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Characterization of Gofa Cattle Population, Production System, Production and Reproduction Performance in Southern Ethiopia

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Abstract

The study was carried out in Gamo Gofa Zone Demba Gofa and Zala Districts of southern Ethiopia. The objective of the study was to undertake Gofa cattle population characterization, and to study production system as well as reproduction performance. Two locations were selected; Demba Gofa and Zala districts. A total of 167 households were randomly selected to fill the structured questionnaire and a total of 420 mature cattle were sampled randomly for characterization of phenotypic traits. Data were collected through questionnaire, field observation; direct cattle body measurements of sample cattle population and secondary source. During data collection both male and female cattle were consider. The study result revealed that the average cattle herd size was found to be 10 ± 0.44 heads per household and were significantly different (P<0.01) between the two locations. According to elder and cattle owners, Gofa cattle population trend were in increasing (60.6%) and about 33.3% of respondents were reported Gofa cattle were in decreasing trend. cattle owner keep cattle primarily for milk production in both locations. Saving is the second most important reason to keep cattle. The major types of grazing land for cattle were found to be own grazing land and communal grazing land. The most common breeding system was herd mating and natural controlled-breeding. The mean age at first mating of Gofa cattle was 3 year for male and 3.5 year for female. Mean average age at first calving (AFC) for breeding female cattle was 50.4 months. The AFS of male Demba Gofa cattle was found to be 3.8 ± 0.81 years and were significantly different (P<0.01) 3 ± 0.83 than Zala districts. The AFM for female cattle of Demba Gofa and Zala worda were significantly different at (P<0.01) 3.9 ± 0.68 and 3.1 ± 0.7 years respectively. The mean CI of Gofacow was estimated to be 13.35 ± 4.6 months, no significant difference between the two locations. Calving was takes place year round. The mean productive life time and number of calves born per female cattle productive lifespan were found to be 10.9 ± 3.6 years and significant difference at P<0.01 11.9 ± 3.5, 10.9 ± 3.6 respectively were observed between the two location. The average age of bull to castrati was calculated to be above 4 year (77.58%) and between 3-4 years (22.4%). The average length of lactation length of Gofa cow was estimated to be 9.27 ± 0.9 month and daily milk yield was 2.1 ± 0.2 liters. Average daily milk yield was estimated to be 2.1 ± 0.2 liters. Mean milk yield during first, second and third stage was estimated to be 2.19 ± 0.19, 1.5 ± 0.3, 1.05 ± 0.32 liter per day, respectively. The frequency of milking was calculated to be twice a day (97%). The coat color type of male Gofa cattle was found to be plain (70.2%), patchy (15.11%), and spotted (14.9%).coat colors of male cattle are black dominated red 10.4%, red and white 2.5%, red 24.4%, white dominated (gray) (48.75%), light red (6.25%) and fawn (3.75%). The body skin color was estimated 87.2% non-pigmented, and the remaining 12.79 was pigmented. The muzzle color was 79.06% non-pigmented and about 20.93% were pigmented. About 72.9% of Gofa male cattle were pigmented eyelid color and 27.1% were non-pigmented eyelid. The hoof color was 86.04% non-pigmented and 13.95% pigmented. 97.67% of male cattle have horned. The color of horn were 62.7% black, 37.2% brown. Hair length was 97.7% short. The female Gofa cattle population possesses 76.9% plain and 21.7% patchy coat color pattern. The dominant coat colors of female cattle are red (56.9%), and white dominated with other color 11.6%. The least body length, height at withers, heart girth, ear length, horn length, horn length, muzzle circumferences and hock circumferences of male Gofa cattle were measured to be 112.4 ± 0.9, 128.4 ± 2.8, 142 ± 2.1, 26.6 ± 2.8, 24.6 ± 2.3, 41.9 ± 1.2, 33.13 ± 0.5 and for female cattle 109.9 ± 1.5, 107.06 ± 1.4, 137 ± 1.2, 22.6 ± 2.4, 29.5 ± 1.0, 34.5 ± 0.5, 28.23 ± 0.4, respectively. Height at wither and heart girth were found to be significantly different (P<0.001) between the two locations. These may be due to best feed availability in Zala districts. In the two locations mating system is mainly natural controlled, natural uncontrolled and herd mating. The main sources of breeding bull were home male uncastrated bull or cattle were mating each other during grazing. The main criteria for breeding animal selection were its body size, coat color and physical appearance. Fertility, physical appearance and milk production, coat color, and age of female cattle were major trait preference for female cattle. The main trait preference of Gofa cattle were drought power supplementation, milk yield, coat color and breeding efficiency. Gofa cattle have moderate adaptability character to tick tolerance, heat tolerance, insect bite tolerance, and low quality feed. The major housing system of Gofa cattle were housed at night. The major animal production constraints were animal health problem or disease and, seasonal feed shortage. Trypanosomosis, Anthrax, foot and mouth, pastholosis and black leg were reported as first ranked cattle production problem cause huge cattle loss in the area.

Keywords: Trypanosomosis; Pastholosis; Lifespan; Anthrax; Muzzle

Introduction

In Ethiopia there are about 32 recognized indigenous cattle breeds. New breeds are incorporating in to database in recent years. Five cattle breeds currently recorded for SNNPR are Gofa, Gurage, Hammer, Mursi and Sheko. Some uses for cattle breeds are: Gurage for draft power and milk production even in the tsetse infested area and Horro for milk and meat production and for draft power purposes [1]. Sheko for meat and work even endangered by interbred with Zebu cattle and

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Abigar for milk and meat and different types of work.

However, there is little attention given in our country for well-developed decision making and policy intervention on exploratory and especially for advanced cattle characterization approach so that there is no any well documented data for phenotypic and genetic characterization for cattle breeds. Domesticated livestock is as source of food. Its increasing demand requires the conservation of diversity among indigenous livestock genetic reserves that are capable to readily respond various environments for next human generations and handle unpredictable future.

Maintaining genetic diversity is an insurance against future adverse conditions [2]. Recently, loss of genetic diversity within indigenous livestock breeds has been a major concern. It is estimated that 35% of mammalian breeds are at risk of extinction, and that approximately two breeds of livestock lost each week [3]. Management and conservation of animal genetic resources require assessment of genetic diversity. Because it is difficult to design appropriate breeding programs for breeds that have not been adequately characterized either phenotypic/or genetically. Exploratory or primary characterization approach is prior important confirmatory or advanced characterization approach in breed identification and classification in ways that farming communities can relate to. The most significant threat to domestic animal diversifying in the developing world is the continual importation of high performing animals from developed countries. Importation leads to crossbreeding or even replacement of local breeds. Conservation of indigenous animal resources has been proposed as a method for slowing down the loss in diversity in livestock breeds through extinction. Apart from preventing extinction, conservation of indigenous breeds also important for the future health of the animal industry globally as they could be a resource for novel genes that can permit sustained genetic improvement as well as enable adaptation to changing breeding objectives and environment.

