International Journal of Advanced Geosciences, 5 (2) (2017) 41-47

International Journal of Advanced Geosciences

Website: www.sciencepubco.com/index.php/IJAG
doi: 10.14419/ijbr.v5i2.8333
Research paper

Herd management and breeding practices of holla sheep owners in south wollo zone, Ethiopia

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Abstract

This study was aimed to generate organized information on selective breeding objectives, trait's preferences and major constraints of the Holla sheep production system in Kalu and Worebabo districts of South Wollo Zone under small holders' management conditions. The study was performed based on the semi-structured questionnaire, focused group discussions. Secondary data source analysis and field observations were used to generate the required information. In addition, simple random sampling technique was used to select 180 sheep owners. Simple descriptive statistics, ranking trial and chip-square test was considered. The primary purpose of keeping sheep was asset development (income generation) followed by breeding purposes with the index value of 0.365 and 0.201, respectively. Body size/Appearance was the primary preference in both districts for breeding ram index value of 0.258 and 0.207 Kalu and Worebabu, respectively. In the study areas, culling inferior sheep, weaning, record keeping, castrating ram at right age and provision of regular vaccination before disease out breaks were poorly practiced. Age at first sexual maturity of male sheep was 7.3±2.17and 7.23±1.34 months while for females 7.9±1.87 and 5.8±1.16 months in Kalu and Worebabo district, respectively. Disease prevalence and genetic potential were the major production constraints in the entire studied districts. In order to minimize the failure of breed improvement programs it is important to involve farmers considering the existing breeding practices, management systems and trait preferences of the community and the multipurpose roles of targeted animals.

Keywords: *Assessment; Breeding; Holla; Management; Sheep and South Wollo.*

1. Introduction

Ethiopia is one of the countries, which has large resources of sheep and goats among African countries (CSA, 2013). Ethiopia is the second in Africa and sixth in the world in sheep populations (Demelash et al., 2006). According to Solomon et al. (2007) who reported that Ethiopia was the home of 9 breeds and 14 traditional sheep populations. So the estimated numbers of sheep were about 29.33 million sheep are found in the country, out of which about 72.77 percent are females, and about 27.23 percent are males (CSA, 2014). Ethiopia's diverse sheep population and distributed across the different ago-ecologies ranging from cool alpine climate of the mountains to the arid pastoral areas of the lowlands (Solomon et al., 2007).The The average holding of sheep per household in Ethiopia ranges between 3.7 (Yenasew, 2010) to 31.6 (Tesfaye et al., 2010). The result of the CSA (2015) survey also revealed that about 21.19 percent and 15.71 percent of the total holdings were one and four head of sheep and goats, respectively. Whereas, about 75 percent of the total population were found in the highlands where mixed crop-livestock production systems are dominated, while the remaining was found in the lowlands' areas of the country (DAGRIS, 2006). From the total sheep population, about 9 million heads were found in Amhara National Regional State (CSA, 2012).

Traditionally, sheep and goats have served as a means of ready cash income to meet immediate needs such as acquiring agricultural inputs, paying school fees or tuition, taxes, medical bills and purchasing large animals and a reserve against economic and agricultural production hardship or monetary saving and investment in addition to many of the other socio-economic and cultural functions (Markos, 2006).

Knowledge of indigenous animal breeding practices and techniques is important to develop sustainable genetic improvement schemes under smallholder situations. Lack of such knowledge leads to the setting up of unrealistic breeding goals in the design of livestock genetic improvement programs and the consequence of which can put in danger the conservation of indigenous animal genetic resources (Zewdu et al., 2006). The farmers' decision of selection criteria could be affected by breed; production system and herd size (Thiruvenkadan et al., 2009). The traits traditionally considered as criteria for selecting breeding stock are important in describing the adaptive attributes and genetic merits of the indigenous livestock and in identifying farmers' choice of sheep breeds and the underlying factors that determine the choice of genetic stock used.

