

Original Article

Phenotypic Characterization of Indigenous Cattle in Western Tigray, Northern Ethiopia

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ABSTRACT

The survey was carried out in western zone of Tigray Region, northern Ethiopia with the aim to describe phenotypic characteristics, cattle production system, trait preferences, breeding practices, constraints in efficient utilization of the breed and to use the information generated as baseline data to design breeding strategy of the breed. To collect the data, in-depth interviews, group discussions, and structured questionnaire were used. The production system employed, purpose of keeping the animals, preferred cattle traits by farmers were assessed. Phenotypic descriptors were directly measured using measuring tape. Reproduction and production performance data was collected and battle necks for Begait cattle production were investigated. Statistical Package for Social Science (SPSS) was employed to analyze the data. Results showed Begait cattle are kept in a mixed crop-livestock production system and are the dominant livestock species in the area. Cattle have multi-functional roles in the production systems. Among reason of keeping cattle, breeding was ranked first followed by milk production. Reproduction performance, body size, and physical appearance were among the highly ranked preferred traits for male cattle in that order. Preferred traits for female cattle include reproduction, milk yield, and mothering behavior. The mean linear measurements of female Begait cattle were: height at wither (131.48±0.25cm), body length (128.13±0.16cm) heart girth (159.55±0.24). In male Begait the values were: height at wither (136.99±0.10cm), body length (135.96±0.09cm), and heart girth (168.91±0.10). The reproduction and production performance results showed; age at first puberty (female) (35.51±0.14 months), age at first calving (48.68±0.16 months), calving interval (17.06±0.11 months) and lift time productivity (8.2±0.02 years); daily milk yield (2.52±0.03 liter), lactation length (6.38±0.03 months) and lactation milk yield (482.95±6.24 liters). Cattle owners had developed a culling mechanism for maintaining the desired quality of their animals. Among the problems of cattle production in the area, seasonal feed shortage, diseases and drinking water scarcity were the major ones. Farmers perceived that Begait cattle population decreased over the years and it is on the verge of extinction. It is concluded that appropriate breeding strategies and conservation models should be designed for overall breed improvement.

Keywords: Begait cattle, cattle management practices, phenotypic characterization, linear body measurements, population status, production constraints.

INTRODUCTION

In Ethiopia, cattle contribute significantly to the livelihoods of smallholder farmers. Cattle provide farm families with draught power, milk, meat, manure, and cash income, and play a significant role in the social and cultural values of the society. Cattle produce a total of 3.2 billion liters of milk and 0.331 million tons of meat annually (CSA, 2008). In addition, 14 million tons of manure are used annually primarily for fuel. Despite the importance of cattle to the farming community in particular and to the national economy at large, the sector has remained underdeveloped and underutilized.

The current cattle population in Ethiopia except the non-sedentary population of the three zones of the Afar region and six zones of Somali region is estimated at about 53.99 million heads, of which 55.48 and 44.52% are reported to be female and male cattle, respectively (CSA, 2012). The majority of these cattle (98.95%) are local breeds which are kept under low input management system. The remaining are hybrid and exotic breeds that accounted for about 0.94 and 0.11%, respectively (CSA, 2012). Tigray is one of the regional states of Ethiopia where livestock production has been an impotent component of the livelihoods of smallholder farming communities. There are seven cattle breeds in the region and the cattle population in the region is higher than other livestock species. Among the cattle breeds, Begait cattle breed is known for its high milk yield (BONAR, 1999), and is mainly found in the western lowlands of Tigray, northern Ethiopia. On-farm studies on phenotypic characteristics of the breed under *in-situ* and *ex-situ* management systems are generally lacking. This study is aimed at establishing phenotypic identities and characteristics of Begait cattle breed and assess the current status of the population and performance of the breed under prevailing production and management system of Begait cattle breed in order to enable cattle breeders and policy makers to make appropriate decision for future utilization and conservation strategy of the breed.

MATERIALS AND METHODS

Study Area

The study was conducted in Kafta Humera (Maycadra and Bereket kebeles) district, western zone of Tigray Region, Northern Ethiopia. Its geographical location lies within the co-ordinates of 13° 40'-14° 27' north latitude and 36° 27'-37° 32' east longitude. It is bordered by Sudan to the west, Tahitay Adiyabo district to the east, Wolkayt district and the Amhara region to the south and Eritrea to the north. The total area coverage of the district is estimated to be 717,652 ha (Woreda unpublished data). The agro-ecology of the District is hot to warm semi-arid lowland plains which are characterized by hot temperature, erratic rainfall, vast area of plains lowlands suitable for large scale and subsistence agriculture including crop and livestock production systems.

