

PRODUCTION AND MARKETING SYSTEMS OF SMALL RUMINANTS IN  
GOMA DISTRICT OF JIMMA ZONE, WESTERN ETHIOPIA

**M. Sc. Thesis**

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**Hawassa University, Awassa**

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PRODUCTION AND MARKETING SYSTEMS OF SMALL RUMINANTS IN  
GOMA DISTRICT OF JIMMA ZONE, WESTERN ETHIOPIA

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*A THESIS SUBMITTED TO THE*  
*DEPARTMENT OF ANIMAL AND RANGE SCIENCES,*  
*COLLEGE OF AGRICULTURE, SCHOOL OF GRADUATE STUDIES*  
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## APPROVAL SHEET 1 OF THE THESIS

### SCHOOL OF GRADUATE STUDIES

### HAWASSA UNIVERSITY

This is to certify that the thesis entitled *Production and Marketing Systems of Small Ruminants in Goma District of Jimma Zone, Western Ethiopia*, submitted in partial fulfillment of the requirements for the degree of Master of Sciences in Animal and Range Sciences with specialization in Animal Production of the graduate program of the Department of Animal and Range Sciences, College of Agriculture, and is a record of original research carried out by Belete Shenkute Gemedo ID No AWR/0034/00 under my supervision, and no part of the thesis has been submitted for any other degree or diploma.

The assistance and help received during the course of this investigation have been duly acknowledged. Therefore, I recommend that it be accepted as fulfilling the thesis requirements.

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## APPROVAL SHEET 2 OF THE THESIS

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We, the undersigned members of the Board of Examiners of the final open defense, by Belete Shenkute Gemeda have read and evaluated his thesis entitled “Production and Marketing Systems of Small Ruminants in Goma District of Jimma Zone, Western Ethiopia” and examined the candidate. This is therefore to certify that the thesis has been accepted in partial fulfillment of the requirements for the degree of: Master of Science in Animal Sciences with specialization in Animal Production, College of Agriculture.

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Final approval and acceptance of the thesis is contingent upon the submission of the final copy of the thesis to the Council of Graduate Studies (CGS) through the Departmental Graduate Committee (DGC) of the candidate’s major department.

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Above all for all my achievements and coming to this end, I give glory to Savior Lord.

## **DEDICATION**

To my father Shenkute Gameda and my mother Britukan Tilaye.

## **DECLARATION**

I declare that this thesis is my original work and that all sources of material that are used for this thesis have been duly acknowledged. This thesis is submitted in partial fulfillment of the requirements for an MSc degree at Hawassa University and is deposited at the university library to be made available to borrowers under rules of the library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the awards of any academic degree, diploma, or certificate.

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## **LIST OF ABBREVIATIONS**

ANOVA	Analysis of Variances
ADG	Average daily gains
CSA	Central Statistical Authority
DA	Development Agents
EARO	Ethiopian Agricultural Research Organization
FAO	Food and Agriculture Organization of the United Nations
GOs	Governmental Organizations
Ha	Hectare
HHs	Households
ILCA	International Livestock Center for Africa
ILRI	International Livestock Research Institute
IPMS	Improving Productivity and Market Success of Ethiopian Farmers
Kg	Kilogram
M a.s.l.	Meters above sea level
NGOs	Non Governmental Organizations
OoARD	Office of Agriculture and Rural Development
SNNPRS	Southern Nations Nationalities and Peoples Regional State
SPSS	Statistical Package for Social Sciences

<b>TABLE OF CONTENTS</b>	<b>PAGE</b>
ACKNOWLEDGEMENTS.....	iii
LIST OF ABBREVIATIONS .....	vii
ABSTRACT.....	xiii
1. INTRODUCTION .....	1
2. LITERATURE REVIEW .....	5
2.1 Genetic diversity and distribution of small ruminant in Ethiopia.....	5
2.2 Role of small ruminant in livelihoods of small holder farmers in Ethiopia .....	7
2.3 Small ruminant production systems in Ethiopia .....	9
2.4 Reproductive and growth performance of small ruminant in Ethiopia .....	10
2.4.1 Age at first parturition (AFP).....	11
2.4.2 Parturition interval.....	13
2.4.3 Litter size.....	14
2.4.4 Growth performances .....	15
2.5 Small ruminant marketing in Ethiopia.....	18
2.6 Small ruminant production constraints .....	21
2.6.1 Feed shortage.....	21
2.6.2 Health constraints .....	22
2.6.3 Water shortage.....	22
2.6.4 Marketing constraints .....	23
3. MATERIALS AND METHODS.....	24
3.1. Description of the Study Area .....	24
3.1.1. Geographical location .....	24
3.1.2 The natural resource base .....	24
3.1.3. Agro-ecology .....	26
3.1.4 Farming systems .....	27
3.1.5. Demographic structure.....	28
3.2. Reaserch design,sampling and data collection.....	28
3.3 Data analysis .....	30

4. RESULTS AND DISCUSSION .....	32
4.1 Socio-economic characteristics of the households .....	32
4.1.1 Household characteristics.....	37
4.1.2 Land holding and its allocation .....	37
4.1.3 Household ownership of different livestock species.....	37
4.2 Small ruminant production system .....	38
4.2.1 Flock structure and production objectives .....	38
4.2.2 Feeds and feeding systems .....	41
4.2.3 Reasons for tethering sheep and goats .....	41
4.2.4 Feed shortage.....	41
4.2.5 Water sources and utilization .....	53
4.2.6 Small ruminant management and husbandry .....	56
4.2.7. Consumption of small ruminant and their products.....	64
4.2.8 Productive performances of small ruminants.....	66
4.2.9 Small ruminant health and diseases .....	77
4.3 Marketing of small ruminants.....	83
4.3.1. Market places .....	83
4.3.2 Market participants.....	85
4.3.3 Small ruminants marketing channels and routes.....	87
4.3.4 Small ruminant fattening and marketing.....	90
4.3.5 Mode of marketing and price setting.....	97
4.4 Extension, cooperatives and credit services for small ruminant production .....	98
4.5 Gender and labor allocation in sheep and goat management.....	99
4.6 Constraints and opportunities of small ruminant production and marketing.....	102
5. SUMMARY AND CONCLUSIONS .....	106
REFERENCES .....	113
APPENDICES .....	129

**LISTS OF TABLES****PAGES**

Table 1. Age at first parturition of some breeds of Ethiopian sheep and goats. ....	12
Table 2. Parturition interval (PI) of some breeds of Ethiopian sheep and goats. ....	14
Table 3. Litter size of some breeds of Ethiopian sheep and goats.....	15
Table 4. The birth weight, weaning weight and average daily gains of some selected breeds.	17
Table 5. Some socio-economic characteristics of the studied household heads shown by small ruminant density group. ....	33
Table 6. Distribution of the studied household members by age, sex, and educational status. .	34
Table 7. Mean (standard error) for land holding and its distribution for grazing and crop by small ruminant density groups .....	38
Table 8. Mean (standard error) number of livestock holding/household in the three areas categorized according to small ruminant density. ....	38
Table 9. Purpose of keeping the small ruminants and ranked by owners in the study area. ....	41
Table 10. Grazing management of sheep and goats by small ruminant density groups.....	46
Table 11. Season and frequency of supplementation of small ruminants in three areas. ....	49
Table 12. Reasons for tether feeding of sheep and goats reported by households . ....	50
Table 13. The relative importance of various reasons for the prevailing feed shortage as suggested by households in the three studied areas classified according to the density of small ruminants. ....	52
Table 14. Watering frequency of sheep and goats in three areas classified by small ruminant density groups.....	55
Table 15. Reasons of housing small ruminants by households . ....	57
Table 16. Types of houses where small ruminants are confined during night for protection ..	58
Table 17. Reasons for culling sheep and goats by household in the study area. ....	59
Table 18. Reasons for castration criteria used in selecting rams and bucks and mean age of castration in three areas. ....	61
Table 19. Method of castration and feeding of castrates by households in the study area.....	62
Table 20. Routes of flock entry and exit .....	64