Despite the importance of knowing the communities breeding practices, such as information is not available for the Holla sheep breed in South Wollo zone. Besides, breeding objectives and selection criteria were not explained well. The sheep has limited research focused on explained well. The sheep has limited research focused on the breeding objectives and selection criteria (Kosgey et al., 2008). The breeding practices and the selection criteria or traits, on which the livestock keepers wish to improve and base their selection, have to be understood. Nevertheless, little is known about traditional herding practices, breeding practices and selection criteria of sheep improvement in South Wollo zone. Thus, this study was essential to assess indigenous sheep breeding

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practices, herding systems, selection criteria and identifying trait preference of smallholder farmers in the studied area.
Specific objectives of the study were:

- To assess farmers' selective breeding objectives and trait preferences in the study areas
- To identify and describe the sheep production systems, major constraints and opportunities to improve sheep production in the study area.

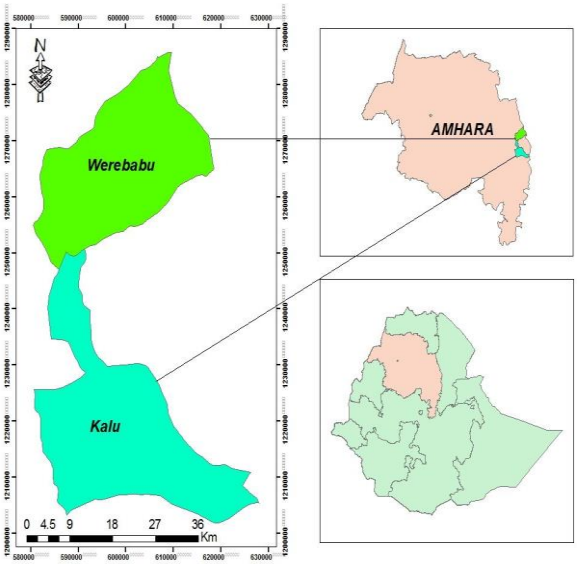

Fig. 1: Map of the Study Areas.

2. Material and methods

2.1. Sampling procedures

South Wollo Administrative Zone consists of twenty three districts. Two districts, namely, Worebabo and Kalu, were strategically selected based on distribution of Holla sheep population. From each district, two peasant associations (PAs) were purposely taken based on higher concentration of Holla sheep population and accessibility information obtained from group discussion, field visits and secondary data. About 45 households were randomly sampled from each peasant association based on the distribution of sheep through discussion with key informants in the village and secondary information. The number of households which were included in the study was 90 from three PAs of Worebabo district and 90 from the two PAs of Kalu district. In total, 180 households were selected for cross sectional survey study.

2.2. Data collection procedures

The survey work was done using: (1) semi-structured questionnaires prepared and translated to local language and pre-tested before administration and some re-arrangement and correction in accordance with respondents' perceptions were made and (2) focus group discussion using well tested checklists (3) reconnaissance tour (field observation) (4) informal ways. The selected households were interviewed using semi-structured questionnaires by enumerators, who were hired, trained and under close supervision of the researcher and the following data were collected: origin of sheep, socio economic characteristics of the household, breeding practices, trait preferences, castration practices and routine husbandry practices.
Basic socio-economic data on description of the study areas and other issues related to them were collected from offices of Agriculture and Rural Development of the two districts using pre-checked checklist.

2.3. Statistical data analysis

The type of statistical analysis used varied depending upon the nature of the data and data collection tools. All data gathered during the study period were coded and recorded in Microsoft excel. Data from the household survey were described and summarized by using descriptive statistics of SPSS version 20(2016). An index was also calculated to provide overall ranking for categorical variables such as constraints of sheep production, purpose of keeping sheep and selection criteria of females and males.

3. Results and discussion

3.1. General Household Information
One hundred eighty households (ninety from Worebabo district and ninety from Kalu distract) were participated in this household survey work. The average family sizes in the study households were 5.71 for Kalu and 4.21 for Worebabo. Family size was highly significantly ($P<0.01$) different between the two districts. This is attributed to high need of labor for agricultural activities. Figures for Worebabo district obtained from this survey were comparable to the report of Harbu (4.54±0.11) (Tassaw et al., 2014). Female-headed households were 71.7% while the proportion of male headed households was 28.3%. This might be related to either their husbands have died, or they are divorce. Majority of the respondent educational statuses (41.7%) could read and write and (40.6%) were illiterate. While, the remaining proportions of the households were gone to primary and secondary educational schools.
All most all the respondents (99%) were fully involved in crop-livestock production systems. There was no significant difference ($P>0.05$) in sex, educational and marital status of the sampling districts. Similarly, both Kalu and Worebabo districts farming system were mixed livestock crop production system. About 54.4% and 60.4% of the respondents were depended on livestock production for food and cash income, respectively (Table 1). These results indicated that the livelihood of the society in the study area was mostly depending on livestock production. Across all the districts, farmers were relying on livestock production as a source of cash income and food for home consumption. This was due to frequent crop production failure due to erratic rainfall.
The total land holding/household was shown as no significant difference between the two districts. The recorded average land holding/household was 0.59 ±0.24 ha from Kalu and 0.7 ±0.48 ha from Worebabu district.