Morphological descriptions have also been used to evaluate breeding goals, to assess type and function and to estimate the animals' value as potential breeding stock [1]. In order to ensure proper conservation and utilization of indigenous breeds, it is necessary to evaluate phenotypic and genetic variation that exists within and among breeds. A large proportion of indigenous livestock populations in the developing world have yet to be characterized or evaluated at phenotypic and genetic levels [4]. Although Gofa cattle population plays a major role in the sustainability of livelihoods for their owners, there is no any published information concerning their phenotypic character, production system, and reproduction and production performance. The lack of information on the physical and molecular characteristics hinders the development programs for improving the breeds. This study is aimed phenotypic identities and characteristics of Gofa cattle breed under prevalent production and management system in order to enable cattle breeders and policy makers to make appropriate decision for future utilization of the breed.

General Objective

To undertake phenotypic characterization of Gofa cattle population.

Specific objectives

- To find out, production system/environment, utilization, physical and adaptive features and production characteristics of Gofa cattle
- To undertake physical linear and morphological characterization through important measurements
- To identify preferable traits of Gofa cattle population based on farmers breeding objectives.
- To evaluate their production and reproduction performances on-farm level.

Materials and Methods

Description of study area

The study was conducted in Gamogofa zone Demeba Gofa and Zala Districts (Docha, Sezega, Zima and Mila kebles). Zala districts is a part of Gamo Gofa zone and located in the southern nation nationality and people regional state of Ethiopia. Zala is bordered by on the south and south west by Uba Debretsehay and Kemba districts, on the north and north east by Demeba Gofa and Kucha Districts, on the east by Deremalo Districts and on the west by Uba Debretsehay districts. The districts are located 810 km from Addis Ababa, 284 km from regional city Hawasa and 240 km from zone. Population numbers of the districts were estimated to be 92,666 and Agro ecologically Zala is divided in to low land (Kolla) 90% and midland (Weyena Dega) 10%. The geographical location lies within the co-ordinates of 06° 04'-14° 00' north altitude and 36° 27'-37° 32' north latitude and -36° 58'-14° 20' east altitude and 36° 37'-13° 30' east longitude. The altitude of Zala Districts longitude ranges from 6.46 to 7.26 masl and the latitude range is 36.32-36.87 masl maximum and minimum rainfall of the district is 900 and 1700 mm, respectively. The temperature variation of Zala districts were between 18-32 degree centigrade. The total area coverage of the district is estimated to be 82000ha (source Zala Woreda 5 year development and transformation plain, GTP-1 achievement and transformation plain and 2nd 5 year development plain unpublished data). Demba Gofa Districts is a part of Gamo Gofa Zone and the districts is bordered by on the south and south west by UbaDebretsehay and Oyda districts, southeast by Zala districts on the north by Dawro Zone and northwest Melokoza districts, on the east by Kucha districts and on the west by Geze Gofa districts. The district is located 526 km from Addis Ababa from regional city Hawasa and 240 km from zone. Population number of the districts was estimated to be 125,889 and Agro ecologically Demba Gofa is divided in to low land (Kolla) 75%, and midland (Weyena Dega) 15% and highland (Dega) 10%. Maximum and minimum rainfall of the district is 900 and 1100 mm, respectively. The temperature variation of Zala districts were between 22 and 38 degree centigrade. The total area coverage of the district is estimated to be 979000 ha (Woreda unpublished data). Land scope type of Zala district were flat land, undulated and mountain, 45%, 30% and 25%, respectively .In the districts the live hood of small holder house hold depends to a great extent on agricultural production (99%) meanly on livestock and crop production and 1% on trading.

Data collection technique

PRA discussion was carried out to identify PA's and exact locations of the cattle population in the area. Four PA's was selected purposively depending on the recommendations of elderly people, zonal and woreda experts considering the exact geographic locations for their cattle population in terms of quality and quantity. Required secondary data has been assessed. From the study districts Production system and number of existing cattle per the study area from each PA were collected.

In addition during PRA, focus group discussion with woreda and Keble experts, farmers, local leaders and office heads together with researchers special characteristics of cattle population, agro-ecology and production system of the study area were considered.

For these study a total of 420 (320 female and 100 male) cattle were used as representative of Gofa cattle population. Only animals with an eruption of the fourth pair of teeth, indicating maturity were included. Age were estimated by examining each animal's teeth as suggested by Pace and Wakeman. Attempt were done to identify regarding origin and development of the animal, local name and back ground of each cattle, breeds known to be most closely related to this population, origin, source, original geographic distribution area and boundaries. Traits such as lactation length, daily average milk off-take over three trimesters, calving interval, total number of calves born, weaning age of calves, age of cow when 1st calf was collected.

Sampling and data collection

The study had an initial rapid survey to document what was known by professionals as well as communities about indigenous cattle genetic diversity in the study area. This rapid field survey was undertaken to know the distribution of indigenous cattle types as they have been already known in the study area and to establish sampling framework from which sampling units were taken. Before starting actual survey discussions were held with zonal and district agricultural experts and development agents about the distribution of known cattle breeds. They also participated in the identification of sampling units and data collection activities. The population sizes of identified breeds were estimated based on information acquired from district agricultural offices and other relevant bodies. Sampling units were selected considering the availability of locally known distinct cattle types, agroecology, cattle population size, and accessibility. The actual survey included a Single visit to a sampling Keble during which qualitative and quantitative measurements were made on mature animals (Table 1). Each sampling unit consisted of clusters of sampling sites within which herds of cattle occurred. Within each sampling unit, measurements were made on individual animals from randomly selected herds until the target number of Sample animals were reached.

