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SOME MORPHOMETRICAL, PRODUCTION AND REPRODUCTION TRAITS OF BEGAIT CATTLE REARED IN TIGRAY REGION OF ETHIOPIA

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The study pertains to some morphometical characterization, production and reproduction traits of Begait cattle reared at two districts of Tigray region, Ethiopia. Calves with high body weight and whose dams who are good milk producers and those heifers who grow well are selected by farmers. According to farmers' preference, in bull selection muscularity is followed by dams' milk yield, while the cows are selected for coat color and Sexual dimorphism following Rensch rule was observed between the traits studied, where the bulls had higher values for most of the morphometical traits including body weight. The coat color of Begait cattle are usually white spots on black background, however other coat colors too were observed. Most of the cattle are horned and the head is convex. The bulls have a well developed perpetual sheath and naval flap, while the hump is of medium size. The age at first mating for the steers and heifers were 38.1 and 40 months, respectively; while the age at first calving was assessed to be 50.8 months while the calving interval was 18.4 months. The production traits indicate that daily milk yield was 2.49 liters, peak milk yield 3.21 liters, lactation length 5.39 months and lactation milk yield 459 liters. The average lifetime calf crop was 6.32 heads. There is a sharp decline in the Begait cattle population and to arrest the same a ranch has been established for insitu conservation of the breed.

Keywords: Phenotypic characterization, production traits, reproduction traits, Begait cattle

Ethiopia has the largest livestock population in Africa. Livestock production in the country contributes for approximately about 16% of the national Gross Domestic Product (GDP) and 35.6% of the agricultural GDP (UNDP 2014). The country has a large cattle population which is estimated to be around 55.03 million heads (CSA 2013/14).

The cattle population in Ethiopia is dominated by the indigenous zebu types. Of the total cattle population 98.71 percent are of native zebu types (CSA 2013/14). In the country the indigenous cattle have been traditionally selected for their adaptive traits (Kool & Steenbergen 2014). Among many of such the indigenous cattle breeds of Ethiopia is the Begait cattle (commonly named as Barka in neighboring Eretria). Begait cattle are widely distributed in northern parts of Ethiopia and Eretria.

The Begait cattle belong to the North Sudan Zebu group and are reared for milk and beef (DAGRIS 2014).The breed is maintained by the Beni-Amir tribes in the lowlands of Eritrea and neighboring areas of Sudan and Ethiopia (DAGRIS 2014). There l reports suggesting that there is a decline in the numbers of Begait cattle in the study areas, (Tewelde 2016).

Begait cattle are relatively tolerant to many common diseases infecting cattle in the area. Begait cattle can graze on the sparse vegetation and yet maintain their body condition (Rezene 2007). This breed of cattle has socio cultural importance among the rearers and therefore the Government of Ethiopia has established a ranch at Humera, recently for insitu conservation of the breed.

Hence, this study was conducted to characterize the Begait cattle reared in their breeding tract in Tigray region of Ethiopia using some morphometrical traits. Two adjacent woredas (districts) viz. Tahatay-Adiabo and Kafta-Humera were selected for the purpose as they represent the breeding

tract of the Begait cattle. The characterization was carried out using some qualitative and quantitative traits based on FAO descriptor list (FAO 2012).

MATERIALS AND METHODS

The study was conducted in two purposively selected woredas of Western Tigray region of Ethiopia. The woredas (Tahatay-Adiabo (14^0 1'53'' and 14^0 59'38''North and between 37^0 18'31'' and 38^0 14' 31''East) and Kafta-Humera (13°42′ to 14°28′ North latitude and 36°23′ to 37°31′ East longitude) (Tigray Livelihood Reports 2009). The kebeles (villages) within the woredas were selected based on the population of the Begait cattle. Furthermore the respondents were randomly selected from a list of farmers who keep the breed. The study also encompassed focus group discussions with the traditional breeders who highlighted the important features sought by the rearers. For morphological, production and reproduction studies the newly established Begait Ranch (name it here) was also used.