Table 21. Occasions when households consume small ruminant meat in the three areas classified according to small ruminant density. ....	65
Table 22. Mean (Standard deviation) of birth weights of lambs and kids. ....	69
Table 23. Mean (Standard Error) of weaning weight of lambs. ....	70
Table 24 Mean (Standard Error) for weaning weight of kids. ....	71
Table 25. Mean (Standard Error) of some reproductive traits of sheep and goats. ....	74
Table 26. Desirable characteristics for selecting breeding male sheep and goat for mating. ....	76
Table 27. Analysis of the six month off take of sheep and goat based on flock monitoring ...	77
Table 28. Mean (Standard Error) number per household of sheep and goats died during a period of the last 12 months. ....	78
Table 29. Death rate by age structure of sheep and goats as reported by respondent households. ....	79
Table. 30 Common sighs for causes of death of small ruminants as reported by households. ....	81
Table 31. Major reported causes of health problems by households. ....	83
Table 32. Place of marketing where households sell and purchase sheep and goats. ....	84
Table 33. Marketing seasons targeted for fattening ....	90
Table 34. Preference of households for selling small ruminants by age groups in times of immediate cash need . ....	92
Table 35. Reasons for selling sheep and goats by households during the last 12 months. ....	93
Table 36. Ranking reasons of sell for selling small ruminants. ....	94
Table 37. Reasons of purchasing small ruminants by households by density group. ....	95
Table 38. Reasons of eye-ball price setting and sources of information in small ruminant marketing by households. ....	97
Table 39. Division of labor by households in small ruminant production ....	100
Table 40. Future plan and reasons for expansion of sheep and goat production ....	101
Table 41. Major constraints reported by households in small ruminant production by small ruminant density groups . ....	102
Table 42. Marketing constraints in small ruminant production reported by household .....	104

<b>Lists of Figures</b>	<b>Pages</b>
Figure 1. The domestic livestock marketing structure in Ethiopia .....	19
Figure 2. The study district .....	25
Figure 3. Flock structure of goats. ....	39
Figure 4. Flock structure of sheep. ....	39
Figure 5. Common grazing sources and their seasonal utilization. ....	42
Figure 6. Common non-conventional feed sources and their seasonal utilization. ....	43
Figure 7. Supplementation practices of households with non-conventional supplements. ....	48
Figure 8. Number of male and female sheep and goats initially considered for monitoring....	67
Figure 9. Body weight change of sheep over the study period .....	67
Figure 10 Body weight change of goat over study period.....	68
Figure 11. Months of kidding and lambing in the study area. ....	73
Figure 12. Marketing channel of small ruminants .....	88
Figure 13 Small ruminant marketing routes .....	89
Figure 14. Preferred times of the year for households to sell and purchase sheep and goats...	96

# PRODUCTION AND MARKETING SYSTEMS OF SMALL RUMINANTS IN GOMA DISTRICT OF JIMMA ZONE, ETHIOPIA

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## ABSTRACT

*The study was conducted in Goma district of Jimma Zone of Ethiopia with objectives of generating baseline information and identifying challenges and opportunities of small ruminant production and marketing. Results are based on diagnostic survey of 160 sample households, group discussions, monitoring of 36 flocks and rapid appraisal of major sheep and goat markets. The study district was stratified into three groups based on flock distribution as: sheep dominating, goat dominating and mixed flock sites. The average land holding per household was 1.93 ha. On average, a household owned 3.6 cattle, 3.6 sheep, 2.1 goats, 0.2 equines and 2.7 chickens. In Goma where coffee and chat are the major cash sources for farmers, small ruminant are mainly kept for cash generation and saving in time of coffee failure. About 94% of the small ruminant owners reported to keep them for income generation. The second main reason for keeping small ruminant in the study area was for saving purpose. Keeping small ruminant for manure purpose was the third important reason. Other important reasons included for meat production and for risk distribution. Farmers kept larger proportion of female animals than male animals and it was rare to find male of advanced age as they were sold or slaughtered at early age. Fattening small ruminants is commonly practiced by most farmers and nowadays getting more attention due to high market demand and better prices. From the interviewed households, 59.4%, 32.1, 23.5%, and 19.4% of them utilize communal grazing, after math grazing, roadside grazing, and riverside grazing, respectively. Most small ruminants are either tethered or herded all the seasons due to the cultivation of perennial crops and predators. All small ruminants are housed for protection from adverse weather conditions and predators. Most lambings and kiddings occurred in the main rainy season. The average litter size, birth weight (kg), and weaning weight (kg) of sheep were found to be: 1.37, 2.86 and 11.59, respectively. The corresponding values for goats were 1.6, 2.76, and 9, respectively. There are five towns where small ruminants were marketed in addition to many villages that were used as primary market sources for small ruminants. Farmers, traders, brokers, restaurant/hotel owners, butchers are the major market participants. There is one main market route i.e., from Agaro to Addis. The major problems for small ruminant production and marketing were: feed and grazing land shortage, lack of input, predators, diseases and parasites and marketing problems. In order to utilize the current growing demand of small ruminant meat at local and international markets, identification of alternative feed resources and strategic feeding management, identification of causes of diseases and their control methods as well as improving marketing efficiency through appropriate policy and provision of information are areas of interventions.*

## 1. INTRODUCTION

Small ruminants are integral part of livestock keeping in Sub-Saharan Africa (SSA) that are mainly kept for immediate cash sources, milk, meat, wool, manure, and saving or risk distribution (Kosgey, 2004). Small ruminants also have various social and cultural functions that vary among different cultures, socio-economies, agro-ecologies, and locations in tropical and sub tropical Africa.

Ethiopia has a large livestock resource than most countries in Africa. It is estimated that 84% of the 70 million people live in rural areas and depend on agriculture for their livelihoods and the sector contributes 41.4% of the Gross Domestic Product of the country (World Bank, 2006).

There are about 26.1 million and 21.7 million sheep and goats population heads in the Ethiopia respectively (CSA, 2008). They are important components of the livestock sub-sector and are sources of cash income and play a vital role as sources of meat, milk and wool for smallholder keepers in different farming systems and agro-ecological zones of the country (Tekelye and Kasali, 1992; EARO, 2000; Workneh, 2000; Ehui *et al.*, 2003; Kassahun, 2004; Markos, 2006; Endeshaw, 2007; Getahun, 2008; FAO, 2009). They are also sources of foreign currency (Asfaw, 1997; Berhanu *et al.*, 2006). Moreover, due to their high fertility, short generation interval, adaptation in harsh environment and their ability to produce in limited feed resource they are considered as investment and insurance (Asfaw, 1997; Tsedeke, 2007). Unlike the large potential of small ruminants in the country their productivity is low. There are



various factors that contribute for low productivity: health constraints, feed shortage both in quality and quantity, poor feeding and health management (Bayou, 1998; Markos, 2006; Sisay, 2006; Tsedeke, 2007; Getahun, 2008). Other contributing factors also include low genetic potential; policy issues (Zinash *et al.*, 2001) market and institutional problems and problem of credit facilities and others (Berhanu *et al.*, 2006).

Although various research and development activities have been carried out in the past, no significant increase in productivity was achieved. Therefore, improvement programs are necessary to increase productivity and sustainable development of small ruminants in different farming systems of the country in innovative approach so as to meet the demands of the human population. However, such development achievement for sheep and goats will only be successful when accompanied by a good understanding of the different farming systems and when simultaneously addressing several constraints: feeding, health control, general management, as well as cost and availability of credit and marketing infrastructure (Workneh *et al.*, 2003; Baker and Gray, 2004).

Similarly, many small ruminant genetic improvement programs in developing countries have not been very successful may be due to failure to perceive the multidirectional aspect of the problem; for example implementing genetic improvement programs without taking into consideration other vital needs of the farmers (Sölkner *et al.*, 1998; Rewe *et al.*, 2002; Wollny *et al.*, 2002; Kosgey *et al.*, 2006). In addition, poor performance of imported breeds from the temperate developed world under sub optimal management conditions, which prevail in most

tropical countries, has created a negative image for genetic improvement programs (Rewe *et al.*, 2002; Workneh *et al.*, 2003).

