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Original Research

Comparison of Small Scale and Large Scale Farms Husbandry Practices of Begait Cattle in Western Zone of Tigray Region, Ethiopia

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Abstract

The aim of this study was to assess the current status of Begait cattle and characterise their husbandry practices. Data collection tools involved rapid appraisal, farm visits, individual farm interviews, and focus group discussions. Primary data were collected from a total of 117 small-scale farms and 63 large-scale farms and analysed using SPSS version 20. The total Begait cattle population is estimated to be 42,000, and they constitute about 40.6% of the total cattle population in the study area. Calculated annual sampled herd dynamics figures revealed a net decline of the population over the previous year, and Begait cattle numbers had been declining over the past five years. Seasonal feed scarcity due to shrinking rangelands was identified as the most serious challenge for Begait cattle production. The most preferred trait of Begait cattle by both small and large farms was milk yield, followed by early growth rate. It was, therefore, recommended that a comprehensive Begait cattle breed management plan be developed. Further research and policy attention are necessary. Dairy traits of this breed also need to be closely investigated to build up on the finding that milk yield of the breed is the most preferred trait.

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INTRODUCTION

The Ethiopian Institute of Biodiversity Conservation (IBC) identified Begait cattle as one of the nationally recognised indigenous cattle breeds of Ethiopia (IBC, 2004). They are Zebu-type cattle reared for milk and beef (Zerabruk *et al.*, 2007; DAGRIS, 2014). They are maintained by the Men-Amir tribes in the lowlands of Eritrea and neighbouring regions of Sudan and Ethiopia (DAGRIS, 2014). Poor health services and feed shortages are the main constraints that restrain livestock production in Ethiopia (Ibrahim & Olaka, 2000). However, adaptation to harsh climatic conditions, the ability to better utilise the limited and poor-quality feed resources, and tolerance to a range of diseases make indigenous livestock breeds like the Begait cattle in Ethiopia valuable genetic resources (DAGRIS, 2014).

Nowadays, Begait cattle are largely owned by small- and large-scale farms, though very few are kept under Humera research and Humera ranch. Begait cattle in Ethiopia are recognised as stress-tolerant, specifically heat-tolerant, and well adapted to the lowland agro-ecology of the Western Zone of Tigray Region, Ethiopia. They contribute much to the economic and social development of the communities in the western zone of Tigray Region, Ethiopia. However, only limited and fragmented information is available about the status of the breed

and the prevailing husbandry practices, except that of Mulugeta and Brhan (2015) on small-scale farms. Informal reports indicated that the geographical distribution of true Begait cattle has been shrinking from time to time, and the population number is declining. This research work was intended to generate information on the current geographical distribution and status of the breed in Western Zone of Tigray Region, Ethiopia, to compare husbandry practices in small-scale and large-scale farms, and to identify current challenges and opportunities for Begait cattle kept on large and small farm types.

Materials and Methods

Study area description

This study was conducted in Kafta Humera and Setit Humera districts in the Western Zone of Tigray Regional State, Ethiopia. The study area is located 600 km north-west of Mekelle city and 954 km north-east of Addis Ababa. Both Kafta and Setit Humera districts lie 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 range of 515 to 1863 metres above sea level. The average annual rainfall of the districts is 449 to 1100 millimetres (Kafta Humera District OoARD, 2015, unpublished); they are characterised by mean maximum temperatures of 33^{o}C to 41.7^{o}C and 17.5^{o}C to 22.2^{o}C of mean minimum temperatures (Niguse & Aleme, 2015).

Sampling techniques and sample size

Six samples of Kebeles were selected purposefully from 21 Kebeles of Kafta Humera and 4 Kebeles of Setit Humera. The Kebeles were selected on the basis of having a relatively large population of Begait cattle. Random sampling was used to select small-scale farms from the sampling frame of Begait cattle population owners (3839) in the Kebeles, but the 63 large-scale farms were involved purposefully. A total of 117 small-scale farm respondents were sampled for the household interview.

Data collection

Field data collection was carried out from October 2015 to February 2016. Semi-structured questionnaires and focus group discussions were used to collect primary data. One focus group discussion, comprised of 11 members, was held in each kebele. Owners trait preferences to the breed, mating practices, culling criteria, population trend and geographical distribution, purpose of keeping, feeding and feed supplementation practice, watering, housing, diseases and ectoparasites, and challenges and opportunities were the types of data collected.

