried out from October 2015 to February 2016.

Age of the sample cattle was estimated using the stage of eruption of permanent pair of incisors (Kikule, 1953) and the information from owners. On that basis, all the selected sample animals were four and above years old.

Data Analysis

SPSS version 20 (2012) was employed to analyze data on reproduction and milk off-take. SAS version 9.1 (SAS, 2003) was used to analyze morphometric data. The GLM procedure of SAS was used to analyze morphometric traits, using the following general model:

$$\mathbf{Y_{ijk} = \mu + m_i + a_j + (ma)_{ij} + e_{ijk},}$$

Where, Y_{ijk}= the observed value of trait of interest, μ is overall mean, m_i is the effect of i^{th} farm type (i=1, 2 and 3), a_j is the effect of the j^{th} age class (j=1,2 and 3), $(ma)_{ij}$ is interaction effect of farm type and age class of animals and e_{ijk} is the residual random error.

RESULTS

Animal Management

All animals in large and small scale farms, and Humera Ranch were kept under extensive management (mainly grazing on communal rangelands) whereas animals in HuARC were kept under moderate intensive management system. The animals in large and small scale farms were supplemented with crop residues while animals in Humera Ranch were supplemented with crop residues, hay and commercial concentrates during the dry seasons. Animals in HuARC were fed on sorghum stover and grass hay as year round basal feeds with the supplementation of sorghum grain, cowpea hay and commercial concentrates. However, no feed formulation is practiced due to lack of feed ingredients and lack of information on body weight of each animal in the farm.

Well water was the main source of drinking water for large scale farms (85.7%) and small scale farms (48.7% of the respondents). About 35% of the respondents from small scale farms also used pipe water as a source of drinking water for cattle. Cattle watering frequency was different among the farms. The result showed that 33.3% and 63.5% of the large scale farms water their cattle once and twice a day, respectively. On the other hand, 49.6% and 44.4% of the respondents from small scale farms water their cattle once and twice a day, respectively. These differences could be associated with differences in distances of watering points to the farms. The main source of water for animals at Humera Ranch was river water located less than one kilometer from the ranch.

Herd Size

Large scale farms are owned by individuals who were involved in both crop production and livestock production. Except donkeys, the other common livestock species were significantly ($P<0.05$) different

between small scale and large scale farms. It was also noted that *Begait* cattle, *Arado* cattle and *Begait* Arado* crossbred cattle holding were significantly (P<0.05) different between small scale and large scale farms (Table 1). The average *Begait* cattle holding per farm in the large scale and small scale farms were 90±31 and 24±17 heads, respectively (Table 1). The aggregate livestock holding in Tropical Livestock Unit (TLU) of large scale farms was over four times bigger than in the small scale farms. In the large scale farms, 93.3% of the cattle were *Begait*, 2.7% Arado, and 4.4% were crosses of Begait and Arado cattle. In small scale farms, 89.8% were *Begait* cattle, 2.9% Arado, 0.2% Holstein Friesian, 0.4% crosses of Holstein Friesian and *Begait*, and 6.6% were crossbreds of *Begait* and Arado cattle. Large scale farms did not introduce Holstein Friesian cattle and their crossbreds to their herds. The reason why large scale farms did not breed Holstein Friesian cattle and their crossbreds was due to the fact that large scale farms aim has been generating income from the sale of *Begait* cattle kept under extensive management system, rather than milk. All *Begait* cattle kept under small and large scale farms were reared in mixed crop-livestock farming system.