Production without access to market is also a problem for many livestock producers in tropical countries (Lightfoot *et al.*, 2005). According to Delgado *et al.* (1999) “livestock revolution” can be expected to allow the rural poor in developing countries to contribute to the growing market. In Ethiopia small ruminant production lack reliable marketing outlets that could provide the full benefits of indigenous small ruminant resources, to be captured by small scale producers, pastoralists and the consumers (AIS, 2003). To achieve these benefits it is necessary to address the constraints within different production systems. Thus, reconsidering government policies and how supportive they are of small scale and pastoral production is important (Conroy, 2004). One outstanding aspect of the livestock revolution is the implied change of production from traditional subsistence to a market-oriented industry, making livestock marketing a significant factor in the development of the Ethiopian economy (Delgado *et al.*, 1999; McPeak, 2003).

In coffee shaded and cereal /livestock farming of Goma district, sheep and goats are important components of the farming system which benefit small holder farmers in generating cash income during the seasons of coffee failure (IPMS, 2007). In these farming systems, small ruminant keeping and fattening is nowadays becoming a common practice even among young landless men and women due to ever-increasing prices. Despite their potential in the area, productivity of sheep and goat remained quite low presumably due to such factors as feed shortage and lack of veterinary services. Therefore it is crucial to systematically describe the

production and marketing systems in order to plan and design appropriate research and development interventions that are relevant to the specific systems. The general objective of the thesis was, therefore, to generate baseline information on sheep and goat production systems and marketing in Goma district of Oromia Regional State.

The specific objectives of the study were;

- To assess productive and reproductive performance of small ruminants in Goma district;
- To assess market information and related socio-economic situation of small ruminant keepers in Goma district.
- To identify challenges and opportunities for small ruminant production and marketing in Goma district.

## 2. LITERATURE REVIEW

### 2.1 Genetic diversity and distribution of small ruminant in Ethiopia

Domestic sheep (*Ovis aries*) and goats (*Capra hircus*) were the first ruminants to be domesticated in southwestern Asia (Iran and Iraq) between 10,000 and 6,000 BC and distributed in various ecological niches of the world. Ethiopia, a country recognized as gateway for Africa to small ruminant from Asia (IBC, 2004), has about 11 phenotypically distinct indigenous goats (FARM Africa, 1996) and 14 sheep (IBC, 2004; Workneh *et al.*, 2004) populations that have been identified based on a combination of their morphological appearance and management systems.

According to report of FARM Africa (1996), Ethiopian and Eritrean goat types are categorized under four broad families that represent type and geographic locations there are the Nubian family that includes Nubian and Barka, the Rift Valley family that includes Wore, Abergalle, Afar, Arsi -Bale and Woyito-Guji, the Somali family that includes Hararghe Highland, short-eared Somali and long-eared Somali; and the Small East African family that includes Central Highland, Western Highland and Kaffa. Other report indicated the identification of four sheep types (Adal, Blackhead Somali, Menz and Horro) and two goat types (Adal and highland goat) type were identified (Zinash *et al.*, 2001). Molecular characterization based on the traditionally recognized populations using micro-satellite exhibited eight goats (Tesfaye *et al.*, 2006) and nine sheep (Solomon, 2006) with separate genetic entities or breeds.

Indigenous sheep and goat genetic resources have developed specific adaptations to survive and produce under adverse local environmental conditions and to perform better under low input system. As a result, they are suitable to be used in the traditional, low-external-input production system (IBC, 2004; Markos, 2006).

The sheep and goats inhabited to the target area of this study belong to Bonga and Kaffa respectively (FARM Africa, 1996; Solomon, 2006; Tesfaye, 2006). Almost all sheep and goats found in study area are indigenous (99.9%) for both species (CSA, 2008).

According to Solomon (2006), there is a need for exhaustive characterization of the existing genetic resource as the presence of sizeable genetic diversity in the country. Past within breed improvement appears to be impeded by failure in identifying genetically superior animals and due to lack of adequate flock size. On station studies, where few indigenous breeds were crossed with exotic breeds, have shown a promising improvement in productivity over the local breeds. However, on-farm observation seems contrary to what is realized on station.

In addition to highland agro-ecological zones, small ruminants are also widely distributed in middle altitude and lowland areas. A report by Akililu *et al.*, (2005) indicated that sheep are distributed in the lowlands in similar proportion to the highlands that deviates from previous reports of larger distribution of small ruminants in the highlands (Workneh, 2000).

## **2.2 Role of small ruminant in livelihoods of small holder farmers in Ethiopia**

The production system in which sheep and goats are kept is differing markedly. Differences exist not only in production systems but also in relative importance and potential for increased production. Variations arise due to differences in resource endowment, climate, population, disease incidence, level of economic development, research support and government economic policies (Beets, 1990).

According recent studies in southern part of Ethiopia, Getahun (2008) found out that smallholder farmers in crop-livestock mixed systems kept small ruminants mainly for cash generation. In Alaba and Dale districts of Southern Nations Nationalities and Peoples Region (SNNPR), small ruminants are also primarily kept for cash generation purpose (Endashew, 2007; Tsedeke, 2007). In central Rift Valley of Ethiopia, where uncertainty of rainfall is observed, women and children are involved in owning and keeping small ruminants for immediate income generation (Abule, 1998). It is likely that smallholder farmers are mainly targeting small ruminant for market rather than using for meat purpose which nowadays restricted to holidays or especial occasions.

According to a recent report by Central Statistics Authority of Ethiopia, about five million small ruminants were slaughtered in the year 2007/2008 in the country which indicates their potential for meat production (CSA,2008).. The milk of small ruminants has also been consumed by many farming communities although there is variation among farming systems, cultural and socio-economic conditions of the society. In Kofele district, of the Oromia

Regional State of Ethiopia, sheep milk is commonly utilized by the household members to whiten coffee (Getahun, 2008). In central rift valley, in eastern, south-eastern and north-eastern part of the country, goat milk is consumed by farming community (Abule, 1998; Workneh *et al.*, 2004).

It was reported that a total 14 million sheep and 13 million goat skins produced annually from which 95% of the sheep and 70% of the goatskin is recovered at the market (Zewdu, 1998; Ahmed, 2000). During 1995-1996 the export value of sheep/lamb skins amounted to be about 82 million US\$ (EARO, 2000). Live animals are also exported to middle east countries and sources for foreign currency; for example, between 1995-1996 an estimated amount of 4.6 million US\$ was derived from the export of small ruminant (EARO, 2000).

There are also other benefits of small ruminants such as manure which is used as fertilizer and household fuel (EARO, 2000); farmers also use small ruminants as savings at time of crop failure or drought (Workneh *et al.*, 2003; Tsedeke, 2007; Getahun, 2008). They are also considered as investment and insurance to provide cash sources for purchase of farm inputs and house expenses. In recent years, landless farmers and young men are involved in small ruminant fattening due to incentive prices and farmers add value of their animals by fattening with local feeds and in some cases concentrate feeds in order to get higher prices.

For many smallholder farmers, livestock are the only ready source of cash to buy inputs for crop production, such as seeds, fertilizers and pesticides. However, the middle and high altitudinal areas are under threat because of shrinking cultivated areas per household, reduced

feed availability and land fragmentation. Results of recent studies in sub-humid highlands of southern Ethiopia showed higher feed scarcity thereby difficulty of sustaining large ruminants (Aune *et al.*, 2001; Desta & Oba, 2004), indicating further comparative advantages of small ruminants pertaining to their lower nutrient requirements. As population increases further and land holding decreases, the role of cattle as compared to small ruminants may be reduced (Jahnke, 1982).

### **2.3 Small ruminant production systems in Ethiopia**

Ethiopia is a country endowed with diversified fauna and flora that are found in various agro-ecologies. These agro-ecologies can be further categorized into sub-agro-ecologies and macro and micro niches which are the home of differently adapted animal and plant species. These life forms are dependent and interdependent on each other forming biological systems. In the agricultural systems, there are various integrated and interrelated systems among which crop farming and livestock keeping are important components. Livestock production system varies due to differences in livestock species, resource endowment, climatic condition, human and livestock population, level of economic development, research support and government economic policies. Moreover, soil condition and crop farming also contribute for variation of livestock production systems.