Data analysis

The data were analysed by SPSS software version 20 (SPSS, 2012). But rankings of economic contribution of livestock species to households, purposes of keeping Begait cattle, diseases and external parasites, trait preferences of Begait cattle owners, culling criteria of male and female breeding Begait cattle, Begait cattle production challenges, and production opportunities were calculated by aggregate indices as follows:

Index = sum of (3 x number of households who ranked first + 2 x number of households who ranked second + 1 x number of households who ranked third) given for each variable divided by sum of (3 x number of households who ranked first + 2 x number of households who ranked second + 1 x number of households who ranked third) for all variables.

RESULTS

Household attributes of Begait cattle keepers, Current geographical distribution, population trend, and status of Begait cattle in Western Tigray.

An initial rapid appraisal of the current geographic distribution of the Begait cattle was conducted in 21 Kafta Humera and 4 Setit Humera villages, where a household knock count of these animals led to an estimated total population of true Begait cattle of about 42,000. These constitute 40.6% of the total cattle population in the two districts, with the rest of the cattle being of the Arado breed of cattle and crosses of the Begait with the Arado and the Holstein Friesian. The total population of the crossbreds with the Arado and Holstein Friesian cattle in these Kebeles was estimated to be about 15,000 heads.

Focus group discussions and key informant interviews revealed that local knowledge on the origins of today's Begait cattle population in Western Tigray indicated multiple routes and identified Eritrea (Gash-Barka), Sudan (Kessela),

and both Eritrea and Sudan as original sources. Perhaps the original cattle populations were attracted by the rich rangelands of Northwestern and Western Tigray, Ethiopia. Numerically more Arado-type cattle than Begait cattle are present in the current home areas of the Begait cattle.

Table 1

Reported current cattle population estimates by breed type and Kebele (2016)

No.	Kebele	Cattle breed type and population									
		Begait Cattle		Arado Cattle		BxA Cattle		HF Cattle		HFxB Cattle	
		Pop.	Prop.	Pop.	Prop.	Pop.	Prop.	Pop	Prop	Pop.	Prop
1	May Keyih	424	1.0	536	1.1	1234	8.6	0	0.0	0	0.0
2	Habesha Adi Goshu	4000	9.5	5500	11.8	0	0.0	0	0.0	0	0.0
3	Kunama Adi Goshu	1049	2.5	78	0.2	1	0.0	0	0.0	0	0.0
4	May weini	2023	4.8	5080	10.9	3228	22.4	3	7.3	0	0.0
5	Wuhdet	1332	3.2	0	0	2375	16.5	0	0.0	0	0.0
6	Hagere Selam	1650	3.9	1275	2.7	110	0.8	0	0.0	0	0.0
7	Adebay	4061	9.7	983	2.1	91	0.6	2	4.9	1	0.3
8	Hilet coca	317	0.75	0	0	53	0.4	0	0.0	0	0.0
9	Rawian	7989	19.0	104	0.2	694	4.8	0	0.0	0	0.0
10	Central	295	0.70	30	0.1	0	0.0	0	0.0	0	0.0
11	Bereket	1531	3.6	72	0.2	193	1.3	0	0.0	0	0.0
12	May Cadra	7208	17.1	341	0.7	802	5.6	8	19.5	63	17.5
13	Baeker	4115	9.8	2120	4.5	2075	14.4	8	19.5	5	1.4
14	Aydolla	962	2.3	882	1.9	1104	7.7	0	0.0	236	65.7
15	Shiglill	198	0.5	2253	4.8	31	0.2	0	0.0	0	0.0
16	Tirkan	895	2.1	2500	5.4	500	3.5	0	0.0	0	0.0
17	Europe	33	0.1	475	1.01	0	0.0	0	0.0	0	0.0
18	Ruwassa	470	1.1	4479	9.6	342	2.4	3	7.3	0	0.0
19	Adi Hirdi	676	1.6	961	2.1	919	6.4	10	24.4	20	5.6
20	Adi Tsetser	42	0.1	5640	12.1	0	0.0	2	4.9	0	0.0
21	Solla	996	2.4	13,348	28.6	0	0.0	0	0.0	0	0.0
22	Setit Humera	1775	4.2	0	0	660	4.6	5	12.2	32	8.9
	Total	42,041		46,657		14,412		41		359	

Source: Cattle inventory in 2016, [Total cattle population= 103,510]

Pop.= population, Prop.= Proportion, BxA= Begait X Arado**,** HFxB= Holstein Fresian X Begait, Proportions are determined in percent.