Table 1: Socio Economic Characteristic's Farmers in Kalu and Worebabo Districts

Variables	District					
	Kalu		Worebabo		Total	
	N=90	%	N=90	%	N=180	%
Family Size/hh(+ SE)	5.71± 0.22		4.21 ± 0.18		4.96 ±0.15	
P-value	0.000**					
Land size/hh((+ SE)	0.59 ±0.24		0.7 ±0.48		0.65 ±0.25	
P-value	0.000**					
Age structure(years)						
<25	0	0	1	1.1	1	0.56
26-35	9	10	17	18.8	26	14.4
36-45	34	37.8	51	56.7	85	47.2
46-56	30	33.3	16	17.8	46	25.5
>56	17	18.9	5	5.6	22	12.2
Sex structure						
Male	63	70	65	71.7	128	71.1
Female	27	30	25	28.3	52	28.9
Marital status						
Single	17	18.9	80	88.9	97	54
Married	69	76.9	7	7.9	76	42.2
Divorced	4	4.4	3	3.3	7	3.8
Educational status						
Illiterate	37	41.1	36	40	73	40.5
Able to read and write	33	36.7	42	46.7	75	41.7
Primary school	20	22.2	12	13.3	32	17.8

3.2. Sheep flock structure and size

The flock structure of the surveyed sheep flock in the two districts was presented in Table 2. Breeding ewes formed the largest proportion (25.74%) of the flock followed by ewes lambs (20.71%), female lambs (17.74%), ram lambs (13.23%), male lambs (12.71%), breeding ram (8.41%) and castrates (1.43%) for Kalu whereas the proportions of breeding ewes, Ewe lambs, female lambs, male lambs, breeding ram, ram lambs and castrates were 25.9%, 17.56%, 15.92%, 14.54%, 12.81%, 11.71% and 1.55%, respectively, in Worebabu. The ratio of breeding rams to Ewe was 1:2.15 in Kalu and 1:1.77 in Worebabu districts. This ratio is lower than 1:5.21 reported by Dejen (2010), in Keffa and Bench-Maji zone;1:6.7 for Gumuz Solomon (2007), 1:8.3 reported in Menz 1:17.4 reported for Afar sheep (Tesfaye, 2008) and higher than Konta (1:1.98) for Amelmal et al. (2015). The flock structure of female lamb and breeding Ewe was higher in Worebabu than Kalu districts. This might be attributed to the prevalent practice of keeping Ewe for breeding purpose, which accounted for a greater portion of the newly born animals while rams are either castrated or sold when they reach market age. The higher proportion of breeding Ewe in the flock followed by suckling age group for both districts was in agreement with those of Zewdu et al. (2008), Mengistie et al. (2010) and Fsahatsion et al. (2013). The lower proportion of ram lambs in Holla sheep compared to other locations in the mixed crop–livestock production system indicates the tradition of marketing young ram lambs because of the greater dependence on sheep production.

Table 2: Sheep Flock Structure in Kalu and Werebabu Districts

Class of sheep	Kalu (N=90)			Werebabu (N=90)			Over all mean	
	N	Mean± SD	%	N	Mean+ SD	%	N	%
Ram lambs (<6 months old)	129	1.55±0.72	15.8	159	1.76±0.52	17	283	16.15
Ram (6-12 months old)	124	1.74±0.84	15.2	128	1.58±0.58	13.7	257	14.7
Breeding ram (>12 months)	82	1.10±0.31	10.1	140	1.59±0.58	15.0	222	12.67
Castrated (> 1 year old)	14	1.16±0.38	1.7	17	1.00±0.00	1.8	31	1.76
Ewe lambs (<6months old)	14	1.16±0.38	1.7	17	1.00±0.00	1.8	31	1.76
Ewe(6-12 months old)	202	2.34±1.23	24.75	192	2.13±1.01	20.51	394	22.49
Breeding ewes (>12 months)	251	2.78±1.30	30.75	283	3.14±0.96	30.19	534	30.47

