COLLEGE OF AGRICULTURE ANDNATURAL RESOURCE

DEPARTMENT OF ANIMAL PRODUCTION AND TECHNOLOGY

ASSESSMENTS OF SHEEP FATTENING PRACTICE AND CONSTRAINTS IN MUHER AKLIL WOREDA,GURAGE ZONE, SNNPRS, ETHIOPIA

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Senior Research Project Approval Form

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ACRONYMS AND ABBREVIATION

AEZ	Agro Ecological Zones
CF	Crude Fiber
CP	Crude Protein
CSA	Central Statistical Agency
EPA	Ethiopian Privatization Agency
IBC	Institute Of Biodiversity Conservation
M.ASL	Meter Above Sea Level
ME	Metabolizable Energy
MWADO	Muher Aklil woredaAgriculture Development office
SNNPRS	South Nation Nationality Regional State
HHs	House holde

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ABSTRACT

A study was undertaken to assessments constraints of Sheep Fattening Systems in Muher Aklil woreda, gurage zone South nation nationality Regional state of Ethiopia. A random sampling technique following a formal qualitative survey was undertaken in three selected kebeles. Thirty households were used for the formal survey of which 63.3% was male and 36.7% was female. The higher proportion of the respondents (56.7%) is found in the age between 25 and 40 ages. Majority (73.3%) of the respondents were educated to elementary level. Majority (66.6%) family size of the respondents were ranged between 5 and 7. Majority (86.7%) of the respondents were married. Majority (66.6%) of the respondents were protestant. Around 44% of respondents kept ewes in their flock composition. Majority (86.7%) of the respondents practiced extensive sheep production systems. Major (60%) sheep production function were for income generation. The higher number of the respondents, used(25.6%) ram for fattening purpose than others. Herd composition indicated that Dyogana sheep the higher proportion (80%) followed by Bonga breed sheep (60%) in Woina Dega and kola kebeles, respectively. Major feed resources for sheep production in the study area were natural pasture. The houses for sheep mainly constructed from locally available materials. Sheep fattening was constrained by different challenges like feed shortage, disease, shortage of capital, lack of appropriate extension approach, shortage of water Feed shortage is very critical constraints in the study area. Disease mainly occurs during feed shortage periods.

***Key words*:** Bonga , Constraints,Dyogana, Fattening

1. INTRODUCTION

Ethiopia has diverse agro-ecological zones suitable for livestock production. Agricultural scenario in Ethiopia is characterized by the pastoralism in low land area, and mixed farming system in mid and highland areas (CSA, 2012). Ethiopia is a home for many livestock species and suitable for livestock production and believed to have the largest livestock population in Africa (Tilahun and Schmidt, 2012). Ethiopia has the largest livestock population in Africa with estimated millions number of cattle 70.29, sheep 42.9, goat 52.4, horse 2.14, camel 8.14, mule 0.38, donkey 10.79 and poultry 56.99 million (CSA, 2020).

In Ethiopia, similar to other developing countries, changes in the demand for livestock products have been largely driven by human population growth, income growth and urbanization (Helen Nigussie et al., 2015).Along with this, large export and domestic market for mutton and live animal has created opportunity for sheep production in Ethiopia. Besides, strategic location of Ethiopia to Middle East is also an opportunity to export meat (Largely from sheep and goats) and live animals to these countries.

Sheep have a great environment adaptability, short production cycle, faster growth rates, easy management, low investment capital and low feed requirement as compared to large ruminants (Azage, 2006). Sheep are major economically important livestock in Ethiopia, playing an important role in livelihood of resource poor farmers. They provide their owners with a vast range of products and services such as meat, milk, skin, hair, wool and manure and as means of saving and investment. Sheep serves as living bank for their owner and immediate cash need and ensures against crop failure specially where land productivity is low and are liable due to erratic rainfall, sever erosion, too frost and water logging problems (Markos, 2006).The income obtained from sheep was used to purchase household commodities and farm inputs (Solomon et al., 2010).

There are several factors contributing to the low productivity of sheep. This include inadequate feed, poor nutrition and lack of improved breed impair the role and productivity of sheep (Belete, 2009; Markos et al., 2006). Diseases, lack of adequate veterinary service and poor housing are also the main constraints for sheep production (Anaeto et al., 2009; Yenesew, 2010). Lack of grazing area due to human population growth and crop land expansion has forced the small scale farmers of Ethiopia to recognize the significance of sheep (Banners, 2000). According to McDonald et al.(2002) and Olfaz et al.(2005), feed types and nutritional levels are related to carcass yield, carcass quality, and fat tissue development and composition. There are many

factors affecting growth performance of lambs. Among these factors, the dietary energy and protein levels and their interaction are probably the most important ones (Haddad et al., 2001; Bellof and Pallauf, 2004).

In many animal production systems, approximately two-thirds of improvements in livestock productivity can be attributed to improved nutrition (Alemu, 2008). Energy and protein are the most required nutrients for sheep production, and their deficiency is characterized by lowered feed intake and poor feed efficiency due to alterations in the rumen function, which results in poor growth and muscular development (Suliman and Babiker, 2007; Stanton and Levalley, 2006). Sheep production exists in a variety of environments under different production systems. However, the growth and reproduction ability of sheep in Ethiopia is low. The sheep producers may not exactly explain animal nutrient requirement related factors that contribute to low productivity of the animals. But, scientific works put nutrition to be the major determinant factor affecting productivity.

Under the extensive systems, sheep have the capacity to express the full range of their natural behaviors, although some aspects of their normal social organization are disrupted. These disruptions include weaning earlier than would occur naturally, segregation of sheep on the basis of age and sex and various husbandry operations, which can cause pain or stress (Kilgour et al., 2008).

Muher Aklil is one of the 16 districts of Gurage zone found in Southern Ethiopia, where breeds of sheep are found. There are many farmers owning sheep who make part of their income generation from the sale of live animals. However, the production system of sheep in the study area is largely based on extensive type, which is not proper for the sheep to optimize their productive potential. Due to the nature of the management systems, which are traditional, the sheep fattening, are challenged with several constraints; such as feed problems, lack of health care, poor housing, etc.

Hence, the producers are not in a position to obtain optimum performances from these animals.

Therefore, there is a need for improvement of the fattening practices for the sheep. To this effect an appropriate intervention of stakeholder is very critical. However, there is lack of documented information regarding the conditions and fattening practices of the sheep in the District. This study is, therefore, aimed at generating the required information and producing a document that can fill the gap.