There are various factors that should be considered to categorize small ruminant production systems in Ethiopia. In mixed crop-livestock production system which mainly seen in central highland of the country, small ruminant production is characterized by low productivity due to



nutritional stress and internal and external parasites. The Pastoral and agro-pastoral systems which are found in the lowlands are characterized by extensive production based largely on the rangeland (Tembely, 1998; EARO, 2000). The existence of private commercial and parastatal production systems on limited scope were also reported by Markos (2006). They are forms of modern small ruminant production systems.

Based on prevalence of agricultural activity Getahun (2008) has classified traditional small ruminant production system into:

1. Small ruminant in annual crop-based system; located in northern, north western, and central highlands.
2. Small ruminant in perennial crop-based; mostly found in southern and south-western highlands.
3. Small ruminants in cattle based systems; these systems usually exist in agro-pastoral and semi arid-areas.
4. Small ruminant dominated systems; found in pastoral and arid areas of eastern and north-eastern Ethiopia, in which system sheep and goats are the dominant livestock species.

## **2.4 Reproductive and growth performance of small ruminant in Ethiopia**

The reproductive and growth performances of small ruminants are important factors influencing flock productivity. All forms of output including milk, meat, wool and skins depend on these factors. The factors vary mostly between breeds and even within flocks in a

given population (ILCA, 1990). Considering reproductive parameters in selection and cross-breeding programs will directly influence the efficiency of milk and meat production and the rate of genetic progress (Mukasa-Mugerwa and Azage, 1991), and the size of the crop for replacement (Kiwuwa *et al.*, 1983).

These factors are influenced by many factors including genotype, nutrition, diseases and other management practices. In addition, these performance parameters are not a single trait each but the combination of other several traits that determine their expression.

#### **2.4.1 Age at first parturition (AFP)**

In small ruminants, it is an economically important trait because it determines rate of genetic progress and population turnover rate. However, many factors affecting pubertal development would also affect age at first parturition. Genetic and environmental factors especially nutrition determine pre-pubertal growth rate, reproductive development, onset of puberty and subsequent fertility (Mukasa-Mugerwa and Azage, 1991) and type of birth (Wilson and Murayi, 1988); number of progenies (lambs) born with multiple litters attained age at first lambing later than their single born counterparts (Wilson, 1986).

Under most traditional systems, where small ruminants breeding males are available in the flocks, age at first parturition is a good indicator of early sexual maturity in does and ewes. Otte and Chilonda (2002) reported the mean ages at first parturition of 17.5 and 16.4 months in traditional systems of SSA for sheep and goats respectively. Horro ewe lambs could attain

puberty at seven months of age weighing 21 kg and produce viable lambs (Solomon *et al.*, 1995) without any adverse effect on their subsequent growth and reproductive performance while Menz sheep in Ethiopian highlands can attain puberty (first estrus) at 10 months of age and 16.9 kg mean weight or 56 percent of their mature body weight (Mukasa-Mugerwa *et al.*, 1994). According to a recent study in southern Ethiopia, age at first lambing for kofele ewes was found to be 11.8 months and for Adilo was 14.6 months (Getahun, 2008). Another study conducted in central highland indicated the average age at first parturition to be of 17.0 and 13.2 months for sheep and goats respectively (Samuel, 2005). Some of the reported age at first parturition for indigenous breeds is presented in Table 1.

Table 1. Age at first parturition of some breeds of Ethiopian sheep and goats.

<i>Species</i>	<i>Breed</i>	<i>Management type</i>	<i>Age (days)</i>	<i>Source</i>
Sheep	Arsi-Bale	Traditional (Kofele)	354	Getahun, 2008
	Arsi-Bale	Traditional (Adilo)	438	Getahun, 2008
	Arsi-Bale	Traditional	510	Samuel, 2005
	Arsi-Bale	Traditional	381	Tsedeke, 2007
	Menz	Traditional	390-540	Mukasa-Mugerwa <i>et al.</i> , 1986
	Menz	Traditional	485	Agyemang <i>et al.</i> , 1985
	Menz	Traditional	477-547	Niftalem, 1990
	Menz	Station	459	Demeke <i>et al.</i> , 1995
	Menz	Traditional	443	Dibissa, 2000
	Menz	Station	523	Mukasa-Mugerwa and Ihloukassi, 1995
Goat	Arsi-Bale	Traditional	396	Samuel, 2005
	Arsi-Bale	Traditional	242	Tatek <i>et al.</i> , 2004
	Arsi-Bale	Traditional	363	Tsedeke, 2007
	Unspecified	Traditional	363	Mukasa-Mugerwa <i>et al.</i> , 1986

#### **2.4.2 Parturition Interval**

Lambing or kidding interval is the interval between two parturitions that determines reproductive efficiency in small ruminant production. The doe/ewe with long kidding/lambing interval has lower reproductive efficiency (Ibrahim, 1998). Extended kidding/lambing intervals commonly arise from long post-partum anoestrus intervals, repeated cycles of service intervals without conception, embryo death or abortion (Gatenby, 1986; Ibrahim, 1998).

According to Wilson (1989), lambing intervals in Africa ranged from 230 to 437 day. A research carried out on Menz sheep showed that ewes had lambing interval of 262 days and about 65 percent of Menz sheep in the Ethiopian highlands have a lambing interval of eight months and are capable of three lambings in two years except when mating is controlled (Tekelye et al. 1993). Similar studies of on-farm monitoring of goats by Tatek et al (2004) indicated parturition interval of 8.1 months. Samuel (2005) on his study of yerer water shade and Adaa districts reported parturition interval of 12.1 and 11.5 months in sheep and goats, respectively. Summaries of parturition interval of some Ethiopian small ruminants breeds was given in Table 2.

Table 2. Parturition interval (PI) of some breeds of Ethiopian sheep and goats.

Species	Breed	Management	PI (days)	Source
Sheep	Arsi-Bale	Traditional	364	Samuel, 2005
	Arsi-Bale	Traditional	234	Tsedeke, 2007
	Thin tailed	Traditional		Mukasa-Mugerwa <i>et al.</i> ,1986
	Menz	Station	345	Agyemang <i>et al.</i> ,1985
	Menz	Sedentary	395	Niftalem,1990
	Adal	Pastoral	315	Wilson, 1982
	Adal	Pastoral	365	Wilson,1982
Goat	Arsi-Bale	Traditional	345	Samuel, 2005
	Arsi-Bale	Traditional	207	Tsedeke, 2007
	Arsi-Bale	Traditional	242	Tatek <i>et al.</i> ,2004
	Unspecified	Traditional	363	Mukasa-Mugerwa <i>et al.</i> ,1986

#### 2.4.3 Litter size

Litter size is the number of lambs or kid born per parturition lambing is influenced by several factors including; ovulation rate, breed, level of nutrition parity or age (Wilson *et al.*, 1984; Gatenby, 1986; Wilson, 1986; Gautsch, 1987). Most estimates of litter size in tropical sheep range from 1.0 to 1.5 indicating that twinning rate is generally between 0 and 50 percent (Ibrahim, 1998).

Study in Ghana by Rey *et al.*,(1992) indicated prolificacy of 185.5% for goats with single births, twins, triplets and quadruplets of 35.7, 45.6, 16.2 and 2.6%, respectively were reported. Tsedek (2007) reported the prolificacy of about 1.7 both for sheep and goats, which is higher than the reported litter size of 1.03 for goats in Southern region (Girma *et al.*, 2000),

indicating a wide variation among the animals when they are evaluated at actual environments. On a separate study, Getahun (2008) found a litter size of 1.28 for sheep in Kofele and Adilo with single, twin and triple births of 74 %, 25% and 1% respectively. The Summary of the litter size of selected Ethiopian small ruminants is given in Table 3.

Table 3. Litter size of some breeds of Ethiopian sheep and goats.