Linear measurements for all variables were taken by using plastic tape. Age of animals was estimated from dentition to support the age information given by farmers. The morphological Variables recorded in this study were adapted from the standard cattle breed descriptor list. Every animal to be measured was identified by sex, dentition and the Site where it occurred. The measurements were made during the day when the animals were grazing. The structured questionnaires were employed to collect information on functions, husbandry practices (feeding, health, breeding, etc.), adaptive traits, herd structures, and productive and reproductive attributes of indigenous cattle through formal interview. Farmers were purposively selected and interviewed from all sample. Adaptation characteristics assessed during the survey were water and feed economy, mothering ability herd instinct and disease resistance. The Production characteristics including birth, weaning and adult weight of male and female animal, milk production per lactation and lactation length were collected. Qualitative measurements like sex, estimated age by dentition, coat color and pattern, skin color, hoof color, muzzle color, eyelid color, horn presence and color separately for male and female, polled and horned separately for male or female, loose or fixed, horn shape and orientation, hair type and length, ear shape and orientation, hump size and shape, head profile, dewlap size, backline profile, rump profile, navel flap width for females, preputial/sheath width/size for males and tail length, teat and udder size were collected.

Quantitative variables including, body size for adult male and female, chest girth, body length, and height at withers, muzzle and hock circumference, horn length, ear length, were measured. Herd level data such as basic temperament, adaptability traits- tolerance to diseases, parasites, drought, and heat resistance were also scored together with livestock owners. Mating practices such as controlled or uncontrolled, seasonal or unseasonal, natural or AI, number of sire per herd were identified based on the questionnaire. Herd size and composition, typical image of adult breeding cow and bull, use of animals in order of importance and type of traction try to describe.

Districts	Kebele	Number of sample animal		
		Male	Female	Total
Demba Gofa	Docha	25	80	105
	Sezega	25	80	105
Zala	Zima	25	80	105
	Mila	25	80	105
Total		100	320	420

Table 1: The number of mature animals sampled in the actual survey by sex and site.

Data management

Data collected from the field through the questionnaire, linear body measurements and secondary sources, were analyzed using SPSS (version 20) software. Descriptive statistics, chi-square tests, univariate and correlation analysis were employed. Simple descriptive statistics were used to compile the observed categorical variables and chi-square test was used to test independence of the categorical variables separately for both male and female. The Model for analyses of data on the linear body measurements for male and female were:

$Yij=\mu+Ki+eij$

Where;

Yij=Observed value of the trait of interest

μ=Overall mean

Ki=Fixed effect of ith dentition class

Eijk=Residual random effect.

Result and Discussion

Respondents and total household members

For this study a total of 167 households were involved from both districts. Of the total households Sampled, the majority (81.8%) were male headed while the remaining 18.12 house hold was female households. The overall average family sizes of households were 6.4 ± 0.2 (Table 1). As shown in Table 2 from Demb a Gofa districts of the total respondents, (72.6%) were male and (27.38) female headed households. Similarly from Zala Districts about 92.1% male house hold and 7.8% female house hold were involved. The average landholding and family size were 2.6 ± 0.18 hectare and 8 ± 0.12 for Demba Gofa districts and 5.5 ± 0.31 (hectare), 5 ± 0.312 for Zala district respectively. In this study, majority household were medium wealth status and

Parameters	Demba Gofa districts N
Cattle	84
Goats	49
Sheep	35
Chicken	66
Donkeys	50
Mule	4
Horse	0

N: Number of respondents.

Table 2: General Household's livestock composition at Zala and Demba Gofa Districts.

married person who maintains and is running a household were above 92% in both districts, whereas female headed household is a widow or divorced woman who maintains and is managing a household were below 5 percent (Table 2).

Cattle herd composition

It was observed that the average number cattle were cattle 10 ± 0.44. Cattle age and sex of both study area sampling population is summarized in Table 3. The overall average goat populations 5.14 ± 0.44 were kept households. The totals mean number of sheep, chicken, donkey were 1.91, 5.27 and 1.04. In proportionate terms, the study site was significantly (P<0.01) different. Demba Gofa cattle herd proportion was lower in herds (7.07 heads) than in Zala herds (13.07) head). In overall mean numbers of local breeding females kept by the two study site were 3.14 ± 0.15 which is larger head per household) in the herd compared to other age groups. The mean replacement heifer per house hold was found to be 2.3 ± 0.1 head. The mean numbers of breeding male and male cattle not used for breeding were non-significant in the two study site.

Gofa cattle population trend in major livestock species

According to Gofa cattle elder owners and the estimated cattle population data in the study area, the population of Gofa cattle breed is in some extent increasing (60.6%) in number at decreasing in productivity trend over time. About 33.3% of respondents were reported Gofa cattle were in decreasing cattle owner reported the number of breeding females and replacement females(heifers) were appears to be not promising for breeding, time to time become small, unfit for breeding purposes relative to the pervious herd. Cattle elder owners also suggest currently born replacement calves are relatively encountered difficulties during breeding (Tables 4 and 5).

Cattle were kept for plowing, and as income source (Table 6). Small ruminants (Sheep) are kept for meat, income, and manure. About 71.8% of respondent report Population trend of sheep were gradually in decreasing way (71.8%) and remaining farmer estimated of 10.6% and 2.4% were reported sheep population were increasing and stable respectively. The report of CSA,2014/15 indicated that in Gamo Gofa livestock population were estimated to be 1,324,813 cattle, 466,627 sheep, 378,797 goat, 49,750 hoarse, 15,115 mule, 66,422, donkey and 1,014442 poultry. The result is differ with the report of (Mulugeta Ftiwi, 2015) where the population of Western Tigray cattle and the report of population size of Begait cattle breed they reported that cattle number of both side were reducing significantly and become near to extinction. According to the farmer report due to lack of knowledge inbreeding effect identified as the most important threats to Gofa cattle [5].

Sources of livelihood

In both districts, Livestock and crop production play important role in improving the livelihood of farmers. Cattle provide meat, milk, manure, and also serve as a source of saving, it was observed that 90.79% of respondents reported to practice both livestock and crop production and the remaining 4.9% of the respondents dependent on only cattle, and 3.06% were depend on crop production, as a source of livelihood.

Origin and development of Gofa cattle

Findings from focus group discussants revealed that, even if local cattle are found widely distributed throughout the study area, they are

Species	Demba Gofa			Zala			
	N	Mean	SE	N	Mean	SE	Over all
Breeding females	78	2.6	0.21	83	3.6	0.22	3.14 ± 0.15
Replacement females	76	2.3	0.14	79	2.3	0.15	2.3 ± 0.1
Breeding males	42	1.9	0.18	80	2.1	0.08	2 ± 0.08
Males not used for breeding	24	1.7	0.17	68	1	0.072	2 ± 0.07
Steers (castrated males)	45	1.5	0.2	65	1	0.03	1.2 ± 0.099
Female calves	63	1.9	0.94	75	1.5	0.72	1.7 ± 0.07
Male calves	69	4	0.5	73	1	0.1	3 ± 0.3
Chicken	66	6.3	0.7	76	4.3	0.3	5.27 ± 0.4

N: Number of respondents

Table 3: Type and average number of local livestock possessed by the study households.