1.2. Statement of the problem

In spite of the presence of small ruminants the productivity of the animals i.e. meat of sheep (mutton) remains low in many developing countries including Ethiopia, for different reason: such as:-

in adequate numeration, poor genetic potential, in adequate sheep health service, and other management's related problem more over this suggest.

That the total number of sheep when comparing this population with the production level, is very low so far, to overcome this constraints there was, limited information on constraints of sheep fattening application in the study woreda of muheraklil,

1.1 Research objective

1.1.2 General Objective

To Asses Sheep fattening system and constraints of sheep fattening in Muher Aklil woreda of Gurage zone.

1.1.3 Specific Objectives

- To indicate possible remedial action in accordance with the major sheep fatting constraints in muhieraklil woreda of gurage zone
- To find out the most effective fatting system among existing once for general recommendation

1.4 Research question

1 What about the majior sheep fatting factiors in study area

2What are the major couses of sheep fatting in the study are

2 LITERATURE REVIEW

2.1 Sheep Production Systems in Ethiopia

2.1.1 Sheep-barley or sheep production system

It prevails in high altitude areas (above 3000m.a.s.l.) where sheep are the main source of cash income, meat, manure, skins and coarse wool for traditional cottage industry to produce blankets, rugs and mattresses by the local handcrafts. In extreme altitudes, precipitous terrain, recurrent droughts, cold temperature and windy climate limit crop production to sheep-barley or just sheep production. Sheep breeds of this system (for example, the Menz breed) are perceived to be the hardiest sheep types evolved under stressful environments. The sheep breeds thrive well with slow growth rate but considerably high annual reproduction rate under gastro-intestinal parasite infestations, recurrent drought and grazing scarcity (Lemma, 2002).

2.1.2 Mixed crop-livestock system

This covers areas in altitudes between1500 and 3000 m in which sheep are kept in small flocks as a source of cash income, meat, manure, skins and in some areas for coarse wool. The sheep flocks are kept along with other livestock species (cattle, goats and equines) in rather reduced communal grazing areas, unsuitable for cropping, or fallows, waterlogged land and steep slopes (Mengistu, 2000).

2.1.3 Pastoral production system

Pastoral production system is located in arid and semi-arid lowland areas below 1500 m.a.s.l. in which livestock rearing is the mainstay of people. Livestock and livestock products provide subsistence, either directly as milk, milk products, meat and blood, or indirectly in the form of purchased cereals through sales of animals. Sheep are raised mainly for cash income (mainly through export) and meat, except in isolated areas where they also keep them for milk (for example, in Afar and parts of Tigray regions). Other important species in this system include cattle, goats and camels. Constant or partial herd mobility is a strategy to achieve feed and water. Pastoralists have no permanent home and, hence move with their herds within their traditional territory (Mengistu, 2000).

2.1.4 Pastoral and commercial production system

Represent a very small proportion of sheep production systems in Ethiopia. Sheep in these systems are managed either intensively or semi intensively. Privately owned ranches, farms or governmental sheep breeding and multiplication centers constitute this type of production system. Privately owned ranches not only breed sheep for market but also purchase grown rams from nearby farmers, and fatten and sell them during festive occasions. Some ranches, however, export sheep to the Middle East either as live animals or as mutton. Established by government (parastatal), two ranches (namely, Debre Berhan and Amed Guya) have been crossbreeding and distributing crossbred rams to farmers on cost-recovery basis until banned in 2001 when maedi-visna disease was confirmed in crossbreds and associated sheep flocks.

2.2 Breed and geographical distribution of sheep

Combining the morphological appearance and management systems, 18 indigenous sheep populations are identified, out of which Menz, Arsi-Bale and Dangila are found in the central highlands of Ethiopia (Markos, 2006). However, based on molecular characterization, Solomon (2008a) reported nine sheep breeds in the country.

There are also exotic sheep breeds which imported and are being utilize in Ethiopia. IBC (2007) reported that the major exotic sheep introduced for wool and mutton production and still in use are Awassi and Dorper sheep breeds.

Menz sheep, numbering about 1.5 million, are indigenous to the highlands of Ethiopia and characterized as fat tailed, medium-sized (30-35 kg adult weight), predominantly black, brown or white in plain and patchy coat color pattern, and are raise for meat and coarse wool (Solomon *et al.* 2008a).

2.3 Flock sizes of sheep

Generally, about 60% of the total sheep flock is concentrated in the highlands of Ethiopia (Solomon *et al*, 2008a). The flock size of sheep is also different in different geographical areas of the country. According to Solomon *et al.* (2010), large flock size of sheep is maintained in subalpine and arid lowland areas like in Menz and Afar areas, respectively, where sheep are the main source of livelihood as crop production is unreliable.

Similarly, in Lallo Mama Midir Wereda, sheep constituted 80% of the livestock production (Abebe *et al*., 2002). Getachew *et al*. (2010) reported that the mean flock size of sheep in Menz and Afar areas of Ethiopia was 31.6 and 23.0, respectively. Contrasting to this, in South Western parts, sheep production system is characterized by a small flock size, free grazing, kept on crop-livestock mixed farms, considered as a sideline business by their owners and is given marginal care (Berhanu and Aynalem, 2009). Likewise, Belete (2009) reported, 3.6 average flock sizes of sheep in Goma district.

2.4 Sheep productivity

In general, lambs from tropical breeds have lower birth weights and weight gains of lambs this result in lower weaning weights and consequent lower slaughter body weight. Ethiopian sheep are slaughtered on average at about 12 months of age with live weights ranging from 18–20 kg (Kassahun, 2000). Sheep finishing activities are undertaken in rural and urban areas of Ethiopia to improve the low slaughter weight of sheep. Younger growing animals utilize feed nutrients more efficiently than older and mature animals during fattening or finishing (Alemu, 2008). But not in all part of the country sheep fattening activities are undertaken. According to Berhanu and Aynalem (2009), although there is a good market price, castration and fattening are not frequently exercised in South Western part of Ethiopia. Different ram lamb fattening experiments undertaken by different authors showed that dry matter and daily body weight change of sheep are affected by feed and breed types.

Either litter size or sex or both influences initial body weight and the next growth rates of sheep; as a result, lambs born as single and male were heavier than the twin and female lambs (Berhanu and Aynalem, 2009). Annual reproduction rate of local sheep breed was 1.36 lambs per year and average litter size was 1.03 lambs per ewe per lambing, which is also affected by seasons (Abebe et al., 2002). The same authors reported that on average lambs weighed 1.76 kg at birth, with body weight gain range from 51.45 to70.57 g/day.

According to Belete (2009), on average litter size, birth weight and weaning weight of sheep were found to be 1.37, 2.86 and 11.59 kg, respectively.