Species	Breed	Management	Litter Size	Source
Sheep	Afar	Traditional	1.03	Wilson,1982
	Afar	Traditional	1.03	Wilson,1982
	Arsi-Bale	Traditional(Kofele)	1.42	Getahun, 2008
	Arsi-Bale	Traditional (Adilo)	1.28	Getahun, 2008
	Arsi-Bale	Traditional	1.7	Tsedeke, 2007
	Blackhead somali	Station	1.04	Wilson,1991
	Horo	Station	1.35	Galal <i>et al.</i> ,1984
	Horo	Station	1.34	Abeggez <i>et al.</i> , 2000
	Menz	Traditional	1.02	Niftalem, 1990
	Thin tailed	Traditional	1.3	Mukasa-Mugerwa <i>et al.</i> ,1986
Goat	Arsi-Bale	Traditional	1.75	Tsedeke, 2007
	Arsi-Bale	Traditional	2.07	Endeshaw, 2007
	Unspecified	Traditional	1.4	Mukasa-Mugerwa <i>et al.</i> ,1986

#### 2.4.4 Growth performances

Growth rate in indigenous sheep and goats is low and drops dramatically from about 100g/day at the earlier stage of growth to less than 50g/day after weaning (EARO, 2000). It is

influenced by several factors like genotype, sex of lamb, birth type, and seasons of birth, age of dam, nutritional condition, and production systems (Wilson, 1991; Mukasa-Mugerwa *et al.*, 1994; Awgichew, 2004; Demeke *et al.*, 2004; Berhane and Eik, 2006; Getahun, 2008). The summary of birth weight, weaning weights and average daily gain (ADG) of some selected breeds of small ruminants is given on Table 4.

Table 4. The birth weight, weaning weight and average daily gains of some selected breeds.

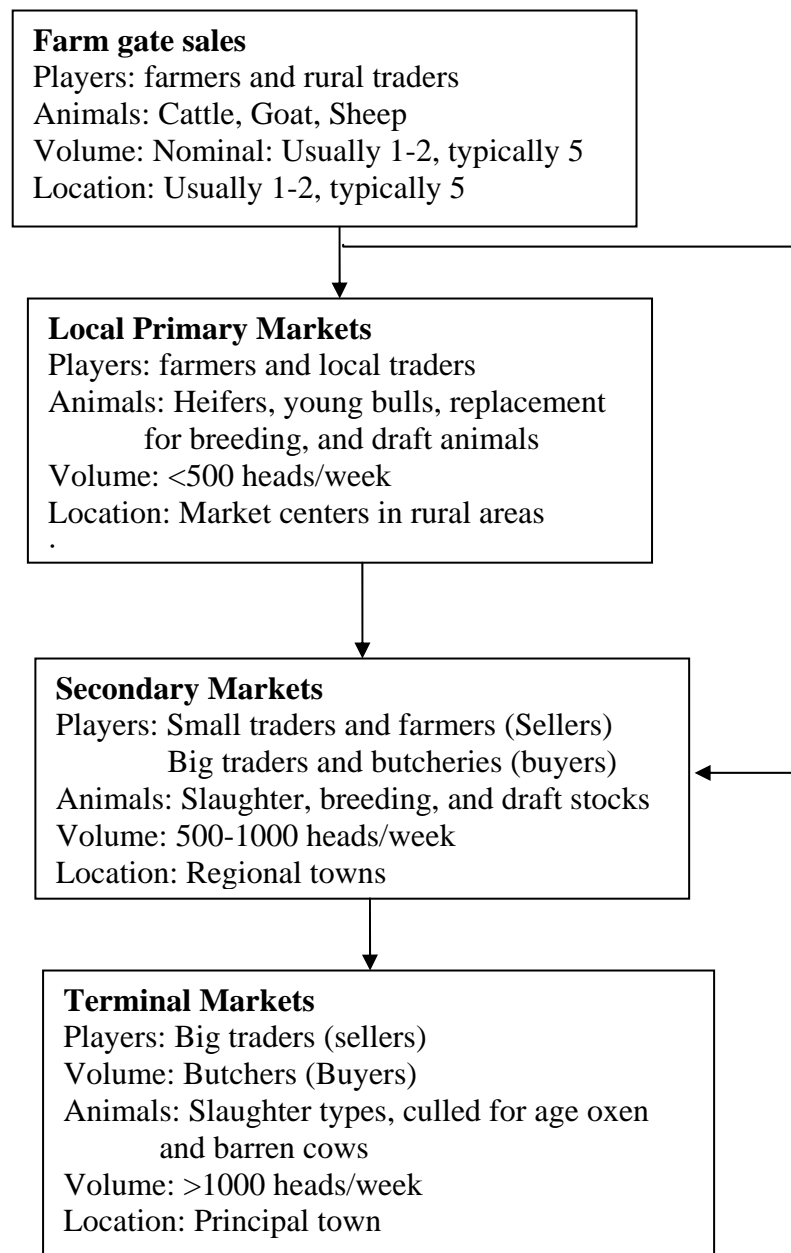
Species	Breed	Management	Birth Weight	Weaning Weight	ADG	Source
Sheep	Afar	Station	2.5	13.0	116.7	Galal, 1983
	Arsi-Bale	Traditional(Kofele)	2.89	12.23	102.01	Getahun, 2008
	Arsi-Bale	Traditional(Adilo)	2.29	11.18	98.77	Getahun, 2008
	Arsi-Bale	Station	2.8	13.5	-	Brannang <i>et al.</i> ,1987
	Blackhead Somali	Station	2.7	14.2	127.8	Galal, 1983
	Horro	Station	2.7	11.8	100	Abegaz <i>et al.</i> ,2000
	Horro	Station	2.43	8.21	89.25	Awgichew,2000
	Horro	Station	2.8	11.0	92.6	Tibbo,2006
	Menz	Station	2.5	8.03	89	Awgichew,2000
	Menz	Station	2.5	9.5	78	Demeke <i>et al.</i> ,2004
	Menz	Station	2	8.6		Mukasa-Mugerwa and Lahlou-Kassi, 1995
	Menz	Station	2.4	10.1	84.9	Tibbo,2006
	Unspecified	Traditional	2.3	13.5	124	Mukasa-Mugerwa <i>et al.</i> ,1986
Goat	Abegelle	Station	2.6-3.4	6.0-8.9	33-35	Berhane and Eik,2006
	Arsi-Bale	Station	2.28	8.39	72.21	Tatek <i>et al.</i> ,2004
	Begait	Station	3.0-3.7	8.0-10.8	55-59	Berhane and Eik,2006
	Somlali	Station	3.05	10.01	76	Abebe, 1986
	Somali	Station	3.19	11.67	61.25	Zelege, 2007
	Unspecified	Traditional	2.5	11.9	104	Mukasa-Mugerwa <i>et al.</i> ,1986



## 2.5 Small Ruminant marketing in Ethiopia

Ethiopia adopted an Agricultural Development-led Industrialization (ADLI) strategy, which initially focused on food crops and more recently, the country has added market orientation to this strategy (Berhanu *et al.*, 2006). Increased availability and utilization of appropriate technologies, an effective and efficient service delivery system and, sustained demand for the agricultural outputs are critical in such market-oriented agricultural development efforts. However, the infrastructural development is also rather limited which is a major bottleneck, only 17% of the rural population lives within 2 km of an all season road and only 0.4% has access to electricity (World Bank 2006).

There is an increase in demand of Ethiopian small ruminants both for local and export markets (Azage *et al.*, 2006). Recent studies showed that smallholder farmers mainly keep small ruminant as a source of income (Markos, 2006; Endeshaw, 2007; Tsedeke, 2007; Getahun, 2008) which may indicate higher demand for small ruminants. According to Ayele *et al.* (2003), the domestic livestock marketing structure of Ethiopia follows a four tier system (Figure 1). The main actors of the 1<sup>st</sup> tier are local farmers and rural traders/rural assemblers who transact at farm level. Those small traders from different corners bring their animals to the local market (2<sup>nd</sup> tier). Traders/wholesalers purchase a few large animals or a fairly large number of small animals for selling to the secondary markets. In the secondary market (3<sup>rd</sup> tier), both smaller and larger traders operate and traders (wholesalers or retailers) and butchers from terminal markets come to buy animals. In the terminal markets (4<sup>th</sup> tier), big traders and butcher (wholesalers or retailers) transact larger number of mainly slaughter type animals.