The age of the cattle reared by the farmers were assessed using dentition method as suggested by Ensimenger (1983): Whereas the age of the cattle reared at the ranch was assessed from the farm records. The morphometical traits were assessed using self devised equipments as suggested by Macjowski and Zieba (1982). The quantitative and qualitative traits of the cattle were carried out according to the methods suggested by FAO (FAO, 2102).

The data was analyzed statistically using SPSS V 19 for Windows for descriptive statistics and one way ANOVA. The qualitative traits were assessed as percentage values.

RESULTS AND DISCUSSIONS

The focus group discussions held with the community elders who had experience in rearing Begait cattle (shown asFigures 1 and 2) indicated that several attributes which have both adaptive and aesthetic importance were considered. Larger body size of this breed and also its faster growth rate when compared to the other known breed of the region i.e the Arado cattle were mentioned. As the Begait cattle are long legged, they can travel long distance walk for search of feed and water. The Begait cattle have some aesthetic features viz. good looking and attractive (because of their mixture of colors) and also that the cows are tame but aggressive towards strangers and predators with their owners. Begait cattle have large skeletal frame when compared to the Arado cattle and hence is preferred by the agrarian community as draught animal.

Figure 1: Typical color of Begait breed (Bull)

Figure 2 Typical color of Begait breed (cow)

However, the elders also indicated that due to large skeletal frame the maintenance requirements of Begait cattle is higher than the Arado cattle. Therefore, under conditions of feed stress (which is quite common in the area) Begait cattle loses its body condition faster than the Arado breed and hence at that time it becomes susceptible to diseases (Mekuriaw and Kebede 2015).

The population of Begait cattle is fast dwindling which can be attributed to shrinking of the natural pastures and also encroachment of the natural pasture with the

non palatable and poisonous grasses and also due to expansion of croplands and anthropogenic causes, similar observations have been reported by Genzebu *et al* (2012) in Arado cattle breeding tract.

Figure 3 Coat color variation of Begait cattle

However, due to some unplanned genetic improvement programmes (using semen of exotic cattle breeds) is fast eroding the genetic base of the breed.

The respondent also indicated that due to shrinkage of grazing lands and also due to intensification of agriculture the farmers are generally forced to rear fewer numbers of cattle when compared to the earlier decades .

Traditional selection practices

The traits which are traditionally used for the selection of calves, bulls and cows of Begait breed are presented in Table 1. Calves with optimal body weight, with straight back and whose dam's milk yield is good are preferred; indicating a traditional type of individual and oral pedigree selection, calves with a good gait and black and white coat color are generally selected (Poursaberi et al 2010 and Banerjee et al 2014).

The preferred coat colors of Begait cattle are white spots over the black background, white and red or light red, gray color patterns too are common amongst the breed. Cattle with spotted coat colors are able to evade the predators as they are difficult to be detected among the bushes .

Calves which are large in size, whose dams are good milk yielders and are fast growers are preferred. The bulls are selected for their masculine appearance (thick muscular neck, wide forehead well, wide canon) and for their draft related traits . Findings of studies by Mwacharo and Drucker (2005); Endashaw et al (2012) and Banerjee et al (2014) reported that the pastoral communities in Ethiopia select bulls based on their coat color, high fertility, large body size, horn shape and milk yield of the bull's dam.

The breeding cows are generally selected based on their coat color as that of the breeding bulls. The cows which have feminine traits (narrow and long neck, developed udder and functional teats, good

Table 1: Traits traditionally used to select calves, bulls and cows

Selection criteria	Tahtay –Adiabo		Kafta-Humera	
	N=50		N=50	
	Index	Rank	Index	Rank
Selection criteria for calves				
Large size	0.26	1	0.27	2
Dam's milk yield	0.25	2	0.24	3
Fast gait	0.25	3	0.18	4
Coat color	0.24	4	0.31	1
Selection criteria of breeding bulls				
Masculine traits	0.29	1	0.19	4
Dam's milk yield	0.22	4	0.27	2
Large body size	0.25	2	0.30	1
Coat color	0.24	3	0.24	3
Selection criteria of heifers/ cows				
Coat color	0.28	3	0.34	1
Feminine traits	0.31	2	0.29	3
Dam's milk yield	0.41	1	0.37	2