As cited in Getahun (2008) age at first parturition for Menz sheep breed ranged from 423 to 474 days and the post weaning average daily gain was 50 grams.

2.5 Socio-economic importance of sheep

Sheep are playing important economic role in Ethiopia in the form of meat, milk, skin, hair, horns, manure and urine, cash security, gifts and religious rituals (Adane and Girma 2008; Wooster, 2005). Similarly, (Abebe *et al*., 2002) pointed out that sheep provide income through the sale of live animals, wool and hides, serve as on-hand assets, and have the socio cultural value for the resource poor farmers. In Ethiopia, especially, those sheep endowed with attractive coat-colors have always exceeded market values of their counterparts (Mammo and Wude, 2012). (Dinksew and Girma, 2000) reported that sheep production is becoming a viable alternative for urban production and is considered to fulfill parts of home consumption and income needs during severe shortage of cash. (Solomon et al., 2008b) reported that coarse wool usually used for the local carpet- making industry is produced from Menz sheep and other sheep in the central and north central highlands.

2.6 Constraints for sheep fattening

2.6.1 Lamb mortality

Lamb mortality is the single most important constraint limiting productivity Studies indicate that up to 50% of the lambs born can die mainly due to diseases and other causes such as adaptation failure, dystocia, cold stress, starvation and mis mothering (Hinch et al., 1986). Information is required on pattern and causes of mortality to improve survival.

2.6.2 Feed scarcity

Sheep in the tropics primarily graze natural pastures or utilize crop residues and their by-products, whose supply and quality fluctuate seasonally. In the highlands of Ethiopia, the communal grazing land is diminishing due to encroachment by cropping land because of increased food demand due to the human population growth (Dibissa, 2000). The land is degraded (Sundquist, 2003) due to high and increasing human and livestock population worsened by poor land use policy resulting in low productivity of the system. Overgrazing, nutrient depletion due to limited recycling of dung and crop residues in the soil, low use of chemical fertilizers, declining fallow periods, soil and organic matter burning, soil erosion and Deforestation is all major concerns (Desta et al., 2000). Inadequate access to feed influences the severity of several infections, particularly in young animals (MacRea, 1993). Isolated efforts to

solve this problem may alleviate only part of the problem. Instead, integrated efforts should involve combined efforts of improving land tenure policies to promote natural resource management, livestock productivity through reducing stressors (e.g. diseases) by herd/flock health management, genetic means (e.g. within and between breed selection, crossbreeding), and improving productivity per unit of Input than keeping large number of mediocre animals.

Furthermore, efforts should be made in family planning to limit human population growth rate and exercise human mobility through re-settlement alternatives in less degraded and under-utilized but productive areas within the country.

2.6.3 Inadequate utilization of indigenous sheep breeds

Despite the fact that huge sheep genetic diversity does exist in the country, no comprehensive analysis into the variation of growth potential of the indigenous breeds has been undertaken. For example, almost none of the sheep breeds from the Ethiopian highlands are exported due to darkening of the meat after slaughter which is less liked by importers (Aklilu et al., 2005). But this 'defect' has not been investigated. The indigenous sheep breeds of Ethiopia, though often been considered low-producers without careful analysis of their output per unit of input, are highly adapted to low input systems or are naturally selected for survival under suboptimal and disease ridden environments. They thrive and produce on marginal and often uncultivable lands. These breeds need to be well characterized, documented, improved and conserved through proper utilization.

2.6.4 Transport and infrastructural problems

Include lack of road transport system. Sheep are often transported on-foot and trek long distance Without water and feed. In some cases, they are transported in unsuitable vehicles or lying on top of public transport (bus) by immobilizing them with a rope. Overloading frequently occurs as well as driving for long hours without rest, water and feed. This predisposes them to infections, injuries, and stresses, the latter seriously affecting meat quality.

Market yards do not have required facilities and operate without water and feed, shades, partitions, scales, crushes, loading ramps and toilets (Aklilu et al., 2005). Most abattoirs have no holding grounds and hence animals cannot be rested and treated.

2.6.5 Lack of trained personnel and absence of recording

Despite the contribution of the livestock sector to the household and national economy, trained manpower is very limited. Specialization in sheep is missing and trained personnel in one species may be on call to contribute in every species as necessary. Recording in general is hardly

practiced in any livestock species. Incomplete records available for ruminants are mainly in research stations and government owned ranches. Farmers mix different livestock species as a strategy to meet the family food demand – cattle are kept mainly for traction and milk, sheep and goats for income and meat, equines for transport and chickens for income, egg and meat. This together with illiteracy at smallholders' level, lack of coordination and facilitation at the extension level, and inadequate knowledge and skill on genetic evaluations even in personnel of research stations, are all major impediments.

There are several factors contributing to the low productivity of sheep. This include inadequate feed, poor nutrition and lack of improved breed impair the role and productivity of sheep (Belete, 2009; Markos *et al.,* 2006). Diseases, lack of adequate veterinary service and poor housing are also the main constraints for sheep production (Anaeto *et al*., 2009; Yenesew, 2010). Diseases reduce the productivity of sheep with the mortality rate of 20- 30% and causing for lamb losses before one year of age in Ethiopia (Biffa et al., 2006).

The major causes of morbidity and mortality of sheep are fasciolosis, pneumonia, sheep pox, blackleg, anthrax, endo-parasites, ecto-parasitic and infectious diseases (Tsedeke, 2007).

Moreover, Abebe et al.(2002) stated that lack of capital and low price of sheep are some of the constraints of sheep production. Similarly, Adane and Girma (2008) pointed out that long marketing channels and lack of market information, low product quality, inadequate provision of credit services and low average reproductive rates are the major constraints of sheep production. Niftalem (2000) also reported that unreliable rainfall, increasing human population and landholding reduction are threats to improved sheep production in mixed farming systems.

Sheep production in Ethiopia suffers from feed shortages at all levels due to deficit in the national feed balance as a results of seasonal availability of feed in the highlands and recurrent and prolonged drought in the lowlands (Yenesew, 2010; Alemu, 2008). In Ghana, also Baah *et al*. (2012) observed that in most cases, even though, producers provided feed in *ad libitum* quantities to their animals, the quality of the feed is questionable.