N	Mean	SE	N	Mean	SE	Mean ± SE
11	0.7	0.19	1	1	-	0.75 ± 0.17
8	0.5		1	-	-	0.67 ± 0.23
11	0.72	0.19	1	1	-	0.75 ± 0.17
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
48	3.2	0.2	35	3.7	0.41	3.4 ± 0.21

N: Number of respondents.

Table 4: Crossbreed type and number in average in the study area.

Parameter	Demba Gofa districts		Zala districts		Overall
	N (80)	Percentage	N (83)	Percentage	Percentage
Livestock production	3	3.75	5	6.02	4.9
Crop production	5	6.25	0	0	3.06
Both	70	87.5	78	93.9	90.79

N: Number of respondents.

Table 5: Farming activity (house hold income source).

Purpose	Demba Gofa districts					Zala districts				
	Rank 1	Rank 2	Rank 3	Rank 4	Index	Rank 1	Rank 2	Rank 3	Rank 4	Index
Meat	6	20	38	9	0.175	5	11	50	8	0.16
Milk	44	27	6	2	0.282	42	28	4	1	0.26
Blood	0	0	0	0	-	0	0	0	0	-
Hide	2	8	8	8	0.058	2	11	5	1	0.05
Ceremony	7	6	13	5	0.08	2	4	39	16	0.11
Manure	24	24	8	0	0.19	6	15	37	7	0.15
Saving	27	26	6	6	0.21	31	38	5	0	0.25

Index: Sum of (4 times rank 1+3 times rank 2+2 times rank 3+1times rank 4) given for an individual reason divided by the sum of (4 times rank 1+3 times rank 2+2 times rank 3+1times rank 4) for overall reasons.

Table 6: Ranking of the purpose of keeping cattle at Gamo gofa zone (zala and Demeba Gofa districts).

not known by any common name or breed type. The cattle of this area are not known by any specific name by the community**.** According to farmers report the ancient source of the animal is also unknown. Elder confirms these cattle were herded for a long time to till now. Farmer use the name 'Gofa cattle' to refer to the cattle type dominated in the study area. Geographically original distribution of Gofa cattle include GamoGofa zone (Dembagofa, Uba Debretsehay, by Zala districts, Zala Oyda districts, Kemba Melokoza Districts, Deremalo Kucha, The key informants agreed that the cattle types of this area are adapted to tick infestation, heat and insect bite. Farmer use Maze cattle purchased from Maze community, which are known to adapt well in hot environment. In addition, maze cattle were preferred for their suitably for milk and traction. ArbaminchZuria, Kucha, Kamba, Boreda, Chencha, Daramalo, Dita, Zala, Melokoza, Bonke, Ubadebretsehay, Mirab-Abaya, Oyda, Geze Gofa, Demba Gofa, Arbaminch Town and Sawla Town**.**

Ranking of the purpose of keeping cattle at Gamo Gofa Zone

The result of this survey revealed that Gofa cattle play multifunctional roles in the study area. It was reported that farmers keep these animals for meat, milk, Hide, ceremony, manure and saving purpose. Based on the ranking purposes for keeping cattle Gofa Cattle were multi-Purpose. Demeba Gofa cattle owner keep cattle primarily for Milk production (0.28) and Zala (0.25). The result line with study conducted by for Mursi cattle is, but different with the report of etal,Mulugeta,2015 study conducted at Tigry region. The second most important purpose for keeping these cattle was identified by the Demba Gofa were saving .for saving purpose Demba Gofa community keep cattle (0.21) and (0.25) for Zala district.in both study area keeping cattle as blood/blood as source of food is not an important and is not ranked. The result is significantly different from the finding of Endashaw for Bodi community blood ranked first as a source of food [6].

Sources of feed

Based on the report of focus group discussion and individual farmer interviews Demba Gofa and Zala Districts the major type of grazing land for cattle were found to be own grazing land and communal grazing land. Communal grazing land especially open grassland grazing area and tree covered grassland type were most important feed resource in Demba Gofa Districts(96%) and 91% respectively. The interview indicate that rented source of feed were insignificant in both area. In Zala Districts about 97% of farmer use their own grazing land as feed resource (Figure 1).

Likewise near to 35% of farmer use communal grazing land. The result is line with the report of that reported from Gozamen, Ankasha, and Bahir Dar Zuria cattle, their major feed sources for their cattle were communal grazing land [7].

Figure 1: Tradational feed preservation practice.

Reproductive and productive performance

Reproductive performance of Gofa cattle were presented in Table 7. The mean age at first mating is 36 month year (between 3 and 4) year for male and 41 month for female Gofa cattle. Gofa cattle average age at first mating and age at first service were significantly shorter than other different cattle breed like Semien and Wegera female cattle, respectively but comparable with the report of Mulugeta [8] for Begayet cattle 35.08 and 37.06 month for female and male respectively (Tables 8-11). The mean average age for Gofa cattle bull castration is 47.52 months .in average above 77.58 percent of farmer reported that mean age for castration age was above four year (Table 12). Mean age at first calving (AFC) for Gofa cattle breeding female in the present study was 50.4 months longer than the report of Mulugeta Ftiw [8] 48.68 months for Begayet cattle and shorted than the 54.1 months for Sheko breed and 53.1 months for Raya-Sanga cattle.

In the study area the most common breeding system was herd mating and natural controlled-breeding using selected bulls. In Zala districts most of the respondents said that the cattle feeding system is free grazing on communal grazing land. Groups to 5-15 farmer cattle were herded by one responsible person among them. Managing the cattle was done one after the other among cattle owner. These practice forced heifers/cows to mate within herd uncontrolled mating because of large sizes cattle managed by one person and difficult to facilitate separation of male and female animals. In both study area above 80 percent of farmer use uncontrolled, non-seasonal, natural mating practice. Hand mating practices were below 25 percent. Concerning the heat sign of Gofa cattle, above 90 percent of the animals were found to be very clear heat sign (Table 13).