N= Sample size, *Index=the sum of (4 times first order + 3 times second order +2 times third order + 1 times fourth order) for individual variables divided by the sum of (4 times first order + 3 times second order +2 times third order+ 1 times fourth order +) for all variables*

Table 2: Some qualitative traits of the Begait cattle breed in the study districts

Trait	Tahtay N=114	Adiabo	Kafta-Humera N=113	Male N=82	Female N= 145
Body hair coat color pattern	%		%	%	%
Plain	41.2		37.2	31.7[b]	43.4[a]
Patchy	19.3		13.3	24.4[b]	11.8[a]
Spotted	39.5		49.5	43.[b]	44.8[a]
Body hair coat color					
Black	6.1[b]		15.04[a]	4.9[b]	13.8[a]
White	16.7[a]		6.2[b]	8.5[b]	13.1[a]
white and black pied	40.4[b]		46.01[a]	51.2[a]	38.6[b]
dark red	10.5[a]		3.5[b]	3.7[b]	8.9[a]
light red	5.3		8.85[a]	13.4[a]	3.5[b]
Gray	7.9[b]		10.6[a]	12.2[a]	7.6[b]
white and red pied	13.2[a]		9.7[b]	6.1[b]	14.5[a]
Horn presence					
Absent	5.3		2.7	4.9	3.4
Present	94.7		97.3	95.1	96.6
Horn shape					
Straight	16.7		14.2	10.9	17.9
Curved	47.4		59.3	56.1	51.7
Loose	11.4		10.62	8.5	12.4
Stumped	19.3		13.3	19.5	14.5
Polled	5.3		2.7	4.8	3.5
Horn orientation					
No horns/polled	2.6		1.8	0.0[b]	3.4[a]
Tips pointing laterally	16.7		17.7	8.5[a]	22.1[b]
Upwards	62.3		66.4	67.1[a]	62.8[b]
Downwards	9.6		8.0	13.4[a]	6.2[b]
Fore wards	3.5		1.8	4.9[a]	1.4[b]
Backwards	5.3		4.4	6.1[a]	4.1[b]
Ear shape	%		%		
Almost Rounded	14.9		16.8	15.9	15.9
Almost straight edge	85.1		83.2	84.1	84.1
Ear orientation					
Lateral	68.4		77.9	65.9	77.2
Dropped	31.6		22.1	34.1	22.8
Hump size					
Small	78.1		65.5	41.5[b]	89.0[a]
Medium	17.5		31.0	50.0[a]	9.7[b]
Large	4.4		3.5	8.5[a]	1.4[b]
Naval flap					
Small	2.6		0.9	2.4[a]	0.0[b]
Medium	28.1		31.9	4.9[b]	6.9[a]
Large	69.3		67.2	92.7[a]	49.6[b]
Perpetual sheath					
Medium	12.2		11.5	0.0	NA
Large	63.2		65.5	62.8	NA
Small	24.6		23.0	37.2	NA
Facial /head/ profile					
Straight	22.8		32.7	14.6[b]	35.2[a]
Convex	77.2		67.3	85.4[a]	64.8[b]

[a, b] ($P<0.05$) means with the different superscripts across rows are significantly different , N= Sample size, SE=standard error

milk yield which are regular breeders and have good mothering ability) are selected by the farmers, the observations are in accordance with those of Fitwi and Tamir (2015).

The cattle are raised on natural pastures and crop residues while concentrate in form of (sesame cake) are provided to the milking cows and working bullocks to improve their milk yield and draft ability.

Qualitative traits of Begait cattle

The coat color of majority of the Begait cattle (Table 2) reared in the Tahtay- Adiabo woreda had plain and patchy coat color with light red, gray, whitish and dark red background. Contrarily most of the cattle raised at Kafta-Humera woreda had spotted coat color. The presence of different coat color patterns in Begait cattle are similar those reported by Mekuriaw and Kebede (2015) and Mulugeta(2015).

Coat colors constitute an important group of qualitative traits for characterizations of livestock studies. Bonsma 1980 indicated that animals with lighter coat colors are able to dissipate body heat better than their dark coated counterparts (). The heterogeneity in the coat color (Figure 3) indicates the presence of several ecotypes within the breed which need to be studied individually and at a molecular level.