3 MATERIALS AND METHODS

3.1 Description of the Study Area

Muher aklil district is one of the 16 districts of gurage zone South nation nationality peoples Regional states of Ethiopia. And located between 38.29 and 38.88 east Longitude8.12 to 8.33 north latitude .It borders with gedbano gutazerwelene north meskan in east ezza in south and kebana in the weast and distance from52 km from the capital city of Gurage zone, Wolkite and 270km from Hawasa,capital city of South nation nationality peoples of regional state and 155km from Addis Ababa, the capital city of Ethiopia,. It lies between 1720 to 3346 m. a. s. l. There are 30 Kebeles in the District. From those 15 Kebeles are "Woyna dega" (midland) , 7 Dega (highland)and 8 kebeles are "kola" (lowland). It receives an annual rainfall that ranges between 1000 to 1200 mm, with mean annual temperature between 19 and 21^{o}c.. It has total land area of 47,484 hectare; of which about 45,484, hectare is occupied by rural house hold farmers, while the remaining 2000 hectare is hold by urban dwellers. The topography of the District is 2.57% mountain, 96.43 plateau and 1% others (MWADO, 2019)

Sampling and Sampling size:

The research design was done by using quantitative method i.e it was collected via structured and semi structured question are ,interview and discussion with target groups coud be analyzed by means of descriptive statically analysis ,such as,Table,percentage and Graphs was used to percent result . Muher akilil district has 30 rural Kebeles which classified into three agro-ecologies among which 15kebeles were "Woynadega" (Midland) and 8 kebeles are "Kola'' (lowland) and 7keble dega (highland) For the study to make a representation based on Agro-ecology one and two kebeles were selected nonrandomly from kola and Woyna-degas respectively. From each Kebele 10 Households will be selected purposively based on the experience of fattening and potential of sheep production. Totally 30 households (3 kebeles *10 households) were included in the study to assess constraints of fattening in muher akill District,

Table 1: Sample size and Agro-ecology of selected three kebeles

Selected Kebeles	Agro-ecology	Sample size
Wukye	Kola	10
Gnabe	Woina dega	10
Teklehymnot	Woina dega	10
Total		30

3.2 Data Collection and sources of data to be collected

Both primary and secondary data was collected from HHs, Group discussions, Key informant interviews and from relevant organizations in the district, respectively. A questionnaire survey was employed to collect the data from the selected HHs. Checklists designed to confirm the data gathered from the HHs survey was used to collect data from the group discussion and Key informants interview. The group discussions were carried out with selected HHs who has long experience in sheep production in the two agro ecologies. The Key informant Interview considers experts in sheep production, knowledgeable elders, and stake holders working in the area in Muher aklil destrict.

The data was collected and designed to generate data on socio-economic characteristics of Household profiles (sex, age, family size, education level, livestock and crop production), sheep production systems (number and types of breed reared, trend of sheep production performances yield, economic importance of the sheep, management practices (feeding, housing, watering systems, veterinary services, and etc.) and opportunity and challenges of sheep production in the study area.

3.3 Data Analysis

Simple descriptive statistics was employed in order to have a summarydescription of the data was collected from the survey. This involved the use of tables, percentages, means, frequency distributions, charts and standard deviations to describe parameters such as socioeconomic characteristics, sheep meat performances, sheep ownerships.

Priority index = (F1*4) + (F2*3) + (F3*2) + (F4*1)/ F total.

F1= Frequency of the first rank;

F2= Frequency of second rank;

F3 = Frequency of third rank;

F4= Frequency of fourth and FT=Frequency of total respondents.

4 RESULTS AND DISCUSSION

4.1. Socio- demographic characteristics of households

The socio-demographic characteristics of respondents in both agiroecologys are indicated in Table 1. The data showed that the majority (63.3%) of interviewed respondents were male headed. This finding agrees with the results of Taye (2006) in the Southern Ethiopia who reported 95% male headed households were hold sheep for fattening purpose. This suggests that sheep production activities are mainly the duty of men even though they are performed by females in small amounts.

Table 2: Socio-economic characteristics of respondents

Variable	Categories	Frequency(Number)	Percent
Sex	Male	196	63.3
	Female	113	36.7
Age	25-40	175	56.7
	41-60	93	30
	>60	41	13.3
Educational status			
	Illiterate	31	10

	Read and write only	2		6	.		7
	Elementary	2	2	7	3	.	3
	High school	2		6	.		7
	Diploma	1		3	.		3
Family size	1 - 4	5		1	6	.	7
	5 - 7	2	0	6	6	.	6
	> 7	5		1	6	.	7
Marital status of household head							
	Single	2		6	.		7
	Married	2	6	8	6	.	7
	Divorced	1		3	.		3
	Widowed	1		3.3			
Religion of house hold head							
	Protestant	20		66.6			
	Orthodox	3		10			
	Muslim	7		23.4			

The higher proportion of the respondents (56.7%) is found in the age between 25 and 40 ages. Presence of Higher proportion of active working age may be an opportunity for active participation in agricultural activities in the study area. Majority (73.3%) of respondents were educated to elementary level and the rest 10%, 6.7%, and 3.3% were Illiterate, Read and write only, and diploma, respectively. Similar to the current results, Edea et al.(2012) reported that 22.8%, 3.53%, 70.2%, 3.50% of the respondents were illiterate, could read and write, had attended primary school and reached secondary school in western and south-western Ethiopia, respectively. Therefore, providing access to education has a role in accepting the new technology and great attention should be needed in this aspect. Majority (66.6%) of family size of the respondents were ranged B/n 5-7. And the remaining, (16.7%) of the respondents family size were ranged between 1-4 and >7, respectively. High proportion large family size household indicates that there will be enough working force to undertake livestock production in the study

area. Majority (86.7%) of the respondents was married and the rest 6.7%, 3.3% and 3.3% of the respondents were single, divorced and widowed, respectively.

4.2 .Livestock holding and Composition

Livestock holding and livestock composition of the study area is presented in table 2.The agro-ecological Zone of the Woreda is suitable for mixed farming activities because of these reason all farmers participated mixed livestock production system. Farmers grow maize, , enset which are the major staple diet. Natural pasture, Crop residues and by product from crops are mainly used as source of feed for livestock in the study area. Jifar et al. (2016) reported that most of crop residues are used as livestock feed but their supply is seasonal.

According to respondents the major livestock species raised in the study area including cattle, sheep, goats, donkey, horse and poultry. The total percentage of cattle, sheep, goats, donkey, horse and poultry reared in the study area was 15%, 20%, 9.3%, 3%,0.3% and 52.4% respectively, in the study areas. From this majority (52.4%) of poultry were reared by the respondents. The flock composition of sheep showed variation from farmer to farmer based on purpose of keeping and feed availability. As indicated in table 2: the percentage of flock composition of the interviewed respondents was 29.5%, 44.9%, and 25.6% for, lamb, ewe and ram respectively. In addition, the percentage of flock composition of the interviewed respondents was 33.3%, 44.4%, and 22.3% for, kids, ewe and rams respectively. In similarly way (Solomon G, 2010) reported in Ethiopia livestock specially cattle play a pivotal role in the per dominantly crop livestock mixed farming system, by providing food, cash, income and mostly importantly, draught power.