Natural pasture is the most common source of feed for cattle in the two locations. Crop by product is the second most important feed resource. Beside to natural pasture and crop residue hay used as cattle

Parameter	Demba Gofa N=82		Zala N=86		Overall Total N=163			
	Mean	SD	Mean	SD	Mean	SD	p. value	C.V
Male average age of at first mating (year)	3.8	0.81	3.1	0.69	3	0.83	**	27.6
Female average age of at first mating (year)	3.5	0.68	3.3	0.7	3.4	0.8	NS	23.5
Average age at first calving (year)?	4.7	1.31	4.6	0.9	4.7	1.31	NS	27.8
Average reproductive life time of a cow	11.9	3.5	9	3.4	10.9	3.6	**	28.41
Number of calves of a cow give on average in its lifetime	8	2.4	9	2.4	8.8	2.5	*	46.94
Average calving interval of cows	13.9	5.5	12.8	3.1	13.3	4.6	*	34.45
Average reproductive lifetime for a bull	7.5	2.7	9	3	8	3.1	**	0.25
Average age of bull castration	4	0	3.9	0.02	3.9	0.17	**	4.29

N=Sample respondents; Ns=Non-significant (P>0.05); **=significant (P<0.05); SD=Standard deviation.

Table 7: Reproductive performance of Gofa cattle.

Trait	Cattle breed/population	Reproductive trait		
		Male	Female	Source
Male average age of at first mating (year)	Gofa cattle	3.0 ± 0.83	3.4 ± 0.8	Current study
	Mursi	3.6 years	3.4 years	Endashaw, Tadelle (2015)
	Sheko	3.2 years	3.5 years	Takele (2005)
	Horro	3.47 ± 0.39 years	3.73 ± 0.51 years	Dereje (2015)
	Boran	4.2 years	3.7 years	DejenTakele, 2014).
Average age at first calving	Gofa		4.7 ± 1.31	Current study
	Horro		4.98 ± 0.68 years	Dereje (2015)
	Sheko		4.5 years	Takele (2005)
	Raya Senga		4.42 years	Dereje (2005)
	Mursi		4.6 years	Endashaw and Tadelle (2015)
Average reproductive lifespan	Gofa	8 ± 0.024	10.9 ± 3.6 years	Current study
	Horro	3.72 ± 0.10 years	13.67 ± 0.31 years	A. Mekonnen et al. (2012)
	Boran	9.86 years lowland	11.5 years lowland	DejenTakele, (2014)
		7.68 years mid and highland	10.9 years mid and highland	

N: Number of respondents.

Table 8: Comparison of reproduction performance of Gofa cattle with other Ethiopian cattle breeds.

Male animal age	Demba Gofa	Zala Districts	Overall
	N=86	N=88	N=174
01-Feb	0	0	0
02-Mar	0	0	0
03-Apr	26.7	18.8	22.4
j ≥ 4	73.3	81.2	77.58

N: Number of respondents.

Table 9: Average age of bull castration in percentage.

Mating system	Demba Gofa N=96	Zala N=82
Natural controlled	44.73	29.26
Natural uncontrolled	26.3	8.5
Herd mating	26.3	62.19
Stud mating	0	0
Artificial Insemination	2.67	0.05
Mating practice		
Uncontrolled, non-seasonal, natural mating	85	79.72
Uncontrolled, seasonal, natural mating (multiple sire).	0	0
Uncontrolled, seasonal, natural mating (1 sire per herd)	0	0
Hand mating	9.7	20.27
Artificial insemination used for at least part of the herd	5.3	0
Heat sign		
Clear	84	100
less intense	11	0
Obscure	5	0
Main calving takes place		
Main rainy season	19.4	22.8
Short rainy season	2.7	4.8
Dry season	2.7	0
Year round	75	72.2

N: Number of respondents.

Table 10: Cattle mating system and heat sign in percentage.

feed in dry season (Table 11). These hay feeding system is common especially in Zala worda due to vast Maze park hay availability.

Milk production performance of Gofa cattle

In the two districts the average lactation length and daily milk yield, of cattle were 9.27 month and 2.12 liter per day respectively (Table 14). Majority of interviewees was reported cow milking were toughly started after two month. Until two month lactating cow were left for calf for the purpose of decreasing calf mortality and to obtain strong calf. Between the two location no significance difference were observed but the daily milk yield for GamoGofa is higher than the report of for Mursi cattle, but lower than the report of Mulugeta [7], 2015 for Begait cattle Western Tigray, Northern Ethiopia. According to Mulugeta result lactation length of Gofa cattle is longer than Begait cattle. Similarly The daily milk yield for Gofa 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 and report on-farm daily milk yield of 1.8 and 1.9 liters per day for Raya Sanga and Wollo highland zebu cattle. Frequency of cow milking practice were reported twice a day (93.86%) in the morning and evening after grazing. The daily milk yield reported here is the amount not including suckled by the calf (Tables 15 and 16).

Type of feed	Demba Gofa					Zala				
	R 1	R 2	R 3	R 4	Index	R 1	R 2	R 3	R 4	Index
Natural pasture	78	0	0	0	0.34	76	0	0	0	0.443
Hay	2	6	55	4	0.15	0	2	32	0	0.102
Crop by products	3	71	2	2	0.25	0	76	0	0	0.221
Improved forage	0	9	15	6	0.07	0	0	0	2	0.002
Kitchen left over	2	9	43	10	0.14	0	43	13	2	0.229
Industrial by products	2	2	2	4	0.02	0	0	0	1	0.001
Grazing method										
Herding	68	1	0	0	0.56	74	0	0	0	0.51
Zero grazing	2	6	32	0	0.18	0	5	46	0	0.18
Tethering	0	36	7	0	0.25	0	57	0	1	0.29

Table 11: Feed and feeding management.

Milk production trait	Location						
	Demba Gofa		Zala		Overall		
	N	Mean	N	Mean	Mean	SD	CV
Length of lactation (month)	73	9.36	76	9.18	9.27	0.9	9.71
Daily milk yield	74	2.19	67	2.01	2.1	0.2	9.52
Milk yield (1st stage of lactation)	80	2.65	81	1.74	2.19	0.19	8.66
Milk yield (2nd stage of lactation)	81	1.12	79	1.43	1.5	0.3	20
Milk yield (3rd stage of lactation)	75	0.97	77	1.14	1.05	0.32	30.4
Frequency of milking							
Once in the morning	3		-4.16		0	0	3 (1.9)
Once in the evening	1		-1.3		0	0	1 (0.6)
Twice a day	68		-94.4		85	-100	153 (97.4)
Common use of milk							
For home consumption only	26	-33.33			39		
As source of income	0	0			2		
For both	48	-61.53			38		

N: Number of respondents.

Table 12: Average yield of milk production performance of Gofa cattle in the Demba Gofa and Zala districts of Gamo gofa Zone southern Ethiopia.