Traditionally, zebu cattle with horns are preferred by most of the rearers which also has a socio cultural significance. Cattle with large horns have aesthetic value and such cattlle are considered to be beautiful besides the same horned cattle are able to defend themselves against any predatory attacks (Mulugeta 2015). Begait cattle have long curved horns which are oriented upwards followed by tips pointing laterally and downwards. The horn orientation varied across the sexes, horns being larger among the steers/bulls. Similar orientation of the horns was also reported by Mulugeta (2015). Horn orientation of Kenana cattle was crescent type and had curved upwards (Aamir et al 2010). The respondents prefer cattle with long horns as was reported among pastoral communities in Africa (Kugonza et al 2011).

The shape and orientation of the ear among most of the cattle (irrespective of the sexes) showed a straight edge and the ear are laterally carried, the observations are however contrary to the findings of Mulugeta (2015) who have reported that the ear orientation of Begait cattle is mostly drooping.

The hump size of the Begait cattle is one of the smallest among all the zebu cattle of Ethiopia (Twelde 2016). The hump of Begait cattle are of medium type and sexual dimorphism was observed where the cows had smaller humps when compared to those of the bull the findings are in close accordance with those of Mulugeta (2015). The naval flap and perpetual sheath of Begait cattle are well developed as in most of the zebu bulls (Mekuriaw and Kebede 2015) and Adebabay 2014). The naval flap of the cows are however lesser developed when compared to the bulls indicating sexual dimorphism for the trait.

The face of the Begait cattle is of convex type, while some cattle too had a straight face profile. However, Mulugeta (2015) in his study reported that most of the Begait cattle have straight facial profile. There were differences ($P<0.05$) in length of tail between the sexes where bulls had longer tails.

Morphometrical measurements

Morphometrical measurements of Begait cattle reared in the two management systems (farmer's management and the ranch) are presented in Tables 3 (cows) and 4 (bulls). The Begait cattle raised at the ranch had higher ($P<0.05$) body length, rump height, pelvic width, neck length and teat length, while the cattle reared under the farmers management (on farm) had higher ($P<0.05$) values for Horn length, muzzle circumference, canon circumference, width of forehead and face length.

The differences as observed may be because the cattle at the ranch were those who were selected purposively from those reared by the farmers and also that management at the ranch was better than those at the farmers end especially when it comes to the availability of feed and fodder.

Table 3: Morphometical measurements (cm) of Begait cows across age categories

Trait	Age of cows			
	4-6 years Mean ±SE	7-9 years Mean ±SE	10-12 years Mean ±SE	>12years Mean ±SE
Ear length	19.4±0.3	20.9±0.2	23.1±0.3	24±0.1
Body length	111.2±2	119.1±2	118.5±2	115.5±6
Chest girth	153.7±1	158.5±1	164.2±0.9	163.50±2
Horn length	20.7±1	23.4±0.7	22.2±1.14	21±0.01
Tail length	106±1	109.1±1	115.9±1.4	123.2±7
Muzzle circumference	35.5±1	36.6±0.6	39.6±0.9	42.5±4
Rump height	133.3±1	135.8±0.6	136.2±1.1	134±1
Height at withers	131.1±1.1	132.9±0.7	133.2±1.5	129.5±1
Canon circumference	17.1±0.3	18.4±0.2	20.4±0.3	25.5±1
Pelvic width	34.9±0.5	35.6±0.3	36.8±0.6	35.5±3
Width of forehead	18.1±0.3	19.8±0.3	22.6±0.5	21±4
Neck length	46.6±0.7	47.3±0.6	49.1±0.8	46.±1
Face length	42.3±0.6	41.7±0.5	43±0.5	46±2
Teat length	5.2±0.2	5.5±0.1	5.3±0.2	5.5±1

[a, b] (P<0.05) means with the different superscripts across rows are significantly different, N= Sample size, SE=standard error

Table 4: Morphometical measurements (cm) of Begait bulls across different age categories