Table3: livestock holding and composition in the study area

Livestock species	No. of livestock	%
Cattle	58	15
Sheep	78	20
Lambs	23	29.5

Ewe	35	44.9
Ram	20	25.6
Goat	36	9.3
Kids	12	33.3
Doe	16	44.4
Bucks	8	22.3
Donkey	12	3
Horse	1	0.3
Poultry	204	52.4
Total	389	100

4.3.Production system and purpose of keeping sheep

Purpose of sheep production in the study area is presented in figure 1. Majority (86.7%) of the respondents practiced extensive sheep production systems and the remaining (13.3%) of the respondents practiced slight semi-intensive sheep production systems in the study areas it is indicated in figure 2: Farmers in the area rear sheep for three main purposes: to get cash income, saving and for home slaughter on festivals.

. Accordingly, about 60%, 30% and 10% respectively sheep kept by respondents. Based on the survey result, male sheep at young age (from 3 to 12 months of age) were mostly slaughtered for home consumption. According to (Gatenby, 1986), Ethiopia is one of the important sheep rearing countries in Africa. Smallholder sheep producers in the study area rear sheep for two main purposes: for cash income and home slaughter during festivals. Farmers use sheep manure for crop production. In addition to the income farmers get from sheep selling this practice increases income indirectly. Most of the farmers slaughter or sell sheep during Easter, New Year and

Christmas. According to Devendra and McLeroy (1982), most traditional sheep in the tropics are maintained as subsistence animals supplying meat, skins, hair, and manure and to some extent wool. The farmers in the study area are subsistence sheep producers.

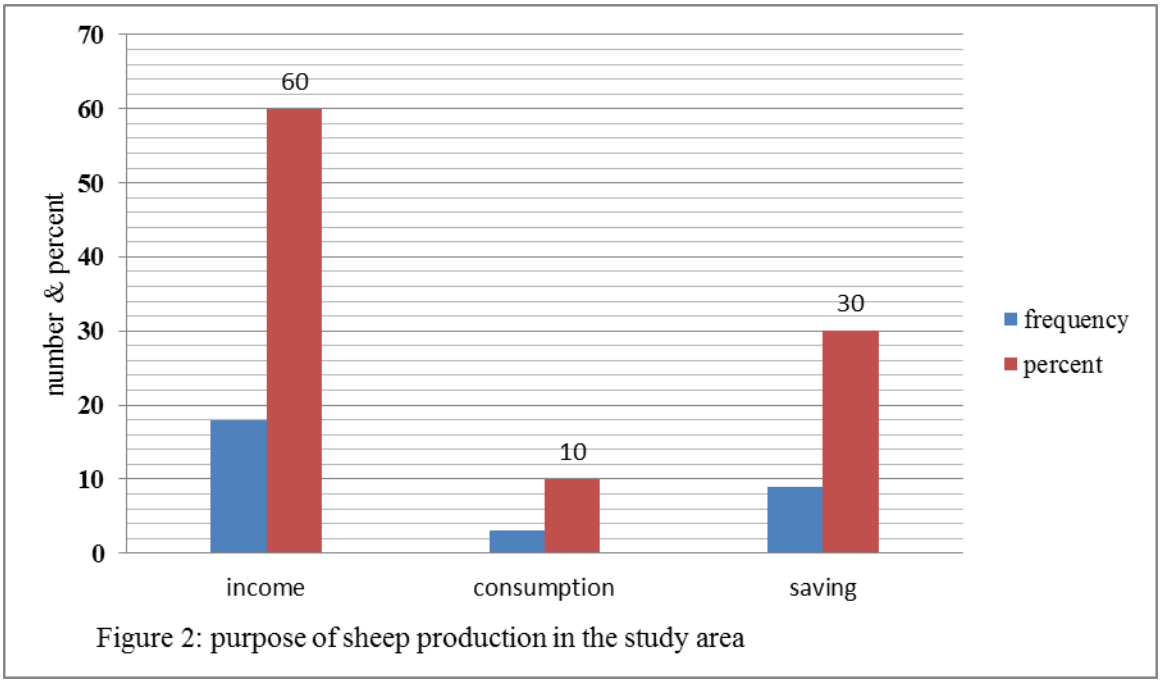

Figure 2: purpose of sheep production in the study area

4.4.Fattening systems in the study area

Sheep fattening system of the study area is presented in figure 3.Majority (90%) of the respondents practiced traditional fattening systems and the remaining (10%) respondents practiced agro industrial byproduct based fattening system. The traditional fattening system is considered to the most dominant in sheep fattening system under smallholder farmers.

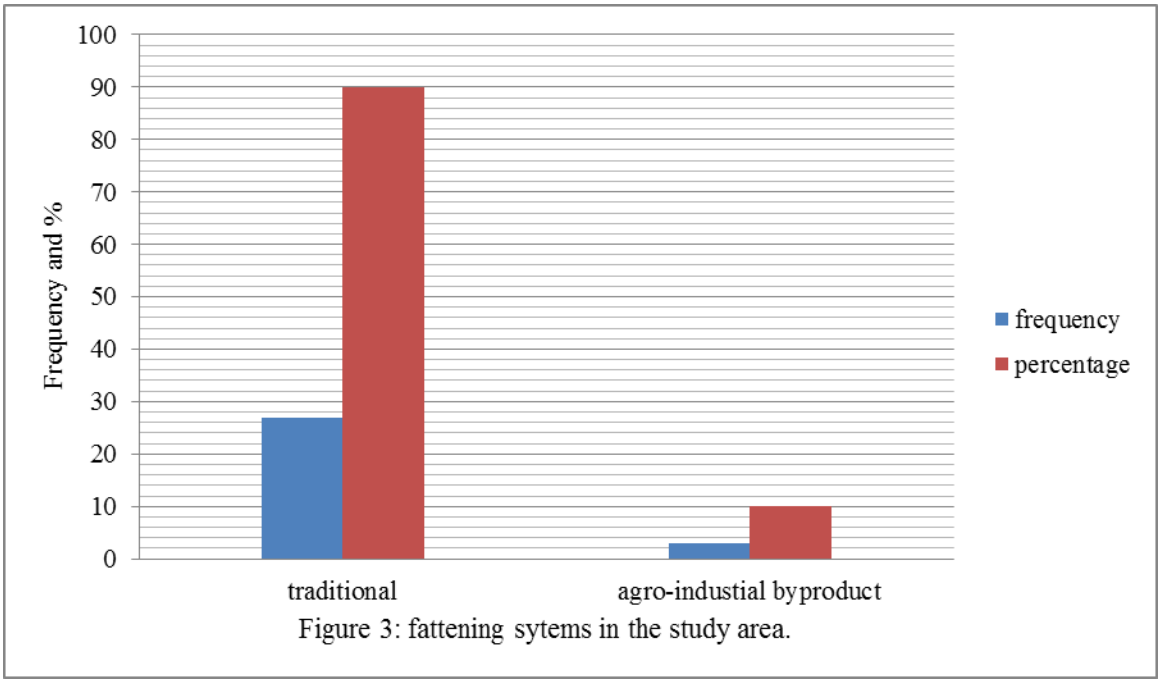

Figure 3: fattening sytems in the study area.