Altituderanges from 568 to 1861 meter above sea level. The dry season occurs during the months of October to May, and the wet season June to September. It has unimodal rainfall pattern which 80 to 85% of the rain falling during the wet season. Annual rainfall is 448.8 and 1102.5mm for the lowland and highland areas of the district, respectively. The mean annual temperature of the area is 25°C to 27°C in the lowlands and 20°C to 25°C in the highlands. The study sites are found within the lowland part (kola) of the district and share the mean annual rainfall and mean annual temperature recorded to the lowland areas (Woreda unpublished data). The people of the study area practice mixed farming systems as means of livelihood. Sesame, sorghum, and cotton are the most common crops produced. Livestock are the valuable components of the farming system contributing enormously towards ensuring food security in the study area. The total livestock species in the district is presented in Fig. 1

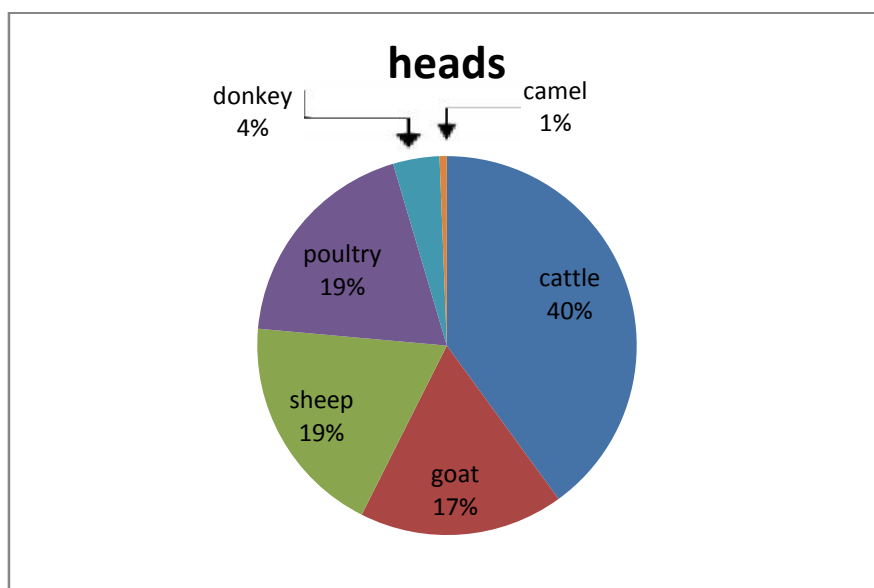


Figure 1: Heads of livestock species in the district

Field Data Collection

The study was carried out on February, 2014 in Maycadra and Bereket villages of Kafta Humera district. These villages which are known to keep typical and having higher population density of Begait cattle were purposely selected. Primary data was collected using in-depth interview, group discussion and structured questionnaire. The data collected included general information on household characteristics, livestock production and management practices, phenotypic characteristics and production and reproduction performances. For characterization of Begait cattle, the descriptors provided (FAO, 2011) were used which this system has been used elsewhere (Dessaegn, 2012). Linear and morphological measurements including body measurements such as heart girth, wither height, body length and ear length were also carried out.

Data processing and analysis

The SPSS statistical computer software (SPSS, version 20) was used to analyze the survey data and Quantitative data were analyzed using the General Linear Model Procedure. An index was calculated to provide overall ranking of the purpose of keeping cattle according to the formula: $\text{Rank}_{\text{Index}} = (3 \times \text{percent of household ranked first} + 2 \times \text{percent of household ranked second} + 1 \times \text{percent of household ranked third})$ given for each purpose divided by $(3 \times \text{percent of household ranked first} + 2 \times \text{percent of household ranked second} + 1 \times \text{percent of household ranked third})$ for all purpose of keeping cattle in the area. Similar indices were calculated for breed selection criteria, health management and production constraints.

RESULTS AND DISCUSSION

Respondents and Total Household Members

A total of 104 households were involved in the study area. As shown in Table 2 of the total respondents, majority (81.7%) were male and (18.3) female headed households. The total family and land size of 4.06 ± 0.07 , 1.53 ± 0.03 (hectare) per household, respectively. In this study, halves of the respondents were illiterate. Education is a good approach to facilitate farmers in making decisions, solving problems and learning new technologies as reported in (IFPRI, 2010).