Table 1. Livestock holding of sample respondents by farm size (TLU, Mean±SE)

Livestock type	Farm type		Total (N=180)	*P*-Value
	Large farm (N=63)	Small farms (N=117)		
Begait cattle (B)	90±31	24±17	47±39	0.000
Arado cattle (A)	28±21	7±4	14±15	0.003
Holstein Friesian (HF)	-	2±1	2±1	
HF x B crossbreds	-	2±2	2±2	
B x A crossbreds	27±10	12±9	18±12	0.001
Total cattle (number)	97±36	27±18	51±42	0.000
Sheep (number)	207±103	33±25	109±111	0.000
Goats (number)	108±64	23±19	66±63	0.000
Chickens (number)	38±20	11±11	22±20	0.000
Donkeys (number)	2±1	2±2	2±2	0.367
Total TLU	96±33	23±14	-	0.000

TLU= Tropical Livestock Units

Body Size

Most of the morphometric traits of *Begait* cows kept under small scale farms, large scale farms and Humera Ranch were significantly (P<0.05) different due to the differences in selection-mating process and overall animal management (Table 2). Traits more directly related to dairy characteristics, such as teat length, neck length, tail length, body length, chest girth and pelvic width significantly (*P*<0.05) varied among farm types, with larger size of morphometric traits in *Begait* cows kept by large scale farms (Table 2). The difference could be associated with the level of management and selection practices. Proximal traits like ear length and navel flap width were similar across farm types. *Begait* bulls kept by the large scale farms also had larger body size. Body length, chest girth, preputial sheath and hock circumference of bulls were significantly (*P*<0.05) different between farm types due to the differences in selection and overall animal management (Table 3).

Table 2. Morphometric traits of Begait cows by farm type (cm, Mean±SE)

Traits	Farm type			*P*-Value
	Small farms (N=117)	Large farms (N=120)	Ranch (N=107)	
Body length	115.5±0.48	118.4±0.48	114.1±0.5	0.000
Chest girth	153.2±0.56	155.6±0.56	152.1±0.59	0.000
Height at withers	129.1±0.46	131.4±0.45	130.8±0.48	0.389
Neck length	45.5±0.35	43.8±0.34	43.3±0.36	0.000
Pelvic width	38.1±0.19	38.4±0.19	38.3±0.21	0.048
Rump length	21.0±0.24	22.5±0.23	21.7±0.25	0.015
Backline length	88.6±0.42	89.2±0.42	89.3±0.44	0.001
Teat length	6.5±0.14	7.5±0.14	5.7±0.15	0.000
Ear length	22.8±0.16	22.3±0.16	23.2±0.17	0.942
Horn length	22.4±0.69	21.8±0.68	21.8±0.72	0.000
Muzzle circumference	38.8±0.17	38.2±0.16	38.2±0.17	0.001
Dewlap width	16.0±0.26	15.8±0.26	15.3±0.28	0.005
Navel flap width	8.6±0.28	9.1±0.27	7.8±0.29	0.453
Hock circumference	33.7±0.17	35.2±0.16	34.6±0.17	0.034
Tail length	96.9±0.72	97.8±0.71	95.8±0.76	0.000

SE=Standard errors

Table 3. Morphometric traits of Begait bulls by farm type (cm, Mean±SE)

Traits	Farm type		P-Value
	Small farms (N=14)	Large farms (N=10)	
Body length	125.6±1.21	131.3±1.43	0.009
Chest girth	167.9±1.58	174.7±1.87	0.005
Height at withers	143.4±1.24	147.6±1.46	0.074
Neck length	46.1±1.14	48.4±1.34	0.198
Rump length	20.9±0.62	21.8±0.73	0.364
Backline length	89.6±1.42	90.5±1.68	0.725
Scrotal circumference	32.1±0.46	33.2±0.54	0.278
Ear length	23.2±0.49	23.4±0.58	0.806
Horn length	26.8±2.28	23.2±2.69	0.334
Muzzle circumference	43.1±0.48	43.6±0.56	0.578
Dewlap width	20.36±0.96	19.3±1.14	0.430
Preputial sheath	14.1±0.63	18.7±0.75	0.007
Hock circumference	35.3±0.61	37.7±0.72	0.012
Tail length	106.9±1.49	110.0±1.77	0.212

SE=Standard errors

Qualitative Traits as Dairy Indicators

As shown in Table 4, most cows in all the farm types have no humps while all males were humped. Most females exhibit concave face profile. These together with the relatively large udder sizes, wide hind quarter, thin and long tail, long naval flap and thin and long necks indicate desirable dairy attributes of *Begait* cattle.