Trait	Age of bulls			
	4-6 years	7-9 years	10-12 years	>12years
	Mean ±SE	Mean ±SE	Mean ±SE	Mean ±SE
Body length	110.8±3.3	110.9±2.1	110.7±1.8	127.7±0.3
Chest girth	159.2±0.9	163.4±0.7	166.7±0.9	174±1.7
Horn length	19.8±0.9	20.7±0.7	20.7±0.9	22.7±4.7
Tail length	107.9±1.9	111.3±1.4	113.8±1.8	117.3±1.2
Muzzle circumference	35.5±0.8	37.2±0.7	40.1±0.9	41.3±2
Rump height	135.6±0.9	136.1±0.9	138.7±0.6	139.7±4
Height at withers	133.5±1.3	134.2±1.1	135.1±0.9	134±6
Canon circumference	18.6±0.4	19.1±0.3	19.7±0.5	22.3±1.2
Pelvic width	34.04±1	35.6±0.4	35.9±0.5	36±1
Width of forehead	21.4±0.8	22.5±0.83	21.7±0.4	22±1.4
Neck length	46.7±1.4	47.9±0.94	47.1±1.2	51±4
Face length	43.2±0.7	42.9±0.6	43.2±0.7	46.3±3

[a, b] (P<0.05) means with the different superscripts across rows are significantly different, N= Sample size, SE=standard error

The differences between the two sexes follow the Rensch's rule for sexual dimorphism where in larger species the males exhibit a larger body size when compared to the females (Rensch 1950). The average body weight of the cows and bulls reared at Humera ranch were 315.3±7.03 and 360.9±10.3 kgs, respectively. The body weight of the Begait bulls and cows are similar to some local breeds such as Kereyu, Nkasi and Boran cattle reported by Sheferaw (2006), Mwambene *et al* (2012) and Banerjee *et al* (2014) for. The weight of the Begait cattle is higher than those of other Ethiopian breeds of cattle, viz. Horro and Arsi Bale which is ascribed to the genetic makeup of the cattle.

Table 5: Some reproductive parameters of Begait cows reared under two management systems

Parameters/variables	Humera Ranch (N=75) Mean ±SE	Farmers level (N=100) Mean ±SE	Overall (N=175) Mean ±SE
Age at first mating of steers (months)	33.4±0.01	42.75±0.5*	38.1±0.5
Age at first mating of heifers (months)	35.8±0.3	43.97±0.3 *	40±0.4
Age at first calving (months)	48.9±0.4	52.68±0.4 *	50.8±0.5
Calving interval (months)	17.4±0.2	19.36±0.2 *	18.4±0.2

*P<0.05, values across rows are significant

Table 6: Some production parameters of Begait cows reared under two management systems

Parameters/variables	Humera ranch (N=75)	Farmers level (N=100)	Overall (N=175)
	Mean ±SE	Mean ±SE	Mean ±SE
Average daily milk yield (liters)	2.97±0.1*	2.1±0.04	2.49±0.1
Peak milk yield (liters)	3.9±0.1 *	2.6±0.02	3.21±0.1
Lactation length (months)	6.23±0.1 *	4.9±0.03	5.39±0.1
Lactation milk yield (liters)	494.6±5.8 *	433.2±3.4	459.52±3.9
Calves born in life time (no)	NA	6.32±0.2	6.32±0.2

*P<0.05, values across rows are significant

The results pertaining to some morphological measurements of Begait cows and bulls across different age groups are presented in Tables 2 and 3. The ear length (EL) of the cows are similar to the findings of Fitwi and Tamir (2015). The zebu cattle usually have a longer ear when compared to the taurus breeds (Brito *et al* 2004). The long EL of Begait cattle can be ascribed to the adaptation of the breed to tropical climate as long ear helps in better dissipation of heat (Bonsma 1980).