Table 1: Quantitative Morphometric traits and their categories considered

Traits	Specifications
Body length	The distance between point of shoulder and the pin bone
Heart girth	Circumference of the body behind the base of the hump and just behind the front legs
Height at withers	The vertical distance between ground and the point of wither
Cannon bone length	Length between the fetlock and knee joint
Horn length	Base to tip following its external curvature
Ear length	The base of the ear to the pointed end of the ear
Face length	The poll of the animal to the end of muzzle
Neck length	Proximal end of cervical region to the distal end of the cranial region
Dewlap width	The widest part of the base of the neck vertically
Naval flap width	Widest part from the base of the abdomen vertically
Pelvic width	Width between the two pins
Perpetual sheath	Widest part vertically from the base of the abdomen
Tail length	From the base of the tail to the pointed end of the tail
Teat length	From the base of the udder to the point of the teat

Table 2: Household characteristics at Kafta Humera District

parameters	Kafta Humera District		
	Maycadra (N=52)	Bereket(N=52)	Total (N=52)
	Mean \pm SE	Mean \pm SE	Mean \pm SE
Age(years)	43.12 \pm 0.12	47 \pm 0.12	45.06 \pm 0.21
Family size	3.65 \pm 0.07	4.48 \pm 0.07	4.06 \pm 0.07
Land size (ha)	1.33 \pm 0.03	1.74 \pm 0.04	1.53 \pm 0.03
Gender head ratio			
Male	42(80.8)	43(82.7)	85(81.7)
Female	10(19.2)	9(17.3)	19(18.3)
Educational status			
Illiterate	17(32.7)	36(69.2)	53(51)
Read and write	35(67.3)	16(30.8)	51(49)

N=Sample respondents

Sources of Livelihood

Livestock and crop production play important role in improving the livelihood of farmers in the study areas. Cattle provide food, draft power, fertilizer, and also serve as a source of cash income. As presented in Tables 3, it was observed that 86.5% of respondents reported to practice both livestock and crop production and 13.5% of the respondents dependent on cattle, crop, and off-farm activities(mainly engaged in mining activities) as a source of livelihood.

Table 1: Households income source at Kafta Humera District

Parameters	Kafta Humera District		
	Maycadra	Bereket	Total
	N (%)	N (%)	N (%)
Livestock production only	0	0	0
Crop production only	0	0	0
Livestock and crop production	40(76.9)	50(96.2)	90(86.5)
Livestock and off- farm activities	0	0	0
Crop and off-farm activities	0	0	0
Crop, livestock and off-farm	12(23.1)	2(3.8)	14(13.5)

N=Sample respondents

Begait Cattle Production System

Mixed crop-livestock production system is practiced in the study area. 98.2 percent of the farmers interviewed reported that their animals communally grazed and are normally herded both during the dry and wet seasons. Herding of cattle was mainly done by hired labour, adult males, and boys. Natural pastures are the major feed resource available in the study area. During wet season (June-September.) cattle depend on natural pastures and browse trees while during the dry season (October-May) crop residues and crop after math that are available after crop harvest are used as sources of animal feed. Results showed that

supplementation using commercial feeds (high energy and protein concentrates) are rarely practiced.

Status of Begait Cattle

The number of breeding females relative to the previous herd appears to be not promising for breeding purposes and the number of replacement calves is relatively small, suggesting difficulties encountered in breed replacement. According to Begait cattle elder owners and the estimated cattle population data in the study area, the population of Begait cattle breed is in a gradually decreasing trend over time. This result is in line with the report by (Zerabruk *et al.*, 2007) who reported that the population size of Begait cattle breed is reducing significantly and it is at a higher risk of extinction due to famine and man-made problems in the past 20-30 years. Currently, shortage of feed, diseases, water scarcity, and animal smuggling were identified as the most important threats to the breed.

Livestock Holding and Herd Composition

The livestock possession of the study areas is summarized in Table 4. There was significant difference ($P < 0.05$) in livestock composition for cattle, sheep, goats and honey bee among Maycadra and Bereket villages. However, there was no significant ($P > 0.05$) difference for equines and chicken composition for the two villages. Equines are mainly kept for transportation and packing purposes. The overall mean of livestock possession (head/HH) in the study area was 12, 3.88, 7.71, 1.07, 0.5 and 0.37 for cattle, sheep, goat, equines, chicken and honeybee, respectively. In both study areas, farmers possessed more cattle than other livestock species. The average herd size was higher in Bereket and significantly different from Maycadra may be due to the availability of feed and long tradition of raising livestock as a source of income.