Table 4. Frequency of occurrence of qualitative traits of Begait cattle by farm type and sex

Major traits by sex	Trait categories	Farm types		
		Small farms	Large farms	Ranch
Females				
Hump presence	Absent	99 (84.6)	101 (84.2)	103 (96.3)
	Present	18 (15.4)	19 (15.8)	4 (3.7)
Hump size	No hump	99 (84.6)	101 (84.2)	103 (96.3)
	Small	18 (15.4)	19 (15.8)	4 (3.7)
Face profile	Straight	19 (16.2)	30 (25)	35 (32.7)
	Concave	92 (78.6)	85 (70.8)	71 (66.4)
	Convex	6 (5.1)	5 (4.2)	1 (0.9)
Males				
Hump presence	Absent	0	0	0
	Present	14 (100)	10 (100)	24 (100)
Hump size	Small	7 (50)	3 (30)	10 (41.7)
	Medium	4 (28.6)	4 (40)	8 (33.3)
	Large	3 (21.4)	3 (30)	6 (25)
Face profile	Straight	0	4 (40)	4 (16.7)
	Concave	12 (85.7)	4 (40)	16 (66.7)
	Convex	2 (14.3)	2 (20)	4 (16.7)

Temperament and Adaptive Traits

Aggressive temperament is a characteristic feature of *Begait* cattle in general. Although, aggressiveness is considered undesirable by many other global dairy farmers, *Begait* cattle keepers in the study area consider it important for against predator attack and theft by the cattle. As shown in Table 5, large scale farms maintain a greater frequency of aggressive animals in their herds. Majority of *Begait* cattle owners believe that *Begait* cattle exhibit excellent tolerance to environmental temperature (up to 41.7^{o}C) in their niche area.

Table 5. Reported temperament types of Begait cattle by farm type

Temperaments	**Farm type**					
	Large farms		Small farms		Total	
	N	%	N	%	N	%
Docile	3	4.8	28	23.9	31	17.2
Moderately tractable	0	0.0	5	4.3	5	2.8
Aggressive	22	34.9	16	13.7	38	21.1
Docile and moderately tractable	0	0.0	6	5.1	6	3.3
Docile and aggressive	8	12.7	30	25.6	38	21.1
Moderately tractable and aggressive	15	23.8	10	8.5	25	13.9
Docile, moderately tractable, and aggressive	15	23.8	22	18.8	37	20.6

Reproductive Performance

As presented in Table 6, the overall mean age at first mating is 3.4 years for bulls and 3.1 years for heifers, with the first calves expected at the age of 4.1 years. These values were significantly (P<0.05) different between large and small scale farms, with animals under small scale farms reaching age at first

mating at about 3.6 months later. Breeding bulls were culled by about a year later in large scale farms than in small scale farms, whereas cows were culled about 22.8 months earlier in large scale farms than the small scale (Table 6). The main reason for the variation in age at first mating and age at first calving under small and large scale farms was attributed to differences in the level of management (mainly in calf rearing). The differences in productive lifetime of bulls and cows between the farms could be associated to purpose of breeding. However, the overall mean number of calves born in productive lifetime of cows is about 7.1 in both large and small scale farms. Days open is significantly (P<0.05) different between cows under small and large scale farms in which *Begait* cows kept under large scale farms conceive 47 days earlier than those kept under small scale farms due to the difference in selection and mating practices.