3.3. Breeding objectives

In this study, the purposes of keeping sheep by farmers in the study area are presented in Table 3. The primary reason for keeping holla sheep in Kalu district was to derive income generation (index=0.365) followed by breeding (index=0.210), manure (index=0.140), ceremony (index=0.122), meat (mutton) (index=0.087) and saving (index=0.076). In Worebabo, like that of Kalu, the primary purpose of keeping sheep was to generate incomes (index=0.336) followed by breeding (index=0.210), manure (index=0.140), ceremonies (index = 0.122) and meat (mutton) (index=0.087). These results corroborated with findings of Tsedeke (2007), Tesfaye et al. (2011) and Belay et al. (2012) who reported that cash income source and insurance were the principal objectives why farmers in the sheep-barley system keep sheep. The fact that farmers keep sheep, mainly as a source of cash income is because it can be immediately sold for quick cash at the local markets (Judith, 2006) and have short generation interval and require low initial capital.

Table 3: Purpose of Sheep Keeping Ranked by the Owner of Sheep

Objectives	Districts Kalu				Worebabo			
	Rank1	Rank2	Rank3	Index	Rank1	Rank2	Rank3	Index
Meat	6	4	21	0.087	23	4	23	0.181
Breeding	27	13	6	0.210	25	21	7	0.224
Manure	7	12	30	0.140	3	9	19	0.083
Income	40	35	7	0.365	40	31	4	0.336
Ceremonies	6	13	22	0.122	2	3	12	0.044
Saving	3	14	4	0.076	3	21	22	0.132

Index = sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for particular purpose divided by sum of [3 for rank 1+2 for rank 2+1 for rank 3] for all purpose.

3.4. Herding practice and species composition

A good understanding of the community's herding practices is crucial to bring sustainable improvement in the small holders flock through community-based strategies (Sölkner-Rollefson, 2003). The average flock size and composition of livestock in Kalu and Worebabo districts are described in Table (4). It was shown that sheep were kept with another livestock, particularly with cattle, goat, camel and equines in the study areas. According to the respondents, sheep were most often herded with cattle, goat, camel and equines. The overall average mean herd size sheep were (11.52 ±3.54) which is the highest followed by goat (8.11 ±3.75), chicken (7.78 ±4.15) and cattle (3.72 ±2.05). In Worebabo district sheep and goats were the predominant livestock species, while in Kalu district sheep, cattle, chicken and donkey with proportion of 100% 82.2%, 72.2% and 27.7%, respectively were proportionally kept by the farmers. Similarly In the lowlands' areas, larger flock size of 16.0 for Gumuz sheep, 23 for Afar sheep and 19.2 for Blackhead Somali sheep were reported (Solomon, 2007; Tesfaye, 2008; Fekerte, 2008, Mulata, 2013).

Table 4: Average Flock Size and Composition of Livestock in the Study Area

Species	Kalu (N=90)			Worebabo (N=90)			Overall average flock size
	N	%	Mean ±SD	N	%	Mean ±SD	Mean ±SD
Cattle	74	82.2	3.81 ± 2.31	73	81.1	2.86 ± 1.62	3.72 ±2.05
Sheep	90	100	11.12 ± 3.81	90	100	12.16 ± 3.13	11.52 ±3.54
Goat	12	13.3	4.37 ± 2.64	90	100	8.56 ± 3.63	8.11 ±3.75
Chicken	65	72.2	5.37 ± 3.40	66	73.3	9.11 ± 4.45	7.78 ±4.15
Donkey	25	27.7	1 ± 0.00	54	60	1.09 ± 0.29	1.06 ±0.24
Horse	0	0	0	2	2.2	2± 0.00	2.00 ±0.00
Camel	10	11.1	1 ± 0.00	11	12.2	1.54 ± 0.93	1.28 ±0.71
Honey Colony	3	3.3	1 ± 0.00	26	28.8	1.61 ± 0.49	1.55 ±0.50