The body length (BL) of the cows are similar to the findings of Fitwi and Tamir (2015). The BL is also similar to those of other cattle breeds viz. Arado (Mason and Maule 1960), Gojjam Highland Zebu and Fogera (Fasil 2006), Mwambene *et al* 2012), Abigar cattle (Nakachew 2009) and Boran (Banerjee et al 2014). However, the BL is shorter than Holstein Friesian (Ozkaya and Bozkurt 2008), Brown Swiss (Ozkaya and Bozkurt 2008), Hungarian Simmental, Shaver and Hareford (Bene *et al* 2007). Lower BL was of Begait cattle was reported by Ftiwi and Tamir (2015). Studies by several authors (Kugonza *et al* 2011; Banerjee *et al* 2014; Hafiz *et al* 2014) indicate that BL of the cattle are correlated with BW .

The chest girth (CG) of Bengait cattle are similar to those of Boran cattle (Alberro and Haile-Mariam 1982; Banerjee *et al* 2014), Kenena (Aamir *et al* 2010) , Kereyu (Sheferaw2006), Nilotic cattle (Milla *et al* 2012), Gojjam Highland Zebu and Fogera (Fasil 2006) and Begait cattle Ftiwi and Tamir (2015). The CG is higher than Sheko (Takele 2005), Abigar (Nakachew 2009) and Assam (Kayastha *et al*2011) cattle, which are smaller type zebu cattle.

The CG for several other cattle breeds viz. Angus (Park *et al* 1993), Holstein Friesian and Brown Swiss (Ozkaya and Bozkurt 2008), Angoni; Barotse; Baila and Tonga (Zulu 2008) was higher than Begait cattle. Chest girth is one of the most important traits estimated for the assessment of body weight of livestock. Studies by (Abdelhadi and Babiker 2009; Kayastha *et al* 2011; Banerjee *et al* 2014) Indicate that CG is significantly correlated with body weight, where the thoracic cavity houses some of the most important organs .

The horn length (HL) of Begait cattle is similar to those of Achai and Iringa red

cattle (Saleem *et al* 2013 and Msanga *et al* 2012), respectively. Cattle with longer horns are generally preferred by the pastoralist communities in Africa due to the presence of several predators in the rangelands. Cattle with longer horns are able to defend themselves better than those which are polled or with small horns. Long horned cattle have aesthetic importance for farmers in many pastoral societies (Mwambene *et al* 2012[a] , Chencha *et al* 2013; Banerjee *et al* 2014**)** .

Tail of Begait catttle are long and the switch is below the hock. The tail length (TL) is comparable with those of Ftiwi and Tamir (2015) while the TL was shorter than those of Arado cattle (Genzebu *et al* 2012) and also that of native cattle reared at Awi, East and West Gojjam zones of Ethiopia (Fasil and Workneh 2014). Contrary, shorter TL was recorded in Arado cattle (Genzebu *et al* 2012). Cattle with long tail have an advantage as long tailed animals are able to fend off the flies and other ecto parasites better than those with smaller tails.

Muzzle circumference (MC) of Begait cattle is similar to those of Angus (Park *et al* 1994); Fogera (Zewdu *et al* 2008), cattle reared at Awi, East and West Gojjam zones of Ethiopia (Fasil and Workneh 2014). The MC was however narrower in Arado cattle (Genzebu *et al* 2012). The muzzle circumference of cattle is correlated with body weight of cattle (Prabhat and Nagpaul 2005). Muzzle circumference is also correlated with those of feed conversion of cattle when feed intake of the cattle is not available (Beef cattle research project, 1991). Moreover, the MC of the cattle can be used for breed characterization (Prabhat and Nagpaul, 2005).

The rump height (RH) of Begait cattle (irrespective of both the sexes) was similar to several exotic breeds of cattle viz. Hungarian Simmental; Hereford; Aberdeen Angus; Red Angus; Lincoln Red; Shaver (Bene *et al* 2007). However, the RH was lower than local breeds like Kereyu (Sheferaw2006); Abigar (Nakachew 2009); Sokoto Gudali (Abdulmojeed *et al* 2010). The height at withers (HW) was similar to those of reported by Fitwi and Tamir (2015) and other cattle breeds viz. Angoni, Barotse, Tonga (Zulu 2008) ; Hereford ; Aberdeen Angus; Red Angus; Shaver, Charolais, Limousin (Bene *et al* 2007). However HW of Begait cattle was higher than those of Boran (Alberro and Haile-Mariam 1982); Kereyu (Sheferaw 2006); Arado (Mason and Maule 1960); Sheko (Takele 2005); Gojjam Highland Zebu, Fogera (Fasil 2006) cattle breeds. The differences in HW may be attributed to differences due to genetic makeup of the breeds.