Both small-scale and large-scale farms reported that the numbers of Begait cattle had been decreasing over the past five years (Table 2) due to different production challenges. In the calculated herd dynamics of Begait cattle in 2015 in small and large Begait cattle farms, cattle entries to herds were mainly due to birth (Table 3). In 2015, cattle sales were higher on large farms than on small farms. As indicated in Table 3, under both farm types, Begait cattle disposal (reduction) was higher than total entry during the same year, indicating a net decline of the Begait breed population during 2015. This revealed declining population trend of the true Begait cattle type, coupled with the earlier report on the general breed population decline of the breed, confirms that the breed status of the Begait cattle is a source of concern.

Table 2

Reported trend in local population of Begait cattle over the last five years by farm type

Herd trend	Farm type				Total (N=180)	
	Large farms (N=63)		Small farms (N=117)			
	N	%	N	%	N	%
Increasing	17	27.0	28	23.9	45	25.0
Decreasing	41	65.1	83	71.0	124	68.9
Stable	5	7.9	6	5.1	11	6.1

Table 3

Reported aggregate herd dynamics of sample Begait herds in 2015 by farm type

Type of entry / disposal	Large farms (N=63)	Small farms (N=117)	Percent	
			Large farms (N=63)	Small farms (N=117)
Birth	1224	618	98.7	97.0
Purchase	16	19	1.3	3.0
Total entries (a)	1240	637	100	100
Sale	1251	533	77.4	68.3
Death	321	177	19.9	22.7
Theft	24	46	1.5	5.9
Loss to predators	21	24	1.3	3.1
Total disposals (b)	1617	780		
Net (a-b)	-377	-143		
Average herd size	90.08	24		
Net change per household	-5.98	-1.22		
Net change as share of average herd	-4.19	-5.96		

The mean family size of small-scale farms was 6±2 heads, compared to 8±2 heads for large-scale farms. The major livestock species raised on both large and small farms were sheep, goats, and cattle. The mean herd size of Begait cattle on the large Begait farms was 90±31 heads, compared to 24±17 heads on the small farms (Table 4). The proportion of cattle breed types under large-scale farms was 93.3% Begait cattle, 2.7% Arado cattle, and 4.4% Begait and Arado crossbred cattle, whereas for small farms it was 89.8% Begait cattle, 2.9% Arado, 0.2% Holstein Friesian, 0.4% Holstein Friesian and Begait cattle crossbred, and 6.6% Begait and Arado crossbreds. Therefore, large farms owned slightly larger proportions of Begait cattle than small farms, and large farms did not introduce Holstein Friesian cattle and their crossbreds to their herds.

Table 4

Characteristics of sample farm households by farm type

Household attributes	Farm type		Statistical test of differences (P Value)
	Large farms (N=63) Mean ± SD	Small farms (N=117) Mean ± SD	
Age of respondent	57±12	53±11	0.020
Family size	8±2	6±2	0.000
Land holdings (ha)	261.8±188.3	15.8±23.1	0.000
Total cattle holdings	97±36	27±18	0.000
Begait cattle (B) (number)	90±31	24±17	0.000
Arado cattle (A) (number)	28±21	7±4	0.003
HF (number)	0	2±1	-
HF x B crossbreds (number)	0	2±2	-
B x A crossbreds (number)	27±10	12±9	0.001
Sheep holdings (number)	207±103	33±25	0.000
Goats holdings (number)	108±64	23±19	0.000
Chickens holdings (number)	38±20	11±11	0.000
Donkeys holdings (number)	2±1	2±2	0.367
Tropical livestock units (TLU)	96±33	23±14	0.000

SD= Standard Deviation

Purposes of keeping Begait cattle

As shown in Table 5, the purposes of keeping Begait cattle on large and small farms were different. The primary purpose of keeping Begait cattle on large farms was breeding and selling, and that of small farms was milk production.

Table 5

Reported ranking of purposes of keeping Begait cattle by farm type

Purposes of keeping	**Large farms**				**Small farms**			
	R1	R2	R3	Index	R1	R2	R3	Index
Meat	0	0	2	0.007	0	4	22	0.047
Milk production	6	32	0	0.299	69	40	3	0.474
Laughing	0	2	3	0.026	1	8	25	0.069
Manure source	0	0	1	0.004	0	0	3	0.005
Breeding and selling	57	5	1	0.664	47	60	6	0.405

Relative importance of Begait cattle to their keepers

In both large and small-scale cattle farms, Begait cattle were the most important livestock species to their owners