4.5.Breeds of the sheep in the study area

Available sheep breed, composition of sheep type and sheep fattening process component in the study area is presented in table 4 and 5. Differnt sheep breeds were identified from in the study district: Among the differnt breeds two of the sheep breeds i.e., Dyogana and Bonga sheep were dominantly found. Bonga sheep are long fat-tailed and hairy and large size Dyogana sheep are also long fat tail domint colours are brown and fawn belly is lighter is especially in adult ewes.Those breed, mostly found in South National nationality peoples Regional State, Ethio. Based on respondents' opinion in the area, there was Dyogana breed is being introduced to the highland kebeles and Bonga breed to the lowland kebele. According to the respondents, both Dyogana and Bonga breed are disease resistant.

Table 4: types of sheep breed in the Muher aklildistrict

Types of sheep breed	Agro-ecology					
	Mid land and n=20		Lowland n=10		Overall n=30	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Dyogana local bred	16 4	80	4	40	20	66.7
Bonga breed		20	6	60	10	33.3

Table 5: source, types and frequency of fattening sheep in Muher aklil District

Variables		Midland (n=20)		Lowland(n=10)	Overall n=30	
		Genabe(n=10)	Teklhymanote(n=10)	Wekye(n=10)	Midland (n=20)	Lowland (n=10)
Sources of fattening	**Own production**	7(70)	6(60)	7(70)	13(65)	7(70)
	Immediate Purchase	3(30)	4(40)	3(30)	7(35)	3(30)
Type of sheep prefer for fatter purpose	Ram	4(40)	4(40)	5(50)	8(40)	5(50)
	Wether	2(20)	2(20)	1(10)	4(20)	1(10)
	Lamb	2(20)	3(30)	3(30)	5(25)	3(30)
	Culled ewe	2(20)	1(10)	1(10)	3(15)	1(10)
Frequency of sheep Fattening per year	Only one time	1(10)	2(20)	1(10)	3(15)	1(10)
	Two time	3(30)	4(40)	6(60)	7(35)	6(60)
	Three times	6(60)	4(40)	3(30)	10(50)	3(30)
	Four times	0(0)	0(0)	0(0)	0(0)	0(0)

The source of fattening sheep in the study area were 65% and 70% own production in midland and lowland agro-ecology of the study area, respectively. The remaining 35% and 30% were immediate purchasing from nearby local market during the time of fattening midland and lowland agro-ecology of the study area, respectively.

In respondents' preference of sheep for fattening; the mid land agro-ecology preference of respondents for fattening were ram (40%), lamb (25%), wether (castrated ram) (20%), cull ewe (15%). From the lowland agro-ecology they preferred ram (50%), lamb (30%), wether (castrated ram)(10%), and cull ewe(10%) in the study area.

As it is indicated in Table 4: the higher number of the respondents, the type of sheep for fattening purpose were ram, lambs and wether (castrated ram) were preferred mostly by respondents. The reasons for this were the preference of the demands or market need and attain their weight as fast as possible.

4.6.Major feed sources of sheep

Majority (56.7%) of the respondents the main feed resources for sheep production in the study area were natural pasture. The remaining 20%, 13.3%, and 10% were crop residues, House Hold wastes and agro-industrial byproducts respectively. According to Byaruhanga C et. al (2015)Natural pasture and crop residues do not fulfill the nutritional requirements of animals particularly in the dry season due to poor management and poor quality.

About 36% of the farmers responded that the communal grazing lands had decreased in the study area. This resulted in more animals grazing on a limited area of grazing land. This further resulted in overgrazing and poor productivity of grazing lands. Farmers implemented different strategies to cope the feed shortage problem. Some farmers (30%) have private grazing lands to supplement their animals during feed scarcity period in the rainy season. In addition, farmers supplement weeds from crop lands, weak maize plants, maize leaves and 'Gariba' of chat during this period these feed resources are low in CP content and poor in digestibility. According to (Gatenby, 1991), the minimum protein level for maintenance is about 8% on dry matter basis. More productive sheep, rapidly growing lambs and lactating ewes, need about 11% CP in the feed on dry matter basis. Supplementing sheep with better quality feed resources during this period is essential to improve sheep productivity. If increased productivity is needed, efforts should be made to increase the quantity as well as the quality of feed given (Charry et al., 1992). There were different feed supplements for sheep in the study area. The main locally available feed supplements are maize grain, food left over and Atella. From these feed supplements Atella has high CP content in some cases it is reported that its CP content is 20.2% (Adugna, 2007) and can be used as a protein supplement to sheep production during the dry season. Feeding Atella

during this period might not be possible, because it is not available year round. It is mostly available when the farmers make the local alcoholic beverage.

In the farming system sesbania is available by most households and can be used as a protein supplement. According to (Abebe, 2008), supplementation of Sesbania sesban at 30% of the ration of ewes improves growth rate and reproductive performance of sheep. According to the same source, lambs fed sesbania at 95% of the supplements had an ADG of 35 g per day. Supplementation with sesbania improved the proportion of ewes conceived by 17% over supplementation with concentrates (Abebe, 2008). Generally, it is concluded that Sesbaniasesban is a potential supplement and can be used to substitute commercial concentrates for smallholder farmers in the Ethiopian highlands. From the agro-industrial by-products available Noug seed cake is common in the study area.

Table 6: Available Feed resource in Muheraklil Worda

Feed Resources	Agro-ecology					
	Midland n=20		lowland n=10		Overall n=30	
	Freq.	%	Freq.	%	Freq.	%
Natural Grazing	12	60	5	50	17	56.7
Crop Residues	4	20	2	20	6	20
House Hold wastes	2	10	2	20	4	13.3
Agro-industrial byproducts	2	10	1	10	3	10

It is used by some of the farmers for sheep fattening purpose. In the lowland kebele, there are more indigenous fodder trees available in the grazing lands. According to (Gatenby, 1991), fodder trees are fed to sheep in many parts of the world.