The canon circumference (CC) of Begait cattle was wider than those of Arado cattle (Genzebu *et al* 2012). The canon circumference is significantly correlated with body weight of animals and animals with wider CC have higher body weight (Hammond *et al* 1984).

Pelvic width (PW) of the bulls and cows are similar to those of Arado cattle (Genzebu *et al* 2012), Hereford, Angus (Gilbert et al.1993) and Kamphaengsaen cattle raised on pasture (Suriya *et al* 2011). The PW of dairy type cattle viz. Brown Swiss; Holstein Friesian (Ozkaya and Bozkurt 2008) ; Milking shorthorn (Dawson *et al* 1955) is wider than those of Begait cows. The PW of Kamphaengsaen cattle raised on feedlot (Suriya *et al* 2011) and Jeju cattle (Lee *et al* 2007), too were wider than Begait cows. Cows with wider pelvic width have lower incidences of dystocia (Bonsma 1980;Hammond *et al* 1971 and Banerjee *et al* 1994).

The width of the fore head (WFH) of Begait cattle is similar to those of Hereford; Angus cattle (Gilbert *et al.*1993), Aberdeen Angus; Red Angus ;Hungarian Simmental; Lincoln Red; Charolais; Limousin; Blonde d'Aquitaine; Shaver and Lincoln Red (Bene *et al* 2007) and also Boran cattle (Banerjee *et al* 2014). Animals with wider forehead have higher body weight, Hammond *et al* (1971).

The neck length (NL) of the Begait cattle is in close accordance with those of Kereyu (Sheferaw 2006), Kenena (Aamir *et al* 2010), Abigar (Nakachew 2009) . The NL of Begait cattle was longer than Arado, Baggara and Manipuri cattle, Genzebu *et al*

(2012) ; Abdelhadi and Babiker(2009) and Tolenkhomba *et al* (2012) respectively.

The face length of the Begait cattle was similar to those reported by Fitwi and Tamir (2015), Abigar (Nakachew 2009), Kenena(Aamir *et al* (2010), Hereford(Bene *et al* 2007), Angus (Park *et al.*1994) ,Achai (Saleem *et al* 2013). The face length of the Begait cattle are longer than Arado and Manipuri cattle Genzebu *et al* (2012) and Tolenkhomba *et al* (2012) respectively.

The teat length of the Begait cows are similar to the values reported by Fitwi and Tamir (2015). The teat length of Arado and Sheko cattle Genzebu *et al* (2012) and Takele (2005) was smaller than those of Begait cows, Cows with shorter teat length (as that of the Begait cattle) have lower incidences of subclinical mastitis (Herwin *et al* 2016). Findings of a study on Gir cows indicate that cows with longer teat length have higher incidences of mastitis (Marco *et al* 2010).

Reproduction and Production traits

Some reproduction and production traits of Begait cattle are presented in Table 5 and 6 .

The age at first mating (AFM) of Begait cattle was higher than those reported by Tadele and Nibret (2014) among indigenous cattle reared at North Gondar region of Ethiopia. The AFM was lower than those reported by Ftiwi and Tamir (2015) and Genzebu *et al* (2012). The AFM of the heifers reared at the ranch are similar to those reported by Berihu *et al* (2016). The AFM recorded at the farmers management condition was higher in this study when compared to those reported by Berihu *et al* (2016), however the values obtained in this study are similar to the cattle raised under crop livestock production system in and around Wukoro town Berihu *et al* (2016). The differences in AFM within the breed are clearly attributed to the management of the breed and hence can be improved if the farmers received adequate feed and management resources.

The AFC of Begait cattle reared at the ranch are similar those reported by Fitwi and Tamir (2015) and Berihu *et al* (2016). The AFC of the cattle raised under the farmers management was similar to those raised under mixed livestock production and as reported by Berihu *et al* (2016).The AFC was longer among the cows reared by the farmers than those reared at the farm The differences in AFC may be attributed to differences in management of the animals across the studied locations.