Table 6

Reported ranking of relative importance of livestock species by farm type

Livestock species	Large farms				Small farms			
	R1	R2	R3	Index	R1	R2	R3	Index
Begait Cattle (B)	42	17	4	0.461	97	10	7	0.485
Arado cattle (A)	0	1	1	0.008	0	2	6	0.015
HF cattle	0	0	0	0.000	1	0	0	0.005
HF x B crossbred	0	0	0	0.000	1	1	1	0.009
B x A crossbred	2	0	1	0.020	3	8	4	0.044
Sheep	18	29	7	0.334	6	42	12	0.174
Goats	11	1	12	0.132	3	7	23	0.070
Chickens	0	3	6	0.034	2	8	19	0.063
Donkeys	0	1	2	0.011	3	30	19	0.134

SHFs=smallholder farmers, R1= Rank 1, R2= Rank 2, and R3= Rank 3

Feeding and supplementation practices

Observations indicated that cattle feeding practices vary between farm types and include free grazing on natural pastures and supplementation with crop residues and some concentrates in the dry seasons of the year, all of which involve extensive modes of production. Begait cattle in Humera research and Humera ranch were additionally supplemented with commercial concentrates.

Feed preservation practices in both large and small Begait cattle farms were weak (Table 7). The major feeds preserved for cattle supplementation were sorghum residue, hay residue, and sesame residue. Feed scarcity was identified as the critical impediment to Begait cattle production in both large and small-scale farms. Nearly three-quarters (73.0%) of the large farms and 65.8% of the small-scale farm respondents reported that their cattle were exposed to feed scarcity during the dry seasons. Despite the general knowledge that improved forages are relatively better than local forages for cattle feeding, 98.4% of large farms and 97.4% of small-scale farm respondents did not cultivate improved forages. Nearly all (98.4%) of the large farms and 67.5% of the small-scale farm respondents reported that the major reason for not cultivating improved forage was inadequate extension support. Moreover, small-scale farms reported that there was a lack of land for forage production (15.4%).

Table 7

Reported frequency of use of feed reserves to supplement Begait herds by farm type

Preserved feed types used	Farm type					
	Large farms (N=63)		Small farms (N=117)		Total (N=180)	
	N	%	N	%	N	%
No feed harvesting	1	1.6	5	4.3	6	3.3
Sorghum residues	32	50.8	42	35.9	74	41.1
Sorghum residues and hay	21	33.3	55	47.0	76	42.2
Sorghum residues and sesame residues	4	6.4	4	3.4	8	4.5
Sorghum residues, hay and sesame residues	5	7.9	11	9.4	16	8.9

All of the large farms and 95.7% of the small-scale farm respondents supplemented their cattle with locally available feeds and some commercial (wheat and barley bran, cotton seed cake, and noug cake) feed supplements during the dry season of the year (Table 8). Cattle producers provide supplements for their animals. 61.9% of the large farms supplemented their animals using crop residues and sorghum grain, and 63.2% of the small farms supplemented their cattle with crop residues, sorghum grain, and *Ashera* (sesame oil extracted residue) (Table 8). Although the producers did not supplement their animals based on productivity, physiological status, age, sex, or weight, the practice of mass supplementation was common. Additionally, farmers practiced individual animal feeding for sick and emaciated animals to avoid competition from others.

Table 8

Frequency of reported feed supplements used in the dry season by farm type

Supplements	Farm type					
	Large farms (N=63)		Small farms (N=117)		Total (N=180)	
	N	%	N	%	N	%
No supplement	0	0.0	5	4.3	5	2.8
Crop residues, Sorghum grain and *Ashera*	7	11.0	74	63.2	81	45.0
Crop residues, Sorghum grain and *Hatella* and *Gillet*	0	0.0	17	14.5	17	9.4
Crop residues	2	3.2	4	3.4	6	3.3
Crop residues, Sorghum grain and Cotton seed cake	10	15.9	7	6.0	17	9.4
Ashera, Sorghum grain and Cotton seed cake	0	0.0	1	0.9	1	0.6
Crop residues, *Ashera* and *Hatella* and *Gillet*	0	0.0	1	0.9	1	0.6
Crop residues, Frusca (wheat bran) and Cotton seed cake	0	0.0	1	0.9	1	0.6
Crop residues, *Ashera*, and Frusca (wheat bran)	0	0.0	1	0.9	1	0.6
Crop residues, Frusca (wheat bran), and sorghum grain	3	4.8	6	5.0	9	5.0
crop residues and sorghum grain	39	61.9	0	0.0	39	21.7
Crop residues, Sorghum grain and Noug cake	1	1.6	0	0.0	1	0.6
Crop residues, Sorghum grain and barley bran	1	1.6	0	0.0	1	0.6

Water sources and watering frequency

Water is not easily available in the rangelands of Begait cattle, even during the wet season of the year. The main sources of water for both farm types in the dry season were water wells (Table 9). The large-scale farms (52.4%) and the small-scale farms (45.3%) reported travelling from one to five kilometres to the main water sources. The daily watering frequency of cattle varies from once a day to once every three days between large and small farms.