Many species are legumes and their leaves have very high levels of protein. But several species contain harmful substances, particularly tannins, so only small quantities of these feed should be fed to sheep. Feeding locally available protein supplements is feasible and makes the sheep production more economical.

Feed shortage occurs two times per year. From July to end of October crop lands are covered by food crops. As the grazing land will be overgrazed and poor in productivity, the animals have less feed to eat during this season. There was a relationship between feed shortage and sheep disease and death incidence period.

Sheep morbidity and death is high from July to end of October may be due to severe feed shortage which may predispose the animals to low disease resistance.

In addition to this, during feed shortage period the sheep may consume poisonous plants which may predispose them to diseases and death.

According to respondents there is a difference between the two sheep breeds in feed demand. Dyogana breed demands more feed than Bonga breed. According to (Gatenby, 1991), larger sheep eat more feed than smaller sheep. Due to body size difference, Dyogana sheep may require more feed than Bonga sheep within the same environment and physiological status.

The farmers expend less money on feed for sheep production. Most of the farmers (73% of respondents) do not buy salt for sheep supplementation purpose.

However, some of the farmers (7% of respondents) buy noug seed cake for sheep fattening purpose. These feed costs are low considering the amount of supplement given and the price of these feed resources. According to (Charray et al., 1992), the level of expenditure on feed is related to the production system employed.

4.7.Housing of sheep

The sheep houses are constructed from locally available materials. Construction of the sheep house from locally available materials makes it economical. However, houses constructed from locally available materials are less durable and can be destroyed by fire easily when compared with modern structures. Most of the sheep houses are corrugated iron sheet roofed houses (90%) may predispose sheep to cold stress and eventually to respiratory diseases. As most of the sheep house floor surfaces are rough this may injure the sheep and predispose them to infections. Sheep house cleaning frequency differs between house types, agro-climatic zones and seasons.

During the rainy season floors get muddy easily and cleaning frequency is more frequent. In addition, as the ambient temperature is high in the lowland kebele the floors get dry easily so the households clean floors less frequently when compared with the highland kebeles. As most of the disease causing organisms are killed by sunlight and drying, the sheep house should be kept light, well ventilated and the floor dry (Gatenby, 1991).

Table 7: Reasons, Types and frequency of cleaning in the study area

Reasons of housing sheep and Types of house constructedand Frequency of cleaning house	Agro-ecology					
	Mid land (n=20)		Low land, (n=10)		Overall (n=30)	
	Freq.	(%)	Freq	(%)	Freq	(%)
To protect from thieves and predator	12	60	7	70	19	63.4
To protect from rough weather	7	35	3	30	10	33.3
to provide shelter any time	1	5	0	0.0	1	3.3
Local house	19	95	10	100	29	96.7
Modern	1	5	0	0.0	1	3.3
Daily	20	100	10	100	30	100
Once in two days	0	0.0	0	0.0	0	0.0
Thrice a week	0	0.0	0	0.0	0	0.0

4.8.Diseases control problem

Majority (74%) of the respondents in the study area take their sheep to the veterinary clinic when they sick this indicated that Veterinary service provision is high in the study area. Generally, veterinary clinics are near from farmers' residences. Hence, farmers who are located in near areas from the veterinary clinics buy drugs from the veterinary clinic and the remaining (26%) respondents treat their sheep by ethno-veterinary methods. They do not have training or education on veterinary science. Hence, this practice encourages disease resistant microbes to develop in animal health. Animals which originated in one place are considered to be more disease resistant to the locality and more adaptable (Gatenby, 1991). According to the opinion of the respondents in the study area both Dyogana and Bonga breed are more resistant to diseases.

In addition, majority (85%) of the respondents practiced vaccination their sheep and the rest (15%) do not practiced vaccination to their sheep.

4.9.Sheep fattening constraints

There are several sheep fattening constraints in the study area .According to EARO (2001b), feed shortage, diseases and parasites, animal management, genotype and genetics and socio-economic and institutional constraints are the main problems in sheep and goat production in the country.

Feed shortage is very severe especially in the study area. This problem is caused by cultivation of grazing lands for crop production as the human population is increasing. This resulted in overgrazing and poor productivity of grazing lands. Most of the locally available feed resources are poor in nutritive value. According to (Gatenby, 1991), the minimum protein level required for maintenance is about 8% in the dry matter. The utilization of improved forages and agro-industrial by-products in the study area is low. To improve feed quantity and quality, several measures should be taken.

Introduction and production of improved forages and better utilization of the available feed resources are the main alternatives.

Forage development strategies which fit the farming system should be implemented. According to (Gatenby, 1986), growing improved forages needs great resources and practices which need more resources that are more applicable in intensive sheep production systems. As the study area is one of the main maize and wheat growing areas, under sowing forage legumes with these crops is a suitable strategy (Daniel, 1996). According to the same source this practice increase both forage production and soil fertility. Growing improved forages on private grazing lands is feasible to increase feed production in the area.

Improved forages are better in productivity and nutrient composition than indigenous ones (Alemayehu, 2002). Better utilization of the available improved forages in the area especially sesbania is essential. Supplementation of improved forages should be done strategically during feed and nutrient scarcity periods. In addition to forage crops, utilization of better quality locally available household by-products (Atella and Household wastes), indigenous fodder trees and agro-industrial by-products are additional alternatives to alleviate the feed scarcity and quality problems. From the current study it was observed that the severity and scope of the sheep production constraints differed from kebele to kebele, even within the same kebele. For instance,

water shortage was the main problem in Teklhymnot kebele, but it was not the main problem in the Genabe and Wekye kebeles.

Disease mainly occurs during feed shortage periods. It may predispose the animals to low disease resistance.

According to Gatenby (1986), to alleviate these problems sheep production should not be considered in isolation from other entrrprises. In addition, to bring successful improvements in sheep production the biological, social and economic factors should be considered thoroughly. The type of improvement appropriate for a particular area depends on the system of production and the constraints acting on it (Gatenby, 1986). Disease lowers the productivity of animals.

According to (Gatenby, 1991), well-fed animals are less likely to become ill than underfed animals.

In addition, during feed shortage period (dry season) animals may consume poisonous plants. Sheep death occurs mainly at the end of the rainy season. This may be due to feed shortage and the suitability of the environment for the disease causing organisms during this period. The introduction of animals into the area from different places for marketing may introduce diseases into the area. Vaccination is not common in the area probably because of the fact that farmers are not aware of the importance of vaccination.