Breed/population group	Lactation length	Milk yield/day	Source
Gofa	9.27 ± 0.9 month	2.01 ± 0.2	Current study
Horro	9.57 month	1.65 liters	Mekonnen et al. (2012)
Mursi	7.8 month	2.1 liters	Endashaw and Tadelle 2015).
Wello highland zebu	-	1.9 liters	Dereje (2005)
Sheko	-	2.35 liter	Tatek and Abegaz (2013)
Raya sanga	-	1.8 liters	Dereje (2005)

Table 13: Comparison of Gofa cattle milk production potential with other breeds.

Location										
Trait	Demba Gofa districts					Zala districts				
	R 1	R 2	R 3	R 4	Index	R 1	R 2	R 3	R 4	Index
Milk yield	30	26	10	0	0.26	6	11	4	2	0.1
Fat yield	4	6	7	2	0.06	0	0	0	0	0.02
Growth efficiency	0	3	19	27	0.09	2	1	8	8	0.11
Draught power supplementation	29	17	11	9	0.23	11	3	6	4	0.3
Adaptation	3	2	15	20	0.08	0	0	5	10	0.1
Coat color	3	11	36	2	0.14	4	10	8	5	0.18
Breeding efficiency	15	11	6	13	0.14	5	4	8	6	0.18

Table 14: Trait preference.

Responsibility of family members in cattle husbandry practices categorized by age and gender are indicated in Table 17. Different husbandry practices are accomplished by different members of the family. In the study area herding of cattle is mainly accomplished by husband/house hold head followed by children. But, all family members take part in herding of cattle by different proportion in different time. Milking of cows and taking care of sick animal is mainly the job of wife in many cases for Horrow and Guderu cattle [9]. The report also indicated as cow milking was the duty of female family members. Selling and purchasing of animal is mainly done by husband. But, before selling or purchasing animal, discussion with wife and come up with agreement was done between the family members.

	Response in percentage					
Adaption trait	**Demba Gofa**			**Zala**		
	Weak	Moderate	Good	Weak	Moderate	Good
Tick tolerance	1.25	58.75	40	4.8	85.54	9.6
Heat tolerance	0	65.4	34.56	0	81.9	18.1
Insect bite tolerance	4.9	74.07	20.98	0	86	14
Adaption to feed shortage	4.9	80.24	14.81	0	83.13	16.8

Table 15: Adaptability traits.

Housing type	Demba Gofa Districts		Zala District		Over all	
	N= 89		N=88		N=177	
	N	%	N	%	N	%
Open camp	0	0	5	6.09	5	2.9
Housed at night only	66	75.86	77	93.9	143	84.6
Housed at night and part of the day	21	24.13	0	0	21	12.4
Housed day and night	0	0	0	0	0	0

Table 16: Housing system and husbandry.

Activity	Demba Gofa Districts N=81				Zala Districts N=83			
	Husband	Wife	Children	Hired labor	Husband	Wife	Children	Hired labor
Herding	79.5	2	10.2	8.16	70.54	2.3	16.7	10.46
House sanitation	10	78	12	0	0	75.5	24.44	0
Taking care sick animal	38	14.28	6.6	0	20	73.33	6.66	0
Selling and purchasing	96	4	0	0	95	2.3	2.3	0
Milking	23.4	72.3	4.2	0	0	85	2.4	0
Supplementary feed providing	53	42.8	4	0	40	48.88	11.11	0

N=Number of respondents.

Table 17: Animal husbandry labor division of Gofa cattle morphology of Gofa cattle.

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
Horn length	Base to tip following its external curvature
Ear length	The base of the ear to the pointed end of the ear
Tail length	From the base of the tail to the pointed end of the tail

Table 18: Quantitative Morphometric traits and their categories considered.

Qualitative body description

Majority of Gofa cattle populations have plain coat color (63.89%), patchy (17.9%) and spotted were 18.92% with different cattle coat color combination were reported in both worda. both female and male have predominantly plain coat color (70.2 and 76.9 percent respectively. The dominant plain coat colors of Gofa cattle were (36.18) percent red, 36.03 percent white dominant and 6.89 percent black dominant red, while the rest were (6.39) percent, 3.15 percent red and white, 2.68 red and white and 4.68 were fawn. Different color types such as grey, brown and fawn. 48.75 percent of male cattle were white dominated with other color while in female cattle red coat color is more dominant,(56.9 percent) in the study area white dominated cattle were more preferable for ability to resist biting fly. In Zala about 48.75 male cattle were white dominated coat color. Farmer reported that more concern was done during breeding animal selection. In the study area majority of cattle were non pigmented body skin color, Muzzle color, eyelid color, hoof color, were (85.93 percent, 61.45 percent, 75.54 percent and 86.11 percent respectively, while the remaining 14.07 percent, 38.55 percent, 24.46 percent, and13.89 percent were pigmented body skin color, Muzzle color, eyelid color, hoof color, respectively. Almost all (99.23) Gofa cattle were horned and 53.01 percent were brown colored while the remaining 45.33 and .67 per cent were black and white respectively in the study area Horn orientation cattle indicated that about 69.5% were directed to upward while the remaining 21.34 percent, 8.33 percent, and 0.83 percent were forward, tips pointing laterally, and downward respectively. Horn shape of Gofa cattle were straight (13.62 percent, curved 44.48 percent, lyre shape 2.42 percent loose shape 1.62 percent, stumps 37.86 percent and no polled is observed,. hair type of cattle were shine (41.85), glossy (35.42), dull curl (1.130), and curly (21.61). Gofa cattle were characterized by its thoracic hump, which is distinctive characteristic feature of zebu cattle. 61.72 percent of the cattle in the population possess an erect hump, while 29.62 percent have dropping back ward and dropping side way 6.85 percent. Hump position of Gofa cattle were thoracic (33.11) cervico-thoracic (66.89) (Tables 18-22) (Figures 2 and 3).

Cattle body measurements

a) District effect: District effect was not significant at ($p \geq 0.05$) in most of cattle body measurements. Except height at withers and heart girth which is higher in Zala districts. Such difference might be due to better management and probably environmental difference between the two districts (Figure 4).

b) Cattle sex effect: Sex of the animal had significant effect ($p \leq 0.001$) on height at wither, animal muzzle circumference and hock circumferences which is higher in male cattle. Other parameters like least body length, horn length, ear length, were insignificant (Figure 5).