Source: Ayele *et al.* (2003)

Figure 1. The domestic livestock marketing structure in Ethiopia

Although there has been fluctuating demand of Ethiopian small ruminants in importing countries due to disease, sanitary and phyio-sanitary reasons in current days past few years

there was progressive increase in demand was reported in the past few years (Azage *et al.*, 2006; Berhanu *et al.*, 2007).

Ethiopia exports chilled goat meat to five countries and mutton to the Gulf States of Saudi Arabia and United Arab Emirates which are the largest recipients (Solomon *et al.*, 2005), but there is very high degree of inter-annual variation in traded volume, both within and across species. Similar author reported that high annual volumes in recent years are especially apparent for mutton and lamb (2003) and goat meat (2003-4), confirming that export market options for Ethiopia have recently expanded. It is also important to note, however, that these figures do not include “unofficial” transactions. Large numbers of Ethiopian animals are unofficially traded to Gulf States via the borders of Somaliland and Djibouti and Sudan (Workneh, 2006; Asfaw *et al.*, 2008). It was observed that the net commercial off-take rate is very low over different time periods for sheep and goat for smallholder farmers and pastoralists in Ethiopia (Workneh, 2006; Asfaw and Jabbar, 2008). Similar report indicated that in 1999/2000, the average net commercial off-take rates of sheep and goats for smallholder farmers in the highland areas of Amhara, Oromia and Tigray is 22 and 18%, respectively while in 2004/05, the average net commercial off-take rate sheep and goats for smallholder farmers in highland and lowland areas of Ethiopia were 7 and 8%, respectively (Workneh, 2006). In the case of Borana pastoral production system, the average net commercial off-take rate of sheep and goats for the three years period (2003–05) for cattle and small ruminants were 6 and 7%, respectively (Asfaw and Jabbar, 2008).

## **2.6 Small ruminant production constraints**

### **2.6.1 Feed shortage**

Lack of adequate feed resources as the main constraint to animal production is more pronounced in the mixed crop-livestock systems, where most of the cultivated areas and high human population are located (Sisay, 2006). The problem of good quality and quantity feeds observed in lowlands where pastureland seems relatively abundant. There is a great seasonal variation of quality and quantity of feed resources in most part of the country. According to Alemayahu (1998), there is excessive supply of feed during the rainy season which is usually followed by a deficit in grazing in the following dry season. On the other hand, the allocation of more land for crop production resulted in availability of crop residues as alternative feed, particularly in the smallholder livestock production system. In central rift valley, feed shortage was reported as one of the limiting factors in small ruminant productivity (Abule, 1998). In these areas where there are few rainy months with limited rainfall of erratic nature feed production for small ruminants is inadequate however. However, goats thrive due to their browsing nature. In southern part of the country, although the degree of shortage varies within farming systems/agro-ecologies feed shortage is reported as a major constraint for small ruminant production (Endeshaw, 2007; Tsedeke, 2007; Getahun, 2008)

### **2.6.2 Health constraints**

Another serious constraint for small ruminant production in Ethiopia has been the high prevalence of diseases and parasites. This causes high mortality amongst kids and lambs, diminishing the benefits of their high reproductive performance (Solomon *et al.*, 1995; Yohannes *et al.*, 1995; Solomon and Gemed, 2000; Markos, 2006). Tsetse flies, with the highest infestation in the humid and sub humid zones, are also a major problems in these areas. Further losses are caused by abortions and stillbirths (Getahun, 2008; Markos, 2006).

Other diseases that have limited the productivity of small ruminants in Ethiopia include pneumonia, Contagious Caprine Pleuropneumonia, Ecthyma, Caseous Lymphadenitis and Brucellosis. Individually, these diseases might not constitute serious problems, but combinations of them or their occurrence under marginal conditions could result in serious losses (Markos, 2006; Tsedeke, 2007).

### **2.6.3 Water shortage**

Water shortage is also reported as limiting factor in most lowland areas to a limited extent in mid altitudes. In eastern, north-eastern and south-eastern part of the country there is critical shortage of water; however, small ruminants are somehow adapted to these agro-ecologies through their physiological adaptation mechanisms.

#### **2.6.4 Marketing constraints**

The indigenous sheep and goat are year round breeders and mating is not controlled. However, the current off take rate is very low (Markos, 2006); with an average carcass weight of about 10kg, which is the second lowest amongst Sub-Saharan African countries (FAO, 2004). In Ethiopia, the marketing of livestock and livestock products is underdeveloped. The major problems are the traditional management systems which are not market oriented, underdeveloped marketing systems and poor infrastructure, poor financial facility, and presence of cross-border trade (Azage *et al.*, 2006, Berhanu *et al.*, 2007).

### **3. MATERIALS AND METHODS**

#### **3.1. Description of the Study Area**

##### **3.1.1. Geographical location**

This study was carried out in Goma district of the Jima administrative zone of the Oromia Regional State (Figure 2). Jima zone is one of the 12 administrative zones in Oromia Regional State. Goma district is one of the 13 districts in Jima zone known for its predominant coffee cultivation. It is located 390 km south west of Addis Ababa and about 50 km west of the Jima Zone capital *i.e.* Jima. One of the coffee biodiversity centers in Ethiopia is found in this district.

##### **3.1.2 The Natural Resource Base**

###### **3.1.2.1 Climate**

Goma district, which is situated in south-western Ethiopia, has well distributed annual rainfall with very low seasonal and area- wise variability (IPMS, 2007). Based on 15 years weather data obtained from Goma district, the average annual rainfall was 1524 mm with bi-modal distribution. The small rains are from March to April and the main rainy season extends from June to October; and it was also indicated that there are about 7 rainfall months in the district (IMPS, 2007). The mean monthly temperature varies between 12.67<sup>0</sup> C- 29.1<sup>0</sup> C. Crop and

livestock production is not constrained by the amount and distribution of rainfall as in the other parts of the country.