Table 2: Priority Index, score and rank of constraints of fattening systems in the study area (N=30)

Variables	Agro-ecology Midland (n=20)		Lowland (n=10)		Over
	Score (index)		Rank		Score(
	137 (0.237)		2nd		207(0
Disease					
Feed shortage	143 (0.248)		1st		215(0
Extension problems	37 (0.065)		7th		52 (0
market problem	36 (0.0623)		6th		53 (0.
Shortage of capital	130 (0.225)		3rd		194(0
Water shortage	39 (0.0675)		4th		62 (0.
Lack of veterinary services	30 (0.052)		5th		49(0.
Grand total	578 (1.00)				872(

5. CONCLUSION

Sheep fattening was a common practice in the Muheraklil woreda. The majority of commonly practiced sheep production systems in the study area were mainly extensive (76.7%). Majority (60%) of the respondents reared sheep for cash income purpose. Majority (90%) of the respondents practiced traditional fattening systems. The Breeds of the sheep which found in the study area were Dyogana and BongaBale breed. According to the opinion of the respondents in the study area both Dyogana and Bonga breed are more resistant to diseases. Majority (56.7%) of the respondents the main feed resources for sheep production in the study area were natural pasture. There were different feed supplements for sheep in the study area. The main locally available feed supplements are maize grain, food left over and Atella. According to respondents there is a difference between the two sheep breeds in feed demand. Dyogana breed demands more feed than Bonga breed. The sheep houses are constructed from locally available materials. Mainly (90%) corrugated iron sheet roofed houses. Majority (74%) of the respondents in the study area take their sheep to the veterinary clinic when they sick this indicated that Veterinary service provision is high in the study area. There are several sheep fattening constraints in the study area and from which, feed shortage is major constraints.

6. RECOMMENDATION

There are several sheep fattening constraints in the study area and from which, feed shortage is the major one. Therefore, feed conservation mechanisms including fodder production must be practiced. Like any other places in Ethiopia, the dominant production system in the study area was found to be extensive which is dependent on natural pasture and crop residues. Accordingly, the system need to be improved in to at least semi-intensive production system with little supplementation. Government should create awareness among farmers who practice sheep fattening for proper and punctual vaccination at least for major sheep diseases.

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APPENDIX

Questionnaire on assessment on constraints of sheep fattening systems in Muher Aklil district, Gurage zone, southern Ethiopia

Region_____City_____Zone_____

District/Woreda _____ Site (Kebele) _____

Date of interview _____ Agro-ecology_____

Name of enumerator _____signature _____

I. Socio-economic characteristics (household) information

1. Name of respondent _____
2. Sex of household head A. Male B. Female
3. Age of respondent_____
4. Family size of the respondent? _____
5. Marital status: A. Married B. Single C. Widow D. Divorced
6. Educational status of the household

a. illiterate b. read and write only c. elementary d. high school e. diploma and above

7. Major occupation a. Farmer b. Civil servants c. merchant d. Student

II. Agriculture

1. What type of agriculture you practice? A. Livestock production only

b. Crop production only c. mixed

2. Access to land a. Owned b. Share cropping c. Families
3. Land size? A. <0.5 ha b. >0.5 ha
4. Herd composition, size

No.	Species	Total number	Number in breed types		
			Local	Cross	Exotic
1	Cattle				

2	Sheep				
3	Goat				

III. Sheep Production of the locality

1. What is Purposes of rearing sheep?

   a. slaughtering for own b. Live animal sales c. skins

2. How is the suitability of your vicinity for sheep production?

   a. not suitable b. Suitable. C. Very suitable

3. What is the sheep production system?

   a. Traditional b. Partially modern c. Modern

4. Who in the family is herding the sheep? A. husband B. wife c. children d. hired labor

5. Classify your chicken flock according to age and sex

Sheep	Total No.	Number of local	Number of exotic	Number of cross
Ram				
Ewe				
Lamb				
Goats				
Buck				
Doe				
Kids				

III. Management systems of the sheep in your area

A. Feed sources and feeding systems

Feed resources	Season of availability			
	Dry	Rank	Wet	Rank
Native pasture				
Hay				
Crop residue				
wheat bran and noug seed cake				
Legume grain byproducts				
Attela				
brewery dried grain				

2. What is the grazing practice (method) during both the dry and the wet seasons?

	Dry	Wet
a. Free grazing	_____	_____
b. Semi-grazing	_____	_____
c. Tethering	_____	_____

3. What are forms of feeding for sheep?

As it is	As it is	Chopped	Spray water & salt	Treated with urea	Others
Hay					
Maize Stalks					
Cereal					
Cropresidues					
wheat bran					
brewery dried grain					
Attela					

4. If, you have feed shortage, specify the serious feed shortage seasons? _____

B. water sources and watering systems

Source of water	Dry	wet	Methods of drinking	
			Using bucket	From the source
Tape water				
Pond				
River				

2. Frequency of water drinking for sheep a. Roam freely b. once per day c. twice per day

d. three times

3. What is/are your water related constraints? A. availability b. Parasites c. Impurity

C. housing of sheep

1. Where is the sheep house? A. Isolated B. Adjoining house C. in house

2. Are the lambs housed with adult flocks of sheep? A. yes B. no

V. Fattening systems of the sheep of the locality

1. Do you have sheep fattening experience?

a. yes b. No

2. If you do not have sheep fattening experience what are the reasons? _____

3. How many years' experience in sheep fattening?

4. Season of sheep fattening

a. New Year b. X-mass c. Easter d. at any time

5. For how long do you fatten the sheep____,

6. Number of fattened sheep at one round_____

7. Sources of fattened sheep

a. purchased b. from home

8. What type of animals is fattened?

a. Castrated b. Enacted

9. Which sheep group used mostly for slaughtered?

a. ewe average age b. lamb average age c. castrated age d. ram age

10. When do you slaughter sheep for home consumption

a. all festival b. twice a year c. three times a year d. once a year

11. Is it profitable? _____, how much is profit _____

12. Major sheep diseases (include local name) observed in the area

13. Do you have access to veterinary services in the near place? A. yes b. no

14. If yes, from where do you get the veterinary service a. Government b. Private c. both

15. Number of sheep died in the last 12 months (1yr)

Class	no of died	Cause of the death					
		diseases	Predator & theft	emergency	poisoning	feed shortage	Others
Ewe							
Lambs							
Rams							
Fattened							

VI. Constraints and Opportunities

1. What are the major sheep production constraints?

Constraints	Rank
Feed shortage	
Labor scarcity	
Market problem	
Capital scarcity	
Predator	
Water shortage	
Theft	
Disease	

2. What are opportunities for sheep production in the study area?
3. Do you intend to expand the sheep flocks you have? A. yes B. if no, why?