N.B. More than one response was possible N = number of respondents

3.5. Sources of feeds and grazing practices

According to the information obtained from the interview, the major sources of feed in the study area were hay (96%), crop residue (73%) and concentrate (40%) feed from dry season in Kalu while in Werebabu district natural pasture (50.6%), improved forage (43.6%) and fallow land (32.7%) were the common feed resources. Crop residues from cereals and pulses were more important feed sources, especially in the dry season when grazing pasture is no more available. The feed resources' availabilities in the study area were significantly (P<0.01) affected by seasonal change in both districts (Table 5). It was observed that grazing on natural pasture was the major feed resource for farmers in both Kalu and Werebabu districts during the rainy season as well as a dry season. Almost all farmers were confirmed that they faced feed shortage during the dry seasons. Therefore, sheep owners were used different coping mechanism to overcome feed shortage, and this varied significantly (P<0.05) among seasons. Provision of supplementary feed like concentrate (industrial by-product), crop residues and non conventional feed (Atela) which is the byproduct of local beer (Tella) for their sheep was practiced when availability of grazing pasture is low. Similarly, feed shortage is the major constraint of sheep production in different areas of Ethiopia (Aden, 2003; Samuel, 2005 and Solomon, 2007).

Table 5: Feed Resource Availability in the Study Area

Feed resources	Districts Kalu Wet season		Dry season		Both		Werebabu Wet season		Dry season		Both		P value
	N	%	N	%	N	%	N	%	N	%	N	%	
Natural pasture	19	22.1	6	7	61	70.9	19	21.3	45	50.6	25	28.1	0.000
Improve forage	16	59.3	2	7.4	9	33.3	2	5.1	17	43.6	20	51.3	0.000
Hay	1	2	49	96.1	1	2	25	41.7	17	28.3	18	30	0.000
Crop residues	2	4.2	35	72.9	11	22.9	15	38.5	10	25.6	14	35.9	0.000
Fallow land	21	87.5	2	8.3	1	4.2	8	14.5	18	32.7	29	52.7	0.000
Concentrate	2	40	2	40	1	20	7	9.7	3	4.2	62	86.1	0.000

3.6. Grazing management

Grazing management and way of herding sheep in the study area are presented in Table 6. About 44.52% of the respondents were practices communal land. Private land grazing (43.8%) and Paddocks (10.94%) in Kalu district were as in Worebabo districts free grazing (28.07%), private grazing (27.63%) and tethered (16.67%) in dry season was the common gazing system this is because in Kalu, area has been relatively better for private grazing land as compared to Werebabu area. However, in dry season tethering of sheep was practiced only in Werebabu district, which was not common in Kalu districts. However, in wet season, farmers practiced tethering. Relatively higher proportion (29.66%) of the respondents in Werebabu district practiced tether feeding than Kalu district (16.23%). The overall grazing management in the study area reported that free grazing (34.24%) followed by private grazing (33.7%) and paddock (11.48 %). One of the modification strategies advocated for the typical free-roaming characteristics of animals in the traditional system is tethering feeding method, which confines the animals within a restricted location for grazing. Similarly, during rainy season, the majority of the farmers in Kaffa (72.7%) and in Bench-Maji (77.8%) zone practiced tethering whereas in dry season, the majority of the farmers got their sheep freely graze in Kaffa (78.6%) and in Bench-Maji (70.6%) (Dejen, 2010).

Table 6: Grazing Management Practices of Sheep in the Study Areas

Character	District Kalu		Werebabu		Over all	
Grazing in dry season	N	%	N	%	N	%
Free grazing	61	44.52	64	28.07	125	36.3
Private grazing	60	43.8	63	27.63	123	35.71
Paddock	15	10.95	28	12.28	43	11.61
Tethered	0	0	38	16.67	38	8.33
Zero-grazing	1	0.73	35	15.35	36	8.05
Grazing in wet season	N	%	N	%	N	%
Free grazing	41	26.63	69	33.01	110	32.54
Private grazing	35	22.73	31	14.83	66	19.52
Paddock	28	18.18	24	11.49	52	15.38
Tethered	25	16.23	62	29.67	87	25.73
Zero-grazing	25	16.23	23	11.0	23	6.8