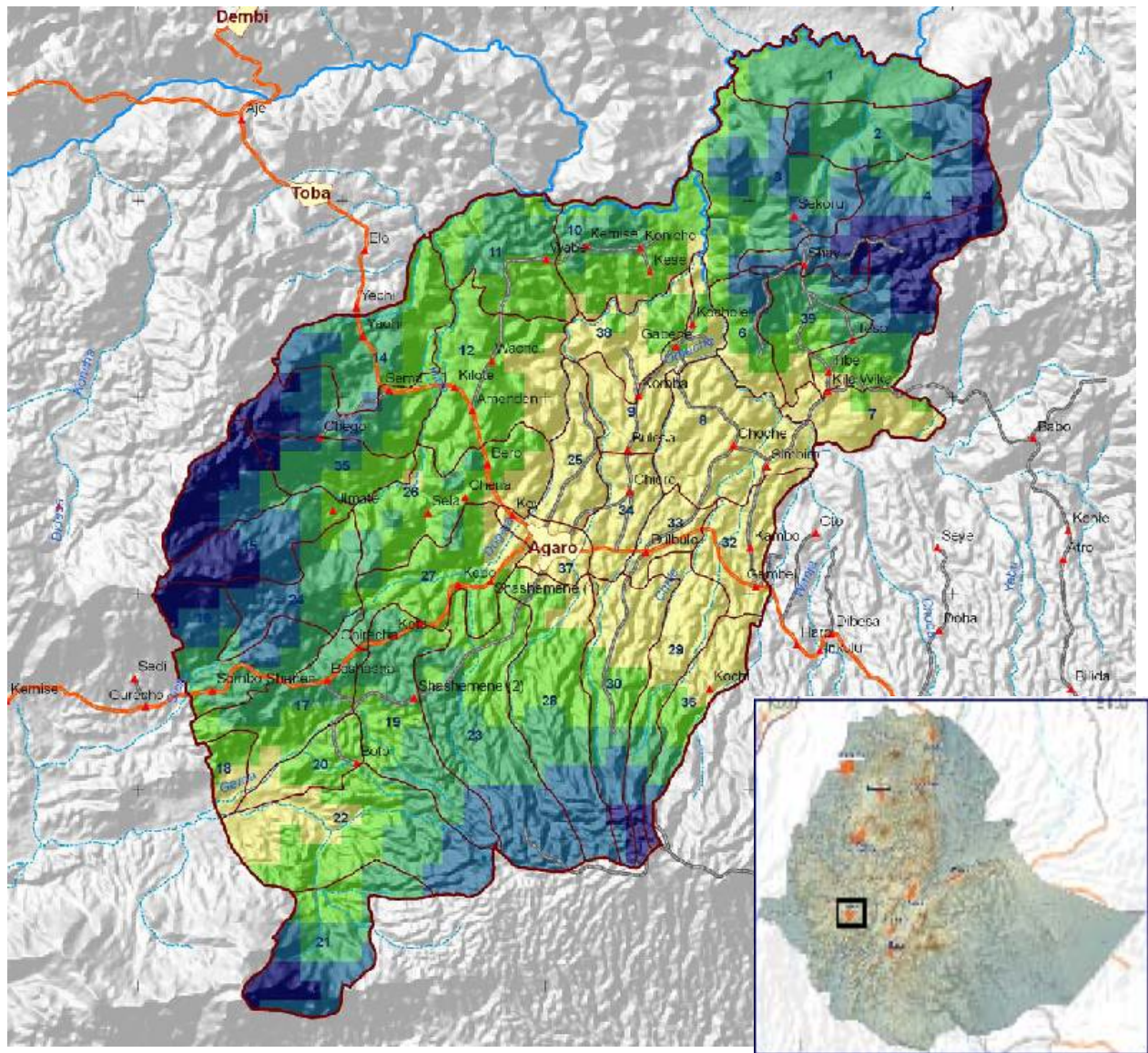


Figure 2. The study district



### **3.1.2.2 Vegetation**

The district has relatively high forest cover that serves as a source of livestock feed, habitat for different wild life and potential area for apiculture. Major forest tree species in the area include *Albizia lebbeck*, *Milita ferruginea*, *Juniperus procera*, *Cordia africana*, *Croton macrostachys*, *Acacia spp.*, *Podocarpus gracilior* (IPMS, 2007). The forest area holds wild animals like leopard, hyena, monkey, fox which are a potential treat for small ruminant production.

### **3.1.2.3. Soils**

The Eutric Vertisols, Humic alisols and Humic Nitosols are the three dominant soil types in Goma with Nitosols being the most abundant soil type (about 90%) of the district. These soils are generally acidic soils with PH values ranging between 4.5 and 5.5 (IPMS, 2007).

### **3.1.3. Agro-ecology**

Agro-ecologically, Goma district is classified as 96% wet Weina Dega (wet midland) and 4% kolla (lowland). Altitude in Goma ranges from 1387 to 2870 metres above sea level (m asl). Most parts of the district lay between 1387 and 1643; and 1849 and 2067 m asl. However, few of the areas in the district have altitudes ranging from 2229 to 2870 m asl (IPMS, 2007)

### **3.1.4 Farming systems**

#### **3.1.4.1. Coffee/livestock farming system**

Thirty-two kebeles with more than 92% of the people in Goma are categorized under this farming system. The major cash crop commodities in this farming system include; coffee, chat (*Catha edulis*), tropical and sub tropical fruits (mango, avocado, papaya, banana, orange, pineapple) and spices (mainly ginger and Ethiopian cardamom). Among cereals, maize, teff, barely are grown in the area; amongst of which, maize is the dominant cereal crop in the farming system. Livestock commodities include; cattle, small ruminants (sheep and goat) apiculture, poultry and equines. Sheep are larger in number than goats in this farming systems. In general, as altitude increases the goat population reduces.

#### **3.1.4.2 Cereal/livestock farming system**

Four rural kebeles are categorized into this farming system (IPMS, 2007). Although the productivity is low, coffee and tropical fruit are also produced in these kebeles. Relatively higher flock densities of cattle and goats with limited sheep population were found in these farming systems. Maize is the dominant cereal crop in this farming system.

### **3.1.5. Demographic Structure**

There are 36 rural kebeles\* and 3 urban kebeles in Goma district. The number of agricultural households in the district is 45,567 from which 35,533 are male headed and 10,034, female headed (IPMS, 2007). The total population of the district was 216,662 from which 110,448 are males and 106,174 females (CSA, 2008). Goma is the second most densely populated district in the zone with the total area 96,361.72 ha (96.4 km<sup>2</sup>) including the two coffee state farms which cover an area of 2704 ha (IPMS, 2007).

### **3.2. Research Design, Sampling and Data Collection**

Initially discussions were held with district livestock experts; secondary data were collected; published and unpublished information were assessed; in addition, the woreda was visited to better understanding of agriculture in general and small ruminant production in particular. Then, based on this information, the 36 kebeles were stratified into small ruminant density zones based on the proportion of sheep and goats. Accordingly, 26, 6 and 4 kebeles were found to be sheep dominant, mixed flock (almost similar proportion of sheep and goats) and goat dominant, respectively. From these strata of kebeles, 4, 2 and 2 kebeles were selected from sheep dominant, goat dominant and mixed flock zones, respectively.

Households that have at least 2 small ruminant or landless farmers who are involved in fattening and have a minimum of one year experience in small ruminant production and/or

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\*Kebele is the lowest administrative unit in rural Ethiopia and normally consists of small number of villages and hundreds or thousands of households.

fattening were randomly selected. Accordingly, 20 households from each kebeles (a total of 160 households) were randomly selected to participate in production system and marketing study. Structured questionnaire was used to collect information on the following variables: socio-economic characteristics of households purposes of keeping sheep and goats, inventory of sheep and goats, feeds and feeding, breeding systems and reproductive performance of sheep and goat, problems and constraints, housing, diseases and parasites, veterinary services, input in sheep and goat production, labor and its distribution in sheep and goat production, fattening practices, technologies and interventions (Appendix 2). The questionnaire was then translated into Amharic and technical words were translated into Oromiffa. Development agents (DAs) and supervisors who were working in the district and who speak the local Oromiffa language were recruited, trained and collected the data under close supervision. Group discussions were held with 7-12 key informants once in each study area in order to gain an in-depth insight about the topics covered during the structured interview and to check whether patterns found in the households were validated by focus groups.

Productive performance and flock dynamics of sheep and goats were studied on 36 purposively selected households (18 from sheep dominating and 18 from goat dominating site) who had already been involved in production system and marketing study. These households were selected based on their interest, proximity to the main road and ownership of a minimum of three sheep and/or goats. They were monitored using continuous surveying method. Data on productive performance: birth weight and weaning weight as well as flock dynamics; entry ways (birth, gift, purchases, and share) and exits (death, sale, theft, and predator) from the

flock were monitored on bi-weekly basis from November 2008 to April 2009. Data sheets were prepared and data were collected by trained enumerators during the study period.

The marketing system study was carried out using the technique called Rapid Marketing Appraisal (RMA). Following this technique, information was collected by interviewing experts, extension workers, local traders, export traders as well as hotel and restaurant owners. The five towns in the area namely; Agaro, Chago, Gembe, Limu Shayi, Bashasha were visited and discussion were made with informants. Physical facilities were also visited.

### **3.3 Data analysis**

The data were organized, summarized and analyzed using SPSS statistical package (SPSS 13.0, 2003). For data involving frequencies, descriptive statistics were employed and Pearson chi-square were used to compare variables across the small ruminant density groups, where as quantitative variables were analyzed using analysis of variance procedure and Tukey test was used to separate group means when the F test declared significant differences.