Pattern and type	Type	Overall	Location		Cattle sex	
			Demba Gofa	Zala	Male	Female
			N=226	N=210	N=100	N=320
Coat color pattern	Plain	63.89	66	44.7	70.2	76.9
	Patchy	17.19	21	14.8	15.11	21.7
	Spotted	18.92	9.6	40.5	14.9	1.4
Coat color	White	6.39	2.4	4.8	3.4	11.25
	Black dominated red	6.89	21.6	0	10.4	10.6
	Red and white	3.15	0	4.8	2.5	2.3
	Red	36.18	55.4	28.9	24.41	56.9
	Black and white	2.68	3.6	2.4	4.6	1.16
	White dominated	36.03	8.4	50.6	48.75	11.62
	Light red	3.59	6.02	2.4	6.25	2.3
	Fawn	4.68	2.4	6	3.75	4.5
Body skin color	No pigment	85.93	89.15	84.33	87.2	86.25
	Pigmented	14.07	10.8	15.66	12.79	13.75
Muzzle color	No pigment	61.45	67.4	59.03	79.06	46.25
	Pigmented	38.55	32.5	40.96	20.93	53.75
Eyelid color	No pigment	75.54	67.4	79.5	72.09	75
	Pigmented	24.46	32.5	20.48	27.9	25
Hoof color	No pigment	86.11	86.74	85.71	86.04	86.25
	Pigmented	13.89	13.25	13.9	13.95	13.75
Presence of horn	Present	99.23	97.5	100	97.67	100
	Absent	0.77	2.4	0	2.3	0
Horn color	Black	45.33	43.37	46.98	62.7	26.25
	Brown	53.01	53.01	53.01	37.2	68.75
	White	1.67	4.8	0	0	5
Horn orientation	Tips pointing laterally	8.33	13.25	6.02	12.7	6.25
	Upward	69.5	53.01	78.3	82.5	47.5
	Downward	0.83	2.4	0	0	2.5
	Forward	21.34	31.3	15.6	4.6	43.75
	Backward	0	0	0	0	0
Horn shape	Straight	13.62	10.8	15.6	9.3	16.25
	Curved	44.48	59.05	37.71	27.9	68.75
	Lyre shape	2.42	2.4	2.3	0	5
	Loose shape	1.62	4.8	0	2.4	2.5
	Stumps	37.86	22.8	46.42	60.46	7.5
	Polled	0	0	0	0	0
Hair type	Shine	41.85	76.98	69.76	19.76	42.5
	Glossy	35.42	19.39	19.45	36.04	56.25
	Dull curl	1.13	3.61	0	2.3	1.25
	Curly	21.61	0	26.37	41.8	0
	Straight	0	0	0	0	0
Hair length	Short	99.21	95.06	92.77	97.7	100
	Medium	0.79	2.4	0	2.3	0
ear orientation	Erect	3.37	2.1	1.1	4.29	4.75
	Lateral	96.03	97.9	98	95.71	95.25
	Dropping	0.6	0	0.8	1	0
Ear shape	Rounded	8.97	25.67	2.4	14.28	10
	Straight edge	91.03	71.85	97.6	83.3	90
Hump size	Absent	0	0	0	0	0
	Small	48.67	58.02	43.37	22.6	80
	Medium	14.17	28.39	7.2	17.8	17.5
	Large	37.15	13.5	49.39	59.53	2.5
Hump shape	Absent	1.82	4.9	0	2.3	2.5
	Erect	61.72	71.6	45.23	23.38	94.25
	Dropping back ward	29.62	17.28	16.6	58.3	3.25
	Dropping side way	6.85	6.17	6.17	11.9	0
Hump position	Thoracic	33.11	18.53	31.46	34.52	33.75
	Cervico-thoracic	66.89	81.24	69.75	65.47	66.25

Facial profile	Straight,	57.2	62.33	37.66	16.66	78.75
	Concave	6.86	9	3.8	5.9	6.25
	Convex	31.86	27.16	2.4	70.23	1.5
	Ultra-convex	4.08	4.9	2.4	7.1	0
Dewlap size	Absent	0.54	1.2	0	0	1.25
	Small	36.23	33.3	34.9	14.28	59
	Medium	25.65	46.9	16.8	23.8	36
	Large	38.12	18.5	48.19	61.9	3.75
Backline profile	Straight	41.05	54.32	33.7	28.57	60
	Slopes up towards the rump,	18.21	3.7	7.2	15.8	31.25
	Slopes down from withers,	40.74	41.9	59.03	53.57	8.75
	Dipped (curved)	0	0	0	0	0
Rump profile	Flat	10.97	8.98	13.25	10.47	8.75
	Sloping	76.97	72.74	74.21	83.57	70
	Roofy	12.06	18.27	12.5	1.95	21.24
Navel flap (for cows)	Absent	12.55	16.41	10.8		14.28
	Small	30.46	46.26	29.72		31.16
	Medium	53.03	37.31	54.05		51.94
	Large	3.95	0	5.4		2.5
Preputial sheath (for bulls)	Absent	1.14	9.8	0	2.3	
	Small	14.95	35.2	9.4	20.71	
	Medium	74.34	56.8	90.5	59.28	
	Large	9.57	0	0	19.28	
Tail length	Short	7.61	12.34	2.3	6.25	14.28
	Medium	84.47	71.6	97.6	77.08	78.57
	Long	7.92	16.04	0	16.6	7.14

N: Number of respondents.

LBL: Least Body Length; HaW: Height at Withers; HG: Heart (chest) Girth; EL: Ear Length; HL: Horn Length; MC: Muzzle Circumference; HC: Hock Circumference.

Table 20: Least square means and standard error of body measurements (cm) of adult Gofa cattle in the Demba Gofa and Zala Districts of Gamogofa Zone, Southwest Ethiopia.

Breed group	Breed	Sex	LBL	WH	HG	Source
Na	GamoGofa (on farm)	Male	112.4 ± 0.9	128.4 ± 2.8	142 ± 2.1	Present study
		Female	109.9 ± 1.5	107.06 ± 1.4	137 ± 1.2	Present study
Hamp less	Sheko	Male	114.6 ± 7.51	103.6 ± 5.98	141.2 ± 9.21	Takele, 2005
		Female	110.2 ± 6.34	99.4 ± 4.95	136.5 ± 7.51	Takele, 2005
Mursi	Mursi	male	129.3 ± 1.7	121.3 ± 1.9	154.6 ± 1.6	Endashaw, 2015
		Female	114.9 ± 0.8	104.6 ± 0.9	134.3 ± 0.7	Endashaw, 2015
Begait	Begait	male	135.96 ± 0.09	136.99 ± 0.1	168.91 ± 0.1	Mulugeta, 2015
		Female	128.13 ± 0.16	131.48 ± 0.25	159.55 ± 0.24	Mulugeta, 2015
Na	Gojjam highland	male	112.82 ± 0.9	109.91 ± 0.71	150.54 ± 1.22	Fasil, 2006
		Female	104.86 ± 0.39	104.84 ± 0.32	136.91 ± 0.56	Fasil, 2006
Zenga	Fogera	Male	113.74 ± 0.86	118.98 ± 0.67	158.08 ± 1.17	Fasil, 2006
		Female	114.27 ± 0.48	114.81 ± 0.39	155.06 ± 0.69	Fasil, 2006
Zebu	Ogaden (on farm)	Male	110.4 ± 0.91	120.9 ± 0.70	165.41 ± 1.21	Fasil, 2014
		Female	104.1 ± 0.50	113.5 ± 0.39	149.1 ± 0.66	Fasil, 2014

Na=Not identified.