Table 4: Households livestock composition at Kafta Humera District

Parameters	Kafta Humera district			p-value
	Maycadra (N=52)	Bereket (N=52)	Total (N=104)	
	Mean \pm SE	Mean \pm SE	Mean \pm SE	
Cattle	9.54 \pm 0.18	14.54 \pm 0.20	12.0 \pm 0.28	**
Sheep	2.94 \pm 0.22	4.81 \pm 0.10	3.88 \pm 0.15	**
Goat	4.52 \pm 0.36	10.9 \pm 0.27	7.71 \pm 0.39	**
Equines	1.0 \pm 0.08	1.13 \pm 0.09	1.07 \pm 0.06	NS
Chicken	0.38 \pm 0.13	0.62 \pm 0.14	0.50 \pm 0.10	NS
Honey bee	0.54 \pm 0.11	0.19 \pm 0.06	0.37 \pm 0.06	**

N=Sample respondents; Ns =Non-significant ($P > 0.05$); **=significant ($P < 0.05$); SE=standard error

Table 5: Linear body measurements of male Begait cattle

Parameters	Kafta Humera district		
	Maycadra (N=52)	Bereket (N=52)	Total (N=104)
	Mean \pm SE	Mean \pm SE	Mean \pm SE
Height at wither	136.85 \pm 0.14	137.13 \pm 0.14	136.99 \pm 0.10
Body length	135.87 \pm 0.12	136.05 \pm 0.13	135.96 \pm 0.09
Heart girth	169.0 \pm 0.14	168.8 \pm 0.14	168.91 \pm 0.10
Horn length	119.06 \pm 0.10	119.23 \pm 0.10	119.14 \pm 0.07
Ear length	21.67 \pm 0.10	21.81 \pm 0.10	21.74 \pm 0.07
Neck length	47.10 \pm 0.13	47.17 \pm 0.14	47.14 \pm 0.09
Tail length	98.50 \pm 0.07	102.20 \pm 0.10	100.31 \pm 0.06
Facial length	44.36 \pm 0.09	45.51 \pm 0.09	44.75 \pm 0.07
Cannon length	26.39 \pm 0.07	26.49 \pm 0.05	26.44 \pm 0.04
Pelvic width	41.14 \pm 0.06	42.37 \pm 0.08	41.54 \pm 0.06
Dewlap width	19.64 \pm 0.05	19.71 \pm 0.10	19.68 \pm 0.05
Perpetual sheath	11.97 \pm 0.04	12.34 \pm 0.08	12.05 \pm 0.04

N=Sample respondents

Table 6: Linear measurements of female Begait cattle

Parameters	Kafta Humera district		
	Maycadra (N=52)	Bereket (N=52)	Total (N=104)
	Mean \pm SE	Mean \pm SE	Mean \pm SE
Height at wither	131.36 \pm 0.35	131.68 \pm 0.36	131.48 \pm 0.25
Body length	127.86 \pm 0.22	128.4 \pm 0.22	128.13 \pm 0.16
Heart girth	157.17 \pm 0.33	159.92 \pm 0.34	159.55 \pm 0.24
Horn length	18.47 \pm 0.46	18.27 \pm 0.52	18.37 \pm 0.34
Ear length	21.10 \pm 0.17	21.01 \pm 0.13	21.06 \pm 0.11
Neck length	45.08 \pm 0.38	44.33 \pm 0.39	44.70 \pm 0.27
Tail length	97.37 \pm 0.52	97.95 \pm 0.53	97.66 \pm 0.37
Facial length	43.09 \pm 0.11	42.89 \pm 0.1	42.99 \pm 0.07
Cannon length	25.88 \pm 0.33	25.07 \pm 0.34	25.47 \pm 0.24
Pelvic width	40.31 \pm 0.44	39.61 \pm 0.44	39.96 \pm 0.31
Dewlap width	18.57 \pm 0.33	18.63 \pm 0.36	18.60 \pm 0.24
Teat length	4.90 \pm 0.05	5.29 \pm 0.03	5.09 \pm 0.03
Naval flap length	6.00 \pm 0.1	6.04 \pm 0.1	6.02 \pm 0.07

N=Sample respondents

As shown in table (5, 6) the animals sampled in the study sites had similar average body measurements. The similarities in measured values were, most likely, due to the likeness in breeding methods and absence of a strong genetic effect from other breeds in the study areas. Male animals, however, had greater body measurements when compared to females. This result was in accordance with (Dessalegn, 2012) who reported that males Arrado cattle have better body measurements than females.