Table 9

Sources of drinking water, reported distance of watering points from homestead and frequency of reported cattle watering patterns during the dry seasons by farm type

Source of water	Farm type					
	Large farms (N = 63)		Small farms (N = 117)		Total (N = 180)	
	N	%	N	%	N	%
River	1	1.6	19	16.3	20	11.1
Water well	54	85.7	57	48.7	111	61.7
Piped	8	12.7	41	35.0	49	27.2
Watering points distance from homestead						
Homestead	5	7.9	7	6.0	12	6.7
<1 km	14	22.2	24	20.5	38	21.0
1-5 km	33	52.4	53	45.3	86	47.8
6-10 km	10	15.9	27	23.1	37	20.6
>10 km	1	1.6	6	5.1	7	3.9
Watering frequency						
Freely available	1	1.6	2	1.7	3	1.7
Once a day	21	33.3	58	49.6	79	43.9
Twice a day	40	63.5	52	44.4	92	51.1
Once in 3 days	1	1.6	5	4.3	6	3.3

Mating and reproduction practices

More than one-third (36.5%) of the large farms and 23.9% of small-scale farm respondents practiced crossbreeding in addition to pure breeding. Arado cattle were the major breed used for crossbreeding with Begait cattle. Only 5.1% of the small-scale farm respondents used Holstein Friesians for crossbreeding with Begait cattle. The remaining 63.5% of large farms and 76.1% of small-scale farm respondents used pure breeding using natural mating. The mating practices of the large and small farms were different (Table 10). Large farms used many bulls in a single herd, whereas small-scale farms used many bulls during grazing on communal pastures. Just more than a quarter (27.0%) of the large farms and 24.8% of the small farms used natural services with single sire. In addition to this, 6.3% of the large farms and 46.2% of the small farms reported that the sire (parent) of their calves was not known due to the problem of uncontrolled breeding. The use of artificial insemination (AI) was negligible; only 21.9% of the total artificially inseminated cows in 2015 in the study area led to birth (OoARD, 2015, unpublished annual report).

The majority (61.9%) of large farms and 64.1% of small farms reported that they did not castrate their bulls. The main reason was the early age (55.6% of the large farms and 56.4% of the small farms) of the sale of the bulls for the purpose of cash income and rarely to prevent inbreeding. The age of the castration of bulls was also different. The reasons for not castrating bulls in large farms were early sale (55.6%) and aggressive behaviour of bulls (1.6%), whereas in small-scale farms the same reasons were claimed by 56.4% and 6.0%, respectively. As indicated in Table 11, both large and small farms castrated their bulls between the ages of 2 and 3 years. Begait cattle owners reported different animal culling criteria. As shown in Table 12, for male cattle, the first male culling criterion of both large and small farms was body conformation, and the first female cattle culling criterion of large farms was milk yield of the cows, whereas that of small-scale farms was longevity of the cows.

Table 10

Frequency of reported mating practices used by farm type

Mating practices	Farm type					
	Large farms (N=63)		Small farms (N=117)		Total (N=180)	
	N	%	N	%	N	%
Natural service multiple sires	45	71.4	62	53.0	107	59.4
Natural service single sire	17	27.0	29	24.8	46	25.6
Natural service multiple sires and AI	1	1.6	8	6.8	9	5.0
Natural service single sire and AI	0	0.0	2	1.7	2	1.1
Natural service single sire and natural service multiple sires	0	0.0	16	13.7	16	8.9

Table 11

Frequency of reported ages of castration of bulls by farm type

	Farm type					
	Large farms (N=63)		Small farms (N=117)		Total (N=180)	
Age categories	N	%	N	%	N	%
Do not castrate	39	61.9	75	64.1	114	63.3
2-3 years and ≥6 years	4	6.3	11	9.4	15	8.3
2-3 years	9	14.3	10	8.5	19	10.6
4-5 years	6	9.5	2	1.7	8	4.5
2-3 years and 4-5 years	2	3.2	16	13.7	18	10.0
6 years and above	3	4.8	3	2.6	6	3.3