Table 21: Comparisons of morph metric measurements (cm) of Gamo Gofa cattle with other cattle breeds of Ethiopia.

Constraint	Demba Gofa					Zala				
	R 1	R 2	R 3	R 4	Index	R 1	R 2	R 3	R 4	Index
Feed shortage	13	23	8	0	0.18	36	22	10	0	0.23
Health problem	31	11	2	0	0.22	54	14	0	0	0.26
Lack of improved breed	0	23	11	12	0.14	0	7	31	30	0.11
Land	10	10	19	5	0.15	9	37	17	5	0.19
Water	2	0	18	24	0.09	13	22	30	3	0.07
Market accessibility	0	0	25	19	0.13	0	5	29	34	0.07
Theft	0	3	4	37	0.07	0	4	13	51	0.055

Table 22: Ranking of cattle production constraints.

Disease and parasite	Demba Gofa					Zala				
	R 1	R 2	R 3	R 4	Index	R 1	R 2	R 3	R 4	Index
Trypanosomiasis	25	5	4	2	0.24	42	6	2	0	0.17
Anthrax	7	17	15	1	0.21	20	14	4	5	0.2
Pasteurellosis	5	8	8	4	0.12	9	3	7	8	0.06
Black leg	6	3	6	13	0.115	10	10	11	17	0.1
Foot and mouth disease	10	8	1	4	0.138	22	12	14	3	0.14
Lung worm	2	6	7	2	0.117	36	5	8	3	0.16
Mastitis	2	0	0	0	0.015	9	5	8	19	0.08
Mycoplasmosis	1	2	0	0	0.019	5	7	6	10	0.05

Table 23: Ranking of disease prevalence.

Figure 2: Male adult Gofa cattle.

Figure 3: Typical Gofa cattle coat color.

Figure 4: Female adult Gofa cattle.

Figure 5: Gofa cattle with its usual production environment.

Parameter	Demba Gofa	Zala	Total
	Response (%age)	Response (%age)	Response (%age)
Docile	36.7	9.5	23.17
Moderately tractable	61.2	80.4	71.6
Wild	2.1	10.1	5.23

Table 24: Cattle temperament.

Cattle production constraints

Ranking of cattle production constraints in the study area is presented in Table 22. Among the constraints, health problem feed shortage and grazing land shortage were considered as the most important problems ranked first, second and third with different index values respectively.as indicated in the table disease and parasite prevalence were among the listed main constraint that hindered cattle production in both study area. This high disease and parasitic problem in the area might arise from insignificant accessibility of vaccination and medication. In addition for Zala districts livestock share Maze national park. This high disease and parasitic problem in the area might arise from transmissible disease the presence of different wild animals in the area that share park ecosystem with the livestock [9].

Rank indices of major cattle production constraints in Demba Gofa and Zala districts in Gamo Gofa Zone southern Ethiopia.

Ranking of major cattle disease in the study area is presented in Table 23. Among the disease, Trypanosomiasis ,anthrax and Foot and mouth disease were considered as the most economically important disease ranked first, Second and third with different index values, respectively [10-12] (Tables 24-26).

Importance of keeping Gofa cattle	Demba Gofa districts				Zala districts			
	Rank 1	Rank 2	Rank 3	Index	Rank 1	Rank 2	Rank 3	Index
Traction	46	28	10	0.33	37	23	20	0.325
Milk production	29	25	14	0.24	19	51	0	0.218
Meat production	0	21	29	0.11	0	26	38	0.123
Manure	0	13	35	0.1	10	18	32	0.134
Sociocultural	18	18	33	0.2	9	35	47	0.197

Table 25: Ranking indices on use of animal in order of importance of keeping Gofa cattle.

Horn type	Respondents reporting for horn presence and its orientation at herd level				
	Demba Gofa (%age)		Zala (%age)		
	Male	Female	Male	Female	Over all
Presence of polled	8 (20	28 (31.46)	14 (20.28)	15 (18.98)	22 (20.18)
Presence of horn	32 (80)	61 (68.54)	55 (79.72)	64 (81.01)	87 (79.820
Horn orientation					
Tips pointing laterally	23 (16.08)	24 (19.35)	3 (1.93)	7 (4.29)	57 (9.7)
Upward	35 (24.47)	38 (30.64)	69 (44.51)	48 (29.44)	190 (32.4)
Downward	31 (21.67)	30 (24.19)	21 (13.54)	50 (30.67)	132 (22.5)
Forward	34 (23.77)	24 (19.35)	48 (30.96)	56 (34.35)	162 (27.69)
Backward	20 (13.98)	8 (6.4)	14 (9.03)	2 (12.260	44 (7.5)

Table 26: Gofa cattle herd level presence of horn in percentage.

Conclusion and Recommendation

From this study it can be concluded that Gofa cattle are kept in a mixed crop-livestock production system and they play multifunctional roles in this production system. Even though the breed survives and produces through tolerating the existing hot environment and trypanosomiasis challenge, cattle production in the area is constrained by prevalent disease, seasonal feed shortage and inbreeding effect. Anthrax, FMD and Lung worm also most important economically important disease. Presence of park neighboring to cattle grazing area, absence of frequent vaccination and treatment of cattle in such hot environment makes the area potential to harboring epidemic diseases and parasites that cause loss of huge cattle number**.** Time to time production performance of Gofa cattle is decline due to inbreeding effect. Therefore it is suggested as follows:

- Improve veterinary service
- Further study on the origin of the cattle
- Molecular characterization should be done including the related breeds
- Planned selection Breeding program should be done(genetic improvement via Community based)
- Create awareness to control inbreeding and most economically important disease
- Develop live weight estimation of predictive formula

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