Purposes of Keeping Begait Cattle

Knowledge of reasons for keeping animals is prerequisite for deriving operational breeding goals (Rewe *et al.*, 2006). The result of this survey revealed that Begait cattle play multi-functional roles in the study area. Based on the ranking of purposes for keeping Begait cattle (Table 7), it was observed that farmers keep these animals for reproduction, milk production, income source, draft power, meat, manure and social value,. Most farmers in the study areas keep Begait cattle primarily for breeding purpose followed by milk production. This indicates the importance of inclusion of breeding and milk production in any breeding programme aimed at Begait cattle in the study area. This finding is in line with the work in Kenya (Rege *et al.*, 2001) and in the Sudan (Musa *et al.*, 2005) indicated that indigenous zebu cattle are multipurpose animals. These results are different with results of a study conducted in western Showa by (Jirenga, 2007) and Horro district by (Agere, 2008).

Within the study area, cattle are a direct source of income, which is realized by exchanging cattle for cash. This in turn is used to purchased goods and services ranging from food items, clothing, medication and school fee to the purchase of breeding stock and agricultural inputs for crop production. As more and more farmers send their children to school, the use of cattle as a source of income is bound to play a greater role in the future generation.

The use of cattle as a source of draft power is still very low because majority of the farmers use tractors for ploughing their land. But the importance of draft animal technology is expected to increase in the future as the farm size getting smaller due to population growth. Begait cattle are also used as a source of manure and manure is used mainly as a fertilizer. Functions like source of meat for consumption rank relatively low among the reasons of keeping Begait cattle. This could be mainly because cattle are slaughtered during specific occasions and functions such as weddings, funerals, religious festivity and cultural festivals when rare slaughter of animals is conducted outside these days. For home consumption the majority of households preferred to slaughter small ruminants and chickens or to purchase beef from local butcherries rather than to slaughter cattle.

The survey also revealed that the production objectives of farmers in mixed production system include not only marketable products such as milk, generation of income from sale of live animal and butter, hide and meat, but also non-marketable functions such as draught power, manure, and socio-cultural services.

Table 7: Ranking of the purpose of keeping cattle at Kafta Humera District

Parameters	Kafta Humera District							
	Maycadra (N=52)				Bereket (N=52)			
	Rank1	Rank2	Rank3	Index	Rank1	Rank2	Rank3	Index
Breeding purpose	69.2	28.9	1.9	0.4455	75	23.1	1.9	0.4615
Milk production	26.9	65.4	5.8	0.3622	19.2	53.8	23.1	0.3141
Income source	3.8	5.8	59.6	0.1378	5.8	21.2	57.7	0.1955
Draught power	0	0	21.2	0.0351	0	1.9	7.7	0.0192
Meat production	0	0	5.8	0.0096	0	0	5.8	0.0032
manure	0	0	3.8	0.0064	0	0	1.9	0.0032
Social values	0	0	1.9	0.0032	0	0	1.9	0.0096

N=Sample respondents

Reproductive and Productive Performance

The important parameters that determine cattle reproductive and productive efficiency are age at first service, age at first calving, total milk yield, average milk yield per day and calving interval (Dematawawa and Beger, 1998). Reproductive performance of Begait heifers, cows and bulls are presented in Table 8. The mean age at sexual maturity in this study is 38.1 months for male and 35.51 months for female Begait cattle. The present finding is also lower than 55.6 and 57 months reported for Semien and Wegera female cattle (Zewdu, 2004), respectively. This variation may be due to different feeding management and genetic makeup of the different cattle breeds. The management factor especially nutrition determines pre-pubertal growth rates and reproductive development of (Masama *et al.*, 2003). The better-managed and well-fed heifers grew faster, served earlier and resulted in more milk and calves produced during the lifetime of the animal.

Mean age at first calving (AFC) for Begait breeding female in the present study was 48.68 months. This was not longer than AFC of some indigenous cattle types reported by different authors. (Takele, 2005) reported 54.1 months for Sheko breed whereas, (Dereje, 2005) reported 53.1 months for Raya-Sanga cattle. The differences in the reproductive performance of indigenous cows reported by the different researchers might be attributed to the differences in nutritional and reproductive managements among the smallholder cattle keepers in different parts of the country.