Table 12

Ranking of culling criteria of male and female breeding Begait cattle by farm type

No.	Traits	Farm type							
		Large farms				Small farms			
		R1	R2	R3	Index	R1	R2	R3	Index
For male cattle									
	Body weight	0	3	21	0.070	0	0	54	0.076
	Conformation	51	7	2	0.446	97	20	0	0.465
	Color	1	0	9	0.031	0	0	28	0.039
	Milk yield	8	44	7	0.311	20	97	0	0.357
	Longevity	1	2	12	0.050	0	0	28	0.039
	Walking speed	3	7	12	0.091	0	0	17	0.024
	For female cattle								
	Conformation	17	3	3	0.158	28	8	12	0.160
	Temperament	0	5	6	0.042	1	17	20	0.081
	Milk yield	20	12	24	0.284	29	45	43	0.313
	Longevity	6	9	13	0.129	52	27	20	0.328
	Fertility	11	22	14	0.239	4	18	15	0.090
	Walking speed	10	11	4	0.147	3	1	9	0.028

Trait preferences

Trait preferences of livestock producers are a basis for developing breeding strategies and programmes. Cattle have different preferred traits among their owners. As indicated in the table, the most important and preferred trait of Begait cattle ranked first by both large and small farms was milk yield. Large farms have a preference for the fast-walking speed of Begait cattle due to their ability to escape from thieves and predators and walk long distances in search of feed. Both large and small-scale farms reported that calves of Begait cattle grow relatively fast and reach maturity early to mark body weight and mating. Interestingly, 30.2% of the large farms and 41.9% of the small-scale farm respondents reported that Begait cattle have desirable traits. However, 44.4% of large-scale farms and 40.2% of small-scale farms reported that Begait cattle have undesirable traits due to their high susceptibility to drought. The second undesirable behaviour was being aggressive towardss their owners and particularly towardss other people. This behaviour, however, impresses some large and small farms as it helps prevent the animals from theft.

Table 13

Ranking of reported Begait cattle trait preferences of cattle owners by farm type

Traits	Farm type							
	Large farms				Small farms			
	R1	R2	R3	Index	R1	R2	R3	Index
Large body weight	2	6	9	0.071	6	18	51	0.150
Heat tolerance	0	0	6	0.016	1	1	14	0.027
Milk yield	35	22	5	0.407	90	18	9	0.449
Fast growth rate	8	28	16	0.254	7	70	20	0.258
Fertility	4	2	3	0.050	9	4	10	0.064
Walking speed	14	5	24	0.201	4	6	13	0.053

Housing, diseases, and parasites

Three-quarters (74.6%) of the large farms and 63.2% of the small-scale farm respondents did not use any housing for Begait cattle. Only 25.4% of large farms and 15.4% of small farms constructed simple fences to provide night enclosures (Table 14). Most of the cattle houses did not fulfil the requirement of protecting animals from the effects of weather elements; some farmers provided housing to prevent animals from damaging crop fields. The main reason that large farms (74.6%) did not have cattle houses was that cattle eat at night and take rest under large trees around watering points during the day. The same reason was reported by 46.2% of small-scale farms. Some small-scale farms have other reasons why they do not have cattle houses, which include a lack of adequate land (11.1%) and capacity (6%).

Economically important diseases and external parasites were reported by the owners. The majority (85.7%) of the large-scale farms and 65.0% of the small-scale farms were accessible to veterinary services, and 79.4% of the large farms and 42.7% of the small-scale farms used both government and private clinics. Only 4.8% of large farms and 16.2% of small farms relied only on government clinics. A third of the small farms and 14.3% of the large farms reported that they did not receive veterinary services. Small-scale farms did not use private veterinary clinics as an option due to insufficient financial capacity for what they regarded as expensive drugs.

Table 14

Frequency of reported housing types of Begait cattle

Housing type	Farm type					
	Large farms (N=63)		Small farms (N=117)		Total (N=180)	
	N	%	N	%	N	%
No house	47	74.6	74	63.2	121	67.2
Stall/shed	0	0.0	3	2.6	3	1.7
Yard	0	0.0	22	18.8	22	12.2
Simple fence	16	25.4	18	15.4	34	18.9

As presented in table 15, there were various Begait cattle diseases and external parasites in the study area. The top three cattle diseases were trypanosomiasis, bovine pasteurellosis, and foot and mouth disease under both large and small farms. These diseases were major setbacks in Begait cattle production. Almost all (96.8%) of the large farms and of small farm respondents (96.6%) reported that their cattle were affected by external parasites. The major parasites of Begait cattle in both farm types were ticks, tsetse fly and *lemesh* in that order of rank.