Table 6. Average reproductive performance of Begait cattle by farm type (Mean ± SD)

Reproductive traits (in years)	Farm type			P-value
	Large farms (N=63)	Small farms (N=117)	Total (N=180)	
Age at first mating (bulls)	3.2±0.5	3.5±0.5	3.4±0.5	0.000
Age at first mating (heifers)	2.9±0.7	3.2±0.6	3.1±0.6	0.004
Age at first calving	3.9±0.7	4.2±0.6	4.1±0.6	0.004
Reproductive lifetime of bulls	5.3±1.2	4.2±1.2	4.6±1.3	0.000
Reproductive lifetime of cows	9.1±0.9	11.0±0.8	10.3±1.3	0.000
Calves born per lifetime of cow	7±1	7±1	7±1	0.006
Days Open (days)	182±38	229±36	213±43	0.000
Culling age of bulls	8.2±1.7	7.5±1.9	7.8±1.9	0.022
Culling age of cows	12.0±0.9	14.2±0.8	13.4±1.3	0.000

Estimated Milk Off-take

Based on the calculated dairy performance indicators presented in Table 7, the overall mean milk off-take of a random mature *Begait* cow was 537.6 litres, with overall mean daily milk off-take of 2.8 (±0.3) liters and lactation length (LL) of 6.4 (±0.9) months at small scale and large scale farms. The overall estimated age of the random cow was about 6.5 (±1.5) whereas that of the old cow was 11 (±2.5) years. Overall LL was 6.4 (±0.9) for the randomly selected cows and 6.1 (±1.0) months for the old *Begait* cows, and significantly (P<0.05) differ between large and small scale farms. The primary purpose of large scale farms was income genertion from sale of live animals than milk, which may be the reason for shorter LL of the cows in large scale farms as compared to the small scale farms. Average lactation milk yield (LMY) of old *Begait* cows ranged from 349.8-657 liters under small scale farms and from 374.4-556.8 liters under large scale farms. Moreover, the lactation milk yield (LMY) of random *Begait* cows ranged from 410.4-675 liters under small scale farms and from 382.5-585.9 liters in large scale farms. Both small and large scale farms were not practicing complete milking and the cows were mainly milked once a day. Likewise, the average LL of *Begait* cows (N=10) kept under on station in Humera Agricultural Research Center (HuARC) was 7 months, which is numerically higher than that of *Begait* cows in large and small scale farms. Under the more or less zero grazing production system of the HuARC, average daily milk off-take was as high as 6.68 litres, indicating the highly considerable dairy performance potential of *Begait* cows under better management condition. The average lactation milk yield of Begait cows kept under HuARC was estimated to be 1402.8 liters. This large gap in average

daily milk off-take could be mainly associated with differences in management levels between the research center and the farms. Moreover, the desire to save more milk for calf suckling in the large and small scale farms so as to maintain rapid calf growth and prevent cows from stresses associated with frequent milking in the harsh environment could be other reasons. In general, the difference in average dairy performance between small and large scale *Begait* cattle farms is a strong proxy indicator of high variability in dairy performance of the existing *Begait* cattle population.

About 50.8% of the large scale farms were not milking their cows, and all cows with new born calves were not milked for the first four weeks. About 30.2 and 78.6% of the sample respondents in large and small scale farms respectively reported to milk their cows only once a day. Hence, this practice might have contributed for the lower daily milk off take of *Begait* cows under both farms. Milk supply for sale was also very low, because 41.3% in the large scale farms and 48.7% of the respondents in the small scale farms did not supply milk to the local markets, instead more opting to feed the calves and/or meet needs for home consumption. About 14.5% of the respondents in small scale farms also reported lack of market and demand for milk as a constraint.