Table 8: Reproductive performance of Begait cattle at Kafta Humera District

Parameters	Kafta Humera district			
	Maycadra (N =52)	Bereket(N =52)	p-value	Total(N=104)
	Mean ±SE	Mean ±SE		Mean ±SE
Age at puberty in male(month)	37.6±0.20	38.6±0.26	0.003**	38.1±0.17
Age at puberty in female(month)	35.08±0.14	35.94±0.23	0.002**	35.51±0.14
Age at first calving (month)	48.04±0.18	49.33±0.23	0.000**	48.68±0.16
Calving interval(month)	17.10±0.15	17.02±0.16	0.722 ^{Ns}	17.06±0.11
Life time productivity(year)	8.06±0.09	8.35±0.1	0.032**	8.20±0.07

N=Sample respondents; Ns=Non-significant (P > 0.05); **=significant (P < 0.05); SE=standard error

Milk production performance

The mean daily milk yield, lactation length and lactation milk yield of Begait cattle were 2.52 liters, 6.38 months and 482.95 liters, respectively (Table 9). There was no significant difference (P>0.05) among the villages of Maycadra and Bereket for the mentioned parameters. The daily milk yield for Begait cattle is higher than the report from extensive livestock breed survey done in Oromia Regional State with average daily milk yield of 1.4 liters (Workneh and Rowlands, 2004) and report on-farm daily milk yield of 1.8 and 1.9 liters per day for Raya Sanga and Wello highland zebu cattle (Dereje, 2005).

Table 2 Productive performance of Begait cattle at Kafta Humera District

Villages	Kafta Humera District					
	DMY		LL		LMY	
	N=52	Mean±SE	N=52	Mean±SE	N=52	Mean±SE
Maycadra		2.5±0.04		6.40±0.04		479.99±8.624
Bereket		2.54±0.04		6.36±0.04		485.95±8.565
<i>p-value</i>		0.428		0.491		0.638
		NS		NS		NS
<i>Total</i>		2.52±0.03		6.38±0.03		482.95±6.24
Parity						
First parity		2.36±0.4497 ^a		5.67±0.0577 ^a		401.56±8.4408 ^a
Second parity		2.50±0.5222 ^{ab}		5.88±0.0440 ^b		441.58±10.5521 ^b
Third parity		2.65±0.4194 ^b		5.83±0.0400 ^c		467.56±9.0225 ^c

N=Sample respondents; variables with the same letter are not significant; SE=standard error and NS=non-significant. DMY=daily milk yield, LL=lactation length and LMY=lactation milk yield

Breeding System and Selection

The most common breeding system in the study area was natural pure-breeding using selected bulls. Most farmers were forced to allow their heifers/cows to natural uncontrolled mating because of restricted land sizes and the lack of enough resources to demarcate the grazing grounds to facilitate separation of male and female animals. An advantage of natural uncontrolled mating is that it allows for all year round supply of milk. In systems characterized by seasonal availability of feeds, calving throughout the year is a disadvantage, especially when calving occurs during a time when feed is scarce. At such time, the dam is under nutritional stress leading to low milk yield, slow growth rates of calves and low calf survival rates.

The bases of selection of breeding animals were based on quantitative and qualitative traits. Much emphasis was put on breeding potential, milk production, body size and physical appearance for selecting breeding animals. Large animals were preferred as they provided better draft power and higher milk yields, fetched better market prices, had better growth rates and reached market weights sooner. Physical appearance and coat color were valued but this could be due to more aesthetic reasons than economic considerations.

The ranking of important traits for selecting breeding males and females in the two agro-ecological zones as perceived by farmers are summarized in Table 10. Traits like breeding potential, body size, physical appearance, coat color and hump size were all considered as important in both of the study areas and were given due emphasis in selecting breeding bulls (Fig. 2).



Figure 2: Male Begait cattle



Figure 1: Female Begait cattle

High breeding and milk potential, large body size, good physical appearance, white with black coat color, big hump size and pedigree are the most preferred traits by most of the farmers in the area. The preference of farmers for a particular coat color might be associated with social and cultural practices, market demand and environmental adaptation. Pedigree and temperaments were given relatively little emphasis in selecting breeding bulls. Breeding

potential, milk yield, Body size, mothering ability and physical appearance were the most highly rated traits in selecting breeding females (Fig. 3) in the study area.

Udder size, pedigree and coat color were slightly considered in selecting breeding female. Generally, farmers give special emphasis on production and reproduction traits in selecting of female and male animals. Most of the selection criteria used for Begait breeding animals was also reported for Raya-Sanga and Wello highlands breeds (Dereje, 2005) and for Sheko breed (Takele, 2005). Generally, breeding programs should be geared towards top ranked functional traits and management practice such as better feeding and management practices that go in line with genetic improvement programs.