Table 15

Ranking of reported Begait cattle diseases and external parasites by farm type

Diseases	Farm type							
	Large farms (N=63)				Small farms (N=117)			
	R1	R2	R3	Index	R1	R2	R3	Index
Trypanosomiasis	31	16	12	0.363	53	24	30	0.342
FMD	6	14	10	0.149	12	27	21	0.149
Anthrax	2	9	12	0.072	6	18	16	0.082
Bovine Pasteurellosis	5	6	7	0.156	8	25	24	0.172
LSD	8	7	8	0.122	26	8	9	0.149
CBPP	8	10	5	0.088	5	3	10	0.045
Blackleg	3	1	8	0.050	6	11	3	0.062
External parasites								
Tick	38	15	5	0.407	66	29	13	0.403
Fleas	0	4	3	0.030	3	3	9	0.036
Hafew (mange mites)	0	4	5	0.036	10	14	9	0.100
Lemesh (Mosquito)	9	11	24	0.199	7	26	31	0.156
Tsetse fly	13	23	14	0.270	23	37	30	0.259
Nihibay (Biting flies)	1	4	9	0.055	4	2	15	0.046

Reported challenges and opportunities

As indicated in Table 16, the first challenge for small as well as large farms was rangeland and feed scarcity. Reported cattle production opportunities were very limited, and they were reported by only about 5% of the large farms and about a third of small-scale farm respondents (Table 17). Market demand was the first production opportunity ranked high by a few small-scale farms. Aggressive behaviour of Begait cattle was also considered an opportunity, as it makes them difficult to handle by people other than their owners and allows them to easily escape theft.

Table 16

Ranking of reported challenges of keeping Begait cattle by farm type

challenges	Farm type									
	Large farms (N=63)					Small farms (N=117)				
	R1	R2	R3	R4	Index	R1	R2	R3	R4	Index
Rangeland and feed scarcities	43	10	1	0	0.329	81	12	3	0	0.321
Theft	6	20	7	6	0.168	17	34	24	17	0.206
Lack of market demand	6	22	28	4	0.242	1	12	18	13	0.078
Land problem for housing	0	0	1	0	0.003	6	10	4	2	0.056
Water scarcity	0	1	4	16	0.044	1	23	24	13	0.118
EPI	0	0	5	17	0.044	0	1	4	29	0.035
IES	0	0	0	4	0.006	3	3	9	16	0.048

EPI= External Parasites Infestation, IES= Inadequate Extension Support

Table 17

Ranking of reported opportunities of keeping Begait cattle by farm type

Opportunities	**Farm type**							
	Large farms (N=63)				Small farms (N=117)			
	R1	R2	R3	Index	R1	R2	R3	Index
Market demand	1	0	0	0.500	30	12	3	0.430
Aggressive behavior	0	1	0	0.333	5	25	16	0.298
Access to rangeland	0	0	1	0.167	13	2	1	0.162
Access to vet	0	0	0	0.000	0	7	16	0.110

DISCUSSION

Focus group discussions reported that the origin of Begait cattle was linked to Eritrea, Sudan, or both Eritrea and Sudan, which contradicts the report of Mulugeta (2015) that most of the small-scale farmers, did not have any idea about the origin of Begait cattle. But it is in line with the report of Zerabruk *et al.* (2007) that the origin of Begait cattle was explained by 91% of the respondents in Sudan and 9% of the respondents in the lowlands of Eritrea.

Milk production was the primary purpose of keeping Begait cattle on small-scale farms, which disagrees with the report of Mulugeta and Brhan (2015) on the same breed and area. Furthermore, the present report revealed that draft power and manure were not among the major purposes of keeping Begait cattle, which is in contradiction with the report of Mulugeta and Brhan (2015) on the same breed. Reports by Goe (1987) and Gryseels (1988) on the draft power of oxen in Ethiopia are not similar to the findings of this study, which give more weight to breeding and selling for income generation and milk production. Begait cattle dung utilisation is not comparable with that of Fogera district cattle dung reported by Belete (2006) because 98.1% of respondents of Fogera district cattle owners used cattle dung as a source of fuel and the rest, 1.9%, used it for manuring. Purpose of keeping male Begait is also varies with the report of Workneh and Rowlands (2004) on male cattle in Oromia, but the purpose of keeping females in Oromia Region is the same with that of Begait cows. The purposes of keeping Begait cattle are not the same to the purposes of keeping Horro cattle reported by Agere *et al*. (2012) or that of Arsi cattle reported by Chali (2014), because Begait cattle are primarily used for milk followed by sales income.