3.7. Castration

Castration of lambs was a common practice in surveyed areas. According to the respondents' information, about 30% of the farmers in the study area were giving more attention to avoid unnecessary mating, while the rests (70%) not have an idea to control unwanted breeding (Table 7).The The major reason for this is possibly the lack of awareness on the importance of castration. All sheep owners in the two districts use traditional castration methods through castrating their sheep the aim of castration in the study area was fattening (57.8%) followed by temperament (32.8%) and to get better market price (32.2%). As the farmer from both districts reported castration was primarily a means of getting fattening, secondly a means of increase temperament of the ram and thirdly higher sale prices at a later date. The present study in agreement with previously study in Debre Libanos and Wauchula indigenous sheep (Bosenu et al., 2014) castrate rams at the age of from 2 and 2.5 years. The aim of castration in the study area was for fattening (57.8%) followed by temperament (32.8%) and to get better price (32.2%). This result in agreement with the pervious study Easter Tigray (Mulata et al., 2013) reported that the reason for castration is for the purpose of fattening and then to get better market price.

Table 7: Farmer's Castration Practiced in the Study Areas.

Castration practices	District Kalu		Werebabu		Over all	
	N	%	N	%	N	%
Yes	18	20.0	36	40.0	54	30.0
No	72	80.0	54	60.0	126	70.0
Reason for castration	N	%	N	%	N	%
Fattening	57	63.3	47	52.2	104	57.8
Temperament	35	38.9	24	26.7	59	32.8
Better price	36	40	22	24.4	58	32.2

NB: frequency of the respondents

3.8. Selection criteria

The selection criteria of rams and ewes in the study area were varied depending on the individual interest. Farmers in Kalu and Worebabo districts were well experienced in selection of future breeding ewes and rams from the own flock of sheep. About 80% of the farmers in Kalu and 70% in Worebabo practice selection. Males were selected at 5 months for Kalu and 4.9 months for Worebabo. The corresponding figures for females were 5.6 and 5.8 months, respectively. Sheep owners in the study area the primary parameters selections of breeding ewes were lambing interval, age at first maturity, body size, twin ability, lamb growth, color, lamb survival and tail type whereas the criteria used for selection of breeding rams were appearance, fast growth, coat color and pedigree. Physical traits in selection of the rams which most of the owners associated with high carcass output and premi-

um price across all the study area, includes wide chest, conformation and long body size.

Lambing interval, age at first maturity, body size, twin ability, lamb growth, color, lamb survival and tail type with corresponding indexes of 0.22, 0.19, 0.17, 0.13, 0.1, 0.09, 0.06, and 0.04, respectively were the major selection criteria reported by farmers in Kalu districts to identify breeding ewes (Table 8). Unlike Kalu farmers in Worebabo, the corresponding value for Ewe owners was 0.22, 0.23, 0.09, 0.12, 0.12, 0.11, 0.07 and 0.04 respectively. Trait like body conformation, fast growth and coat color was the main preferred traits to select breeding rams from the group with the index value of 0.235, 0.194 and 0.15, in that order. However, selection criteria and their index value were varied between districts. Whereas, Kalu district, body conformation (index = 0.258) was ranked first, followed by fast growth (0.218), coat color (0.17), pedigree (index= 0.14) and adaptability (index= 0.063) and) (Table 9). Whereas in Worebabo districts body conformation, pedigree, fast growth and coat color were ranked first, second, third and fourth with index value of 0.207, 0.19, 0.17 and 0.13, respectively (Table 9). Similar selection criteria were used by sheep owners in other parts of the country (Dejen, 2010 and Getachew et al., 2010).

Table 8: Breeding Ewe Selection Criteria Ranked in both Kalu and Worebabo Districts

Selection Criteria	District								Overall index
	Kalu				Worebabo				
	R 1	R 2	R 3	index	R 1	R 2	R 3	index	
Body size	12	21	9	0.17	11	2	8	0.09	0.13
Color	4	12	17	0.09	6	13	15	0.11	0.1
Lamb survival	4	4	8	0.06	6	3	10	0.07	0.065
Lamb growth	4	17	8	0.1	5	19	8	0.12	0.11
Age at first maturity	20	12	20	0.19	23	12	19	0.23	0.21
Lambing interval	25	12	16	0.22	22	12	17	0.22	0.22
Twining ability	17	8	8	0.13	14	7	9	0.12	0.125
Tail fat	4	4	4	0.04	4	3	4	0.04	0.04