Communal grazing area is the main source of feed for breeding bull in the study area. Different bulls and female animals stay mixed in the communal grazing area. Thus, most farmers did not know which sire mate their heifer/cow. Sometimes they guess the sire based on coat color of the calf. Sharing communal grazing lands could potentially help to minimize the risk of inbreeding through the use of unrelated breeding bulls from the sub-population.

Cattle owners in the study areas have developed a culling mechanism for maintaining the desired quality of their animals. Primary reasons for culling animals from the herd were old age, reproductive failure, and reduction of production performance, health problems, need for some cash for household use and need for slaughtering.

Table 3: Ranking on selection criteria for breeding male and female Begait cattle

Selection of	Kafta Humera District									
	Maycadra					Bereket				
	Rank 1	Rank 2	Rank 3	Rank 4	Index	Rank 1	Rank 2	Rank 3	Rank 4	Index
Breeding male										
Body size	67.3	25.0	7.7	0	0.3596	78.8	21.2	0	0	0.3212
Physical appearance	26.9	71.2	1.9	0	0.3250	13.5	59.6	26.9	0	0.2865
Coat color	5.8	3.8	65.4	25.0	0.1903	7.7	9.6	42.3	25.8	0.1500
Hump size	0	0	23.1	48.1	0.0942	0	9.6	23.1	53.8	0.1288
Pedigree	0	0	1.9	15.4	0.0192	0	0	7.7	15.4	0.0308
Horn	0	0	0	7.7	0.0077	0	0	0	3.8	0.0038
Other qualitative traits*	0	0	0	3.8	0.0038	0	0	0	1.9	0.0019
Breeding female										
Fertility	73.1	26.9	0	0	0.3731	84.6	15.4	0	0	0.3846
Milk production	26.9	73.1	0	0	0.3269	15.4	84.6	0	0	0.3154
Body size	0	0	88.5	5.8	0.1827	0	0	92.3	1.9	0.1865
Mothering ability	0	0	0	38.5	0.0385	0	0	0	38.5	0.0385
Physical appearance	0	0	11.5	21.2	0.0442	0	0	7.7	19.2	0.0346
Pedigree	0	0	0	15.4	0.0154	0	0	0	13.5	0.0135
Coat color	0	0	0	7.7	0.0058	0	0	0	11.5	0.0135
Udder size	0	0	0	5.8	0.0077	0	0	0	11.5	0.0115
Other qualitative traits**	0	0	0	5.8	0.0058	0	0	0	3.8	0.0038

* Other qualitative traits include extended dewlap, long neck, long tail, long prepuce, and temperament.

** Other qualitative traits include extended dewlap, long neck, long tail, temperament, and long navel flap.

Feeding management

Poor nutrition is one of the major problems affecting livestock productivity in the tropics. This is normally reflected in reduced live weight, greater age at first parturition, increased calving intervals, prolonged non-productive life and high mortalities. In the study area, natural pasture is the major feed resource and its utilization is through continuous grazing. Feed conservation is commonly practiced in the form of crop residues and hay (Fig. 4). These conserved feed are fed to animals during the dry season. Supplementation of the Begait cattle using high energy and protein concentrates is rarely practiced. Equally rare is the provision of mineral licks as part of cattle diet.

The major livestock feed resources identified in the study area were natural pasture, crop residue, aftermath grazing, fallow land grazing, household kitchen waste and local beer

byproduct called “*Atala*”. Natural pasture was the main feed resource that support livestock in the study area during the cropping season, whereas crop residues are the major feed in the dry season as crop production is highly practiced by the community. The main crop residues used as animal feed are sorghum stover, sesame straw and sesame bran. Sorghum stover contributes more for livestock feed as compared to other crop residues.



Figure 4: Traditional hay making

Calves are supplemented with green grass during the first two-month until they mature enough to graze on natural pasture around homesteads and on private fallow land. Relatively less attention was given to small ruminants with respect to feeding. This is due to the perception that small ruminants had better capability and feeding habit to survive on overgrazed lands as compared to large ruminants.

Health Management

Table 11 shows diseases that appear to cause most problems in the study area. Animal health management is a very insignificant practice characterized by low levels of inputs. The conventional control measures, such as spraying with acaricide and use of traditional herbs are being employed by farmers, although sometimes in the wrong way. Vaccination is rarely administered through the office of agriculture and animals normally survived in the locality. The overall incidence of these diseases was rather low, which could indicate low susceptibility and relatively better immune- responsiveness to various infections.