The Begait cattle population has been on a decreasing trend in the last five years. This is consistent with the reports of Mulugeta (2015) and Zerabruk *et al*. (2007) on the same breed. The calculated net negative changes in cattle holdings

also confirmed the same trend. Most of the Begait cattle entry was due to birth, whereas the disposals were due to sale. The rate of entry agrees with the reports of Workneh and Rowlands (2004) on the cattle of Oromia Region (88%), and Chali (2014) on the Arsi cattle.

The proportion of small-scale Begait cattle farms that used their own-bred bulls (20.5%) and those that used AI (6.8%) differs from the reports of Mulugeta (2015) on the same breed and Belete (2006) on Fogera cattle. The observation that mating was uncontrolled and seasonal was similar to an earlier finding on the breed by Mulugeta (2015). The practice of uncontrolled mating on Begait cattle farms is also similar to the report of Workneh and Rowlands (2004) on Oromia cattle. As per the report of Agere *et al*. (2012) on Horro cattle, mode of control of mating, bull source, and sire identification of Horro cattle owners and small-scale farms of Begait cattle are similar, but the purposes of keeping bulls of the two breeds are different because Begait bulls are kept only for breeding. Owners of Arsi cattle used controlled mating (Chali, 2014), but owners of Begait cattle do not; Begait cattle have seasonal breeding whereas Arsi cattle are not seasonal, and there is a difference in the practice of record-keeping between Arsi cattle and Begait cattle owners. The practice of castration among Begait cattle owners is very poor compared to that of other indigenous breeds in Oromia Region (Workneh & Rowlands, 2004).

The most important challenges faced by small-scale Begait cattle farms in rangeland and feed scarcity, theft, and drinking water scarcity are similar to the challenges in other developing countries (Ibrahim & Olaloku, 2000). Expansion of crop cultivation and overgrazing were indicated as the major reasons for rangeland decline in the home of Begait cattle. Abdi *et al*. (2013) also reported similar challenges to local cattle in eastern Ethiopia. Takele *et al*. (2009) also identified similar challenges for Sheko cattle in southwestern Ethiopia, as did Chali (2014) for the Ethiopian Arsi cattle in the southern highlands and Agere *et al*. (2012) for Horro cattle production in western Ethiopia.

Conclusions and recommendations

The current geographical distribution of the Begait cattle is concentrated in the very few Kebeles of Kafta Humera and Setit Humera districts and is interspersed with the other local cattle breed, Arado. The current population estimate of Begait cattle is about 42,000, and it is in a decreasing trend. The key reasons for maintaining the Begait cattle under different farm types include breeding, sales income, and milk production. Begait cattle housing, feeding, and watering practices are extensive and of low cost, which leave the cattle population exposed to seasonal feed scarcity. Improved forage production is very rare on both large and small farms due to inadequate extension support. Natural mating with uncontrolled multiple sires is the dominant mode of reproduction.

The most preferred trait of Begait cattle by both small and large farms was milk yield, followed by early growth rate. Feed scarcity was identified as the most serious challenge for Begait cattle production.

1. Considering the declining population of true Begait cattle in the present-day home area of the breed and the shrinking rangelands in the area, there is a need for developing a comprehensive breed management plan covering both small and large Begait cattle farms. A community-based breeding programme should be practiced, covering not only the breeding aspect but also improved feed and nutrition, proper animal health practices, and the marketing system of Begait cattle.
2. Considering the overlapping habitat of Begait and Arado cattle and the large crossbred population between these and other breed types in the area, a closer follow-up investigation is recommended to more deeply understand the reasons behind interbreeding between the breeds with a view to developing an appropriate management plan that also takes account of the conservation needs of the other local breeds. Therefore, the biological and socio-economic values of each cattle breed in the community should be further studied to ensure sustainable utilisation of the different breeds.
3. The fact that milk yield is identified as the most preferred trait of Begait cattle is a vital

attribute of this breed, which is also well recognised outside the home area of the breed. This suggests that the dairy traits of the breed should be further studied with a view to effectively utilising this indigenous genetic resource within and outside the current home area of the breed. Therefore, further on-station and on-farm lactation performance evaluation of Begait cattle should be a critical concern for researchers.

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