DISCUSSION

A study conducted at Haramaya University, Ethiopia on Ogaden cattle breed showed that female Ogaden cattle fed on pasture had chest girth (CG) of 150.1±8.20 cm and height at withers (HW) of 115.5 cm, while the males had a CG of 148.2±14.31 and HW of 115.5 cm (Getinet et al., 2009). Therefore, CG of Ogaden cows is similar to that of *Begait* cattle, nevertheless, HW of females and CG and HW of males of Ogaden cattle and *Begait* cattle are different; being higher in *Begait* cattle. A similar study on different traits of Arsi cattle showed the following scenarios: CG (female=139±7.0 cm and male=152±11.0 cm), HW (female=113±2.7 cm and male=115.0±3.0 cm), muzzle circumference (MC) (female=37±2.2 cm and male=40±3.2 cm), pelvic width of (PW) (female=29.±2.3 cm and male= 30±3.6 cm) and rump length (female=35±2.5 cm and males=37±3.5 cm) (Chali, 2014). Hence, CG, HW and PW of Begait cattle recorded in this study are higher than that of Arsi cattle while MC is similar whereas rump length of Arsi cattle is longer than that of *Begait* cattle.

Table 7. Average milk off-take (liters), lactation length (months) and age (years) of old and randomly selected Begait cows (Mean ± SD)

Dairy traits	Farm types			
	Large farms (N=63)	Small farms (N=117)	Total (N=180)	*P*-value
Age of old cow	10.8±2.5	11.2±2.5	11.1±2.5	0.480
Age of random cow	6.1±1.1	6.6±1.6	6.5±1.5	0.102
Lactation length (LL) of old cows	5.3±0.5	6.3±1.0	6.1±1.0	0.000
LL of random cows	5.7±0.6	6.6±0.9	6.4±0.9	0.000
Daily milk (DM) off-take of old cow	2.9±0.3	2.6±0.4	2.6±0.4	0.000
DM off-take of random cow	2.8±0.3	2.7±0.3	2.8±0.3	0.209
LL of cows in HuARC	-	-	7	-
DM off-take of cows in HuARC	-	-	6.68	-

Most recent study on *Begait* cattle showed the following: HW (female=131.48±0.25 and male=136.99±0.10), CG (female=159.55±0.24 and male=168.91±0.10), PW (female=39.96±0.31) and a preputial sheath (12.05±0.04 cm), which is similar with the present finding (Ftiwi and Tamir, 2015).

Begait cattle appear to reach sexual maturity earlier than Borana cattle maintained under similar agro-ecologies, where bulls and heifers reach first mating at the age of 4.6 and 3.9 years in the midlands and 4.2 and 3.7 years in the lowlands, respectively (Dejene, 2014). *Begait* cattle exhibited earlier age at first mating, age at first calving and more lifetime calf crop than the figures reported for Arado cattle: age at first mating (39.8 months), age at first calving (56.9 months) and lifetime calf crop (4.6) (Dessalegn *et al.*, 2012). This earliness could be attributed to genotypic difference as the environment/management in which the two breeds are raised is similar. Borana cows maintained under improved management in Abernosa Ranch exhibited were able to produce the first calf at the age of 36 to 45 months (Ababu et al., 2006); suggesting that reproductive performance of *Begait* cattle may also be improved under improved management. Similarly, Getinet *et al*. (2009) indicated that Ogaden cows kept on pasture at Haramaya University had age at first service of 34.4±2.28 months, which is earlier than the present figure for *Begait* cattle. The reproductive lifespan reported for *Begait* cattle was lower the 13.67±0.31 years reported for Horro cows (Agere *et al*., 2012), although they compare well with the Horro in terms of lifetime calf crop production (6.46±0.13 calves) and reproductive lifespan of bulls (3.72±0.10 years). Chali (2014) also reported an earlier age at first mating (36.3±0.6 months) for Arsi bulls, and longer reproductive lifetime (12.1±0.2 years) for Arsi cows but similar numbers of calves born per cow within reproductive lifetime (7.0±0.2 calves). Some reproductive traits reported by Ftiwi and Tamir (2015) on *Begait* cattle kept under small scale farms include: age at first mating for males (38.1±0.17 months), age at first mating for females (35.5±0.14), age at first calving (48.7±0.16) and lifetime productivity (8.2±0.07 years). In the current study, age at first mating for both sexes was late by 3-4 months, and age at first calving by one month. However, reproductive lifetime of *Begait* cattle was longer in the current study than the figure reported by Ftiwi and Tamir (2015). The variations might have arisen from differences in methods followed in data collection.