The frequent intermingling of different groups of animals in the utilization of common resources provides ideal opportunities for the extensive spread of infectious diseases and parasites. The exposure of livestock to wildlife, which is common in the study area, provides opportunities of contagious diseases spread. Wildlife species act as the major hosts and as reservoirs for these infectious diseases.

In the study area, it was evident that farmers were aware of some degree of tolerance to the common diseases existing with Begait cattle. Breeding for disease resistant or tolerant animals has attracted considerable research and development attention all over the world. Development of breeds of livestock that are considered to be disease resistant or tolerant is important to reduce the reliance on chemicals, which end up in animal products and on pastures. A near unanimous response from farmers in all districts showed that heat tolerance of the Begait cattle was considered as preferred trait in breeding.

Cattle Production Constraints

Consideration of the relative significance of the different constraints for cattle production is basic priority to beginning any genetic improvement program. Ranking of cattle production constraints in the study area is presented in Table 12. Among the constraints feed shortage, diseases and water shortage were considered as the most important problems ranked first, second and third with different index values, respectively.

Table 11: Ranking of disease prevalence at Kafta Humera District

Disease and parasite	Kafta Humera District									
	Maycadra					Bereket				
	Rank1	Rank2	Rank3	Rank4	index	Rank1	Rank2	Rank3	Rank4	index
Diseases										
Trypanosomosis	48.08	36.54	15.38	0	0.3327	53.85	19.23	26.9	0	0.3269
Pasteurellosis	40.38	48.08	11.54	0	0.3288	28.85	63.46	7.7	0	0.3211
Anthrax	11.54	15.34	65.38	5.8	0.2288	17.3	9.6	59.6	13.46	0.2307
Black leg	0	0	7.7	69.23	0.0846	0	7.7	5.8	57.69	0.0923
Foot and mouth disease	0	0	0	11.54	0.0115	0	0	0	5.8	0.0057
Mastitis	0	0	0	3.8	0.0038	0	0	0	17.3	0.0173
Parasite										
External parasite	0	0	0	5.8	0.0057	0	0	0	3.8	0.0038
Internal parasite	0	0	0	3.8	0.0038	0	0	0	1.9	0.0019

This study revealed that in both areas farmers stressed the lack of livestock feed to be the most important limiting factor for productivity of their cattle, and indicated the importance of improving their feeding regime as an essential step towards any improvement program. Communal grazing is the most important feeding system in the area. However, communal grazing land is decreasing from year to year due to expansion of crop fields, over grazing and human population growth. Seasonal scarcity of livestock feed was mentioned as one of the critical problems in cattle production in the area. In addition, during the dry season both quantity and quality of the pasture herbage decline and fail to meet nutrient requirements for good performance. Therefore, introduction of suitable multipurpose trees, fodder trees, improved forage species and grasses can be integrated into crop-livestock production practices. In addition grazing land management, crop residue treatment, other supplements available in the area and forage development strategy should be given due attention to improve the situation.

Table 12: Ranking of Begait cattle production constraints at Kafta Humera District

Parameters	Kafta Humera District							
	Maycadra				Bereket			
	Rank1	Rank2	Rank3	Index	Rank1	Rank2	Rank3	Index
Feed shortage	88.46	3.85	1.92	0.4583	78.85	11.54	9.62	0.4487
Health problem	1.92	61.54	25.0	0.2564	5.77	76.92	17.3	0.3141
Water scarcity	3.85	17.30	51.92	0.1635	5.77	3.85	50.0	0.125
Market problem	3.85	15.38	13.46	0.0929	3.85	3.85	17.3	0.0609
Theft	1.92	1.92	7.69	0.0289	5.77	3.85	5.77	0.0513

CONCLUSION AND RECOMMENDATIONS

Begait cattle are kept in a mixed crop-livestock production system and they play multi-functional roles in this production system. The productive and reproductive performance of Begait cattle excels that of other zebu cattle in the country. It is often characterized by early puberty, early maturity and short calving interval resulting in high fecundity rates and high milk yield. In addition, the breed may be considered as one of the few capable of surviving under extreme conditions in which their exotic counterparts would be unable to survive, let alone produce.

Population statistics of the breed indicate that it is endangered and on the verge of extinction. There is, therefore, an urgent need that measures be taken to prevent the loss of this potentially valuable genetic material. Cattle owners stressed the lack of livestock feed to be the most important limiting factor for productivity of their cattle, and indicated the importance of improving their feeding regime as an essential step towards any improvement program. In general, from the current study it could be concluded that Begait cattle are the

sole source of breeding and milk production in the study area, and they have potential for greater contribution through better feeding, health management and genetic improvement.

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