The AFC was higher than Boran and Arado cows (Genzebu *et al* 2012) and also Sheko cattle (Takele *et al* 2009). However, AFC in Begait cattle was higher than the findings of Mulugeta and Belayneh (2013). The AFC of Begait cattle is similar to those reported by Berihu *et al* (2016) for Begait reared at Humera ranch and also those of Begait cattle reared under crop livestock production system at Tigray region. The AFC was lower than those of indigenous cows reared by the farmers of North, Gondar (Ethiopia) (Tadele and Nibret 2014) and also of Fogera cattle (Almaz 2012).

The AFC was similar to those of Ogaden cattle, Getinet *et al* (2009). The differences in AFC may be attributed to both genetic and non genetic factors, while the former may be specific to the breed while the later indicates differences in management systems prevailing in the different study areas.

The calving interval (CI) of Begait cows is lower than that of Arado and Horro cattle, Genzebu *et al* (2012) and Mekonnen *et al* (2012) but higher than that of Hararge highland cattle(Estefanos *et al* 2014). Calving interval of Begait cattle reared at Humera ranch was similar to those observed by Berihu *et al* (2016) under ex situ management while those reared at the farmers management were similar to those of Begait cattle reared in crop livestock management system. However, the CI observed for Begait was lower than those observed under Agro Pastoral and Pastoral system of management. The average CI of Begait cattle is comparable to that of Fogera cattle but lower than those of Horro cattle (Almaz 2012).

The differences in CI may be attributed to both genotype and also management practices. Several non genetic factors viz. nutrition of the cows, influence pre-pubertal growth influences the maturity of cattle. Well managed cattle and those receiving

good quality feed attain optimum growth and thus can be served earlier, such cows have higher lifetime calving in more milk and calves produced during the lifetime of the animal (Mukasa 1989).

Shrinkage of grazing land in the region followed by expansion of crop farming has led to shortage of fodder and thereby influencing the productivity of the cows .

The average daily milk yield of Begait cattle is similar to those reported by Fitwi and Tamir (2015). The milk yield was however higher than those reported by Mulugeta and Belayneh (2013) and also than Arado cattle (Genzebu *et al* 2012). The average daily milk yield of Begait cows was 6-8 liters reported by Rezene (2007) is significantly higher than those observed in this study, indicating that within breed selection for milk production and the related traits are possible in Begait cows.

The average lactation milk yield (LMY) was lower among the native cows reared in Mekele town of Ethiopia (Kumar *et al*. 2014) and also among the native cows of Chacha Town (Mulugeta, and Belayneh 2013).

Lactation milk yields (LMY) of Begait cattle are higher than Arsi Bale cows (Gabriel *et al* 1983); Boran and Horro cows (Gebregziabher *et al* 2013). Lower LMY (than those of the Begait cattle) was recorded among the Arado and Fogera cows (Genzebu *et al* 2012 and Aynalem *et al* 2011). Variation in lactation milk yield can be due to several factors both genetic and non genetic viz. season of calving and parity.

The average numbers of lifetime calves born /cow in the study areas was assessed to be around 6.47±0.13, the numbers of calves born were higher than what was reported by Genzebu *et al* (2012). The numbers of calves born was fewer than what was reported in a study by Tesfaye, (2007) and also Fitwi and Tamir (2015). The high numbers of life time calves born indicate that the long productive life of Begait cattle and can be correlated with adaptation to the study areas.

CONCLUSION

The breeding tract of Begait cattle extends from Western part of Tigray (Ethiopia), parts of Eretria and Sudan. This breed is reared for meat and milk in the study area.The study encompassed two districts' of Tigray region, and encompassed the cattle raised by the farmers and at a ranch. Bulls and steers are used as draft animals. Most of the cattle are black coated with white spots and horned. Sexual dimorphism following Rensch law exists in most of the morphometical traits including body weight. The milk production of the cows is relatively low. The lifetime calf crop is around 6 calves per cow. The numbers of Begait cattle are dwindling and hence efforts are needed to conserve the breed .Acknowledgement

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