Estimated daily milk off-take and lactation length recorded for *Begait* cattle in this study are closer to the figures (2.52L, 6.38 months) reported by Ftiwi and Tamir (2015), and the milk off-take (2.56L) reported for Fogera cattle (Zewdu, 2004). The lactation length recorded for *begait* cattle in this study was similar to the overall average of six months recorded for indigenous cattle in the country (CSA, 2012/13; 2015/16 and 2016/17), but the daily milk off-take is much higher than the national average figures of 1.32 and 1.37 liters recorded for indigenous cattle in Ethiopia (CSA, 2012/13; 2015/16and2016/17). The dairy attributes of *Begait* cattle are apparent from the much higher daily milk off-take values compared to the values reported for other indigenous cattle breeds *viz.*, 1.65 liters for Horro cattle (Agere *et al*., 2012), 1.44±0.04 liters for Arsi cattle (Chali, 2014) and 1.85 liters for Boran cattle (Dejene, 2014). The main reason for the considerably higher daily milk off take in *Begait* cattle than the other indigenous cattle breeds in Ethiopia could be associated to the unique genetic makeup for milk production by *Begait* cattle. On the other hand, lactation length of *Begait* cows recorded in this study was is much shorter than the figures reported for the other breeds *viz.*, 10.5 months for Fogera cows (Damitie *et al*., 2015), 314±91 days for Horro cows (Laval and Assegid, 2002), 9.6 months for Horro cows (Agere *et al*., 2012), 9.6 months for Arsi cows (Chali, 2014) and 7.3 months for Arado cattle (Dessalegn *et al*., 2012). This could be attributed to the harsh environment and associated seasonal scarcity of feed in the niche areas of *Begait* cattle.

CONCLUSION

Begait cattle are grouped under the large East African Zebu cattle breeds that can be used as milk and beef animals. The existing population of *Begait* cattle under extensive management exhibit good dairy attributes in terms of daily milk off-take, age at first mating, age at first calving, days open and lifetime calf crop compared to some of the studied breeds such as Boran, Ogaden, Arsi and Horro cattle breeds. However, it should be noted that daily milk off take of *Begait* cows was significantly influenced by their daily milking frequency because 78.6% of the small scale farms and 30.2% of the large scale farms reported to milk their cows once a day. The higher dairy performance of *Begait* cows under moderately improved management condition at Humera Agricultural Research Centre indicated that the breed has a good dairy performance if managed well. The relatively short lactation length of *Begait* breed is attributed to the seasonal feed scarcity and the tendency of keepers to allow calves to suckle/consume more of the milk than milk off-take for sale or home consumption. Better access to reliable milk market may encourage higher milk off-take mainly during the lush season. Hence, interventions to improve dairy performance of the breed should also consider essential infrastructures for efficient milk collection and aggregation given the hot climate of the area. The promising dairy attributes of *Begait* cattle even under the largely extensive management merit consideration as a basis for promoting commercial dairy production in the niche areas and other similar warm and stressful production environments. Based on the morphometric traits of the cows kept under small scale farms, large scale farms and Humera Ranch, intensive selection particularly at Humera Ranch should be taken as an urgent assignment. Therefore, it is recommended to introduce continuous community capacity building and appropriate participatory community based breed improvement interventions. This should also need to be supported by possible reproductive technologies for sustainable improvement of the overall dairy performance of the breed in its niche area. Moreover, mechanisms should be devised to prevent introduction of other indigenous and exotic cattle genotypes in to the niche areas in order to maintain a distinct breed.

ACKNOWLEDGEMENTS

We thank *Begait* cattle owners for their cooperation in providing information. The study was financed by Humera Agricultural Research Center, Tigray Agricultural Research Institute.

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