Index = sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for particular trait divided by sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all traits

Table 9: Breeding Rams Selection Criteria Ranked in Kalu and Worebabo Districts

Selection criteria rams	Districts								Overall index
	Kalu				Worebabo				
	R 1	R 2	R 3	Index	R 1	R 2	R 3	index	
Body conformation	34	9	5	0.258	36	2	3	0.207	0.235
Color	18	18	25	0.17	11	12	12	0.13	0.15
Adaptability	4	8	3	0.063	3	3	5	0.034	0.048
Fast growth	15	27	12	0.218	1	27	39	0.17	0.194
Age	1	3	1	0.014	0	11	15	0.068	0.041
Libido	11	3	9	0.061	2	16	2	0.072	0.065
Tail fat	4	5	12	0.076	18	6	6	0.129	0.102
Pedigree	3	18	23	0.14	25	12	10	0.19	0.165

Index = sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for particular trait divided by sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all traits

3.9. Major constraints of sheep production

Production constraints, which were defined by Sheep owners in both areas, are presented in Table 10. Among the reported constraints of sheep production prioritized by the respondents in the study area were genotype, feed shortage, disease, drought, inadequate extension service, market and predator. Most of the respondents frequently mentioned diseases as the first ranked sheep production constraint in all districts. Whereas feed shortage was the second problems in Kalu district. This study demonstrated that disease and feed shortage were the major challenges of sheep production in Kalu. However, in Worebabo district the genotype and disease were the most important problems. Even though water was not a major concern in Kalu district, whereas it was to be a major problem in Worebabo (index=0.01). Genotype was considered as a problem across all the districts, but it was not a serious problem in Kalu (index=0.22) as compared to Worebabo (index=0.34). Similar constraints were reported by Hassen et al (2010), Solomon et al (2010) Fsahatsion, (2013);Kedjela Kedjela (2010), Tesfaye (2008) and Tsedeke and Endiras (2011) reported that disease and feed shortage was the most important constraints of sheep production in North Western lowland of Amhara region, Gamogofa Zone, West Wollega and Afar, respectively.

Table 10: Major Constraints of Sheep Production in Kalu and Worebabo Districts

Major constraints	District								Over all index
	Kalu				Worebabo				
	R 1	R 2	R 3	index	R 1	R 2	R 3	index	
Genotype	16	30	14	0.21	12	2	7	0.09	0.15
Feed shortage	14	31	28	0.23	19	20	22	0.25	0.24
Water shortage	0	0	0	0	0	0	5	0.01	0.005
Disease	35	7	23	0.25	48	10	4	0.35	0.3
Drought	2	5	6	0.03	4	19	17	0.14	0.085
Market	4	3	6	0.04	1	0	3	0.01	0.025
Inadequate extension service	18	13	14	0.16	6	11	27	0.13	0.145
Predator	1	1	0	0.08	0	2	5	0.02	0.05

Index = sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for particular constraints divided by sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all constraints; R=Rank

4. Conclusion and recommendation

The flock structures of sheep in the two districts were assessed with the largest proportion of breeding ewes. Sheep was predominant species in both areas, and their contribution for income generation was more than any other farming activities. In the study areas, culling inferior sheep, weaning, record keeping, castrating ram at right age and provision of regular vaccination before disease out breaks were poorly practiced. The office of Livestock and fishery development and kebeles development agents are expected to train farmers on improve management practices to enhance flock productivity and plan appropriate health control measures and introduce fast and efficient veterinary service. Qualitative traits like coat color type and pattern influenced the decision of farmers in choosing animals so determination of economic value for such traits is suggested. In order to minimize the failure of breed improvement programs it is important to involve farmers considering the existing breeding practices, management systems and trait preferences of the community and the multipurpose roles of targeted animals.

Acknowledgment

The authors would like to thank the University of Gondar College of Veterinary Medicine and Animal sciences for the budget and materials. I also pass my grateful to the sheep owners who were a volunteer to answer the semi structure questionnaire and focus group discussion.

Competing interests

The authors declare that they have no competing interests with respect to the research, authorship or publications of this article.

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