In describing results of analysis wherever appropriate, the numbers of households providing data are included in each table. Whenever the data analyzed are based on single responses to questions the percentage values should add up to 100%. In multiple answers percentages will not add up to 100%. Percentage units (%) are shown alongside the levels of one of the classification variables, either along the top or down the side, to indicate how the contents of the tables are to be interpreted and in which direction the percentage values are to be summed.

Mortality rates for particular age and sex structure of flocks (per sheep or per goats) was calculated using formulae:

Mortality rates (%) = Overall mortality rates for the flock as a whole:

$$\text{Overall mortality rates (\%)} = \frac{\text{Total deaths}}{\text{Total number of animal}} \times 100$$

$$\text{Gross off-take rate (\%)} = \frac{\text{Gross off-take}}{\text{Total flock}} \times 100$$

Indexes were developed to provide the aggregated ranking of some parameters of small ruminant production and marketing in the study area. The index was calculated as the sum of single item ranks [(3 for rank 1)+(2 for rank 2)+(1 for rank 3) ] divided by the sum of all weighed items mentioned by each density group.

## **4. RESULTS AND DISCUSSION**

### **4.1 Socio-economic characteristics of the households**

#### **4.1.1 Household characteristics**

In the study area, the majority of the small ruminants owning households were male headed (94.4%) while only small proportions (5.6%) were headed by females (Table 5). The proportion of landless young was (6.3%). According to key informants the number of landless young people involved in small ruminant fattening has been growing from time to time may be due to the market demand and high market profit. About 94% of the interviewed household heads belong to Oromo ethnic group while heads from other ethnic groups constitute only 6% of the sampled household heads and most of them were found in sheep dominant areas.

The majority of the households were Muslims (91%) followed by Orthodox Christians (8%) and Evangelical Christians (1%).

Table 5. Some socio-economic characteristics of the studied household heads shown by small ruminant density group. Values in the body are percentages of the households under the respective category.

Descriptor	Group			Overall
	Sheep Dominant	Goat Dominant	Mixed Flock	
No. of households	80	40	40	160
Gender of HH heads				
Male	96.2	92.5	92.5	94.4
Female	3.8	7.5	7.5	5.6
Marital status of HH heads				
Married	91.3	75	95	88.1
Single	5	15	0	6.3
Widow	3.7	10	5	5.6
Religion of HH heads				
Muslim	91.3	82.5	100	91.2
Orthodox	7.5	15	0	7.5
Evangelical	1.2	2.5	0	1.3
Ethnicity of HH heads				
Oromo	88.75	97.50	100	93.7
Others	11.25	2.5	0	6.3
Education level of HH heads				
Illiterate	36.3	27.5	20	30
Literate	63.7	72.5	80	70

The age, sex structure and education of household members are given in Table 6. The average the age of household head was 42.2 years while the age of the spouse was 34.4 years.



Table 6. Distribution of the studied household members by age, sex, and educational status. Numbers in the body are mean (standard error) values of age (years for spouses) and number of household members/family in the respective category.

Descriptors	Group			Overall
	Sheep Dominant	Goat Dominant	Mixed Flock	
Age of household head (yrs)	41.88(1.28)	43.03(1.78)	42.08(1.85)	42.21(0.90)
Age of wife (yrs)	33.86(1.04)	35(1.35)	34.22(1.58)	34.38(0.39)
Number of HH members/family				
<15 years	2.68(0.20)	2.9(0.32)	2.85(0.27)	2.27(0.14)
15-65 years	2.59(0.12)	2.63(0.18)	2.88(0.20)	2.67(0.88)
> 65 years	0.05(0.03)	0.03(0.25)	0.05(0.05)	0.04(0.02)
Total	5.35(0.22)	5.55(0.34)	5.9(0.36)	5.54(0.16)
Female members of the HH	2.49(0.15)	2.65(0.26)	2.38(0.26)	2.5(0.12)
Male members of the HH	2.58(0.17)	2.83(0.20)	2.85(0.25)	2.71(0.12)
Female HH members				
Between grade 1 to 6	1.29(0.114)	1.70(0.22)	1.48(0.25)	1.44(0.10)
Between in grade 7 to 12	0.20(0.05)	0.3(0.1)	0.08(0.04)	0.19(0.06)
Males HH members				
Between grade 1 to 6	1.38(0.12)	1.63(0.17)	1.50(0.19)	1.47(0.09)
Between in grade 7 to 12	0.30(0.68) <sup>b</sup>	0.58(.12) <sup>a</sup>	0.2(0.82) <sup>c</sup>	0.341(0.05)

*Means with the different superscript across rows are significantly different ( $p < 0.05$ )*

There were 5.5 household members in the house from which 2.3, 2.8 and 0.04 are 0 to 14, 15 to 65 and above 65 years, respectively. According to the report of CSA (2008), the average household member in the region is 5.0 which is comparable with the current results. There were on average 2.5 females and 2.71 males in the house. The ratio of male to female for the

studied household is almost similar to the value given for the region *i.e.* 50.4:49.6 (CSA, 2008)

The majorities (70%) of the interviewed household heads were literate while 30% of them were illiterate and there was higher in mixed flock area (80%), followed by goat dominated (72.5%) and it was fairly lower (64%) sheep dominated zones (Table 5). The literacy rate was higher than most reports: 36.3% in Metama area of Amhara region (Tesfaye, 2008); 65% in Alaba district of SNNPR (Tsedeke, 2007); 63% in central highlands of Ethiopia (Addisu *et al.*, 1998); this could be as a result of the preference of the youngsters in the study area to settle with their families after completing their elementary and/or high schools. The endowment of the Goma district to grow valuable cash crops and rear various livestock species may also indirectly contribute for that decision. The number of household members who were in primary and secondary schools was 1.44 and 0.19 for females and 1.47 and 0.34 for males respectively. Considering both sexes, it is slightly higher than half of household members.

#### **4.1.2 Land holding and its allocation**

The average land holding per household in the study area was 1.93 ha. Coffee and cereals occupy about 0.85 ha each (Table 7). There was no significant ( $p < 0.05$ ) difference in land allocation for various purposes among the three sheep and goat density groups. The total land holding in Goma is greater than the value reported for Debark district of Gondar 1.66ha (Sisay, 2006); and Yerer district (1 to 1.5ha) for majority of Households (Samuel, 2005); where as smaller than Layarmacho (2.03) and Metama (6.17) (Sisay, 2006). It was also

smaller than total land holding in Alaba of SNNPR (Tsedeke, 2007) and Bale high lands of Oromia (Teshome, 2006).

Table 7. Mean (standard error) for land holding and its distribution for grazing and crop by small ruminant density groups.

Land allocation	Groups			Overall
	Sheep Dominant	Goat Dominant	Mixed Flock	
Total land holding (ha)	1.8 (0.2)	2.3( 0.3)	2(0.3)	1.9(0.1)
Land for cereal (ha)	0.9(0.1)	1(0.2)	1(0.2)	0.8(0.1)
Land for coffee (ha)	0.8(0.3)	1.1(0.2)	0.7(0.1)	0.9(0.1)
Land for spice (ha)	0.1(0.0)	0.1(0.1)	0.1(0.0)	0.1(0.0)
Land for forage (ha )	0.003 (0.01)	0.005(0.03)	0.015(0.05)	0.005(0.01)
Land for pasture (ha)	0.03(0.04)	0.08(0.01)	0.05(0.06)	0.05(0.03)
Fallow land (ha)	0.03(0.0)	0.05(0.2)	0.08(0.1)	0.05(0.1)
Land for man made forest (ha)	0.03(0.0)	0.03(0.0)	0.03(0.1)	0.03(0.0)

The farmers in the study area allocate larger proportion of their land for coffee which is the main cash crop. According to key informants, there is indirect relationship between small ruminant holding and amount of land allocated for coffee. As the farmer allocates more land for coffee he/she tends to have less number of small ruminants or not at all. The main reason is if they graze/browse in the coffee farm, there will be a higher probability of destroying the flowering part of the plant resulting in reduction of coffee production. The farmers generally do not allow goat to browse in coffee plantation. The lands allocated for cultivated forage and

grazing pasture by house hold were 0.005 and 0.05 ha, respectively. This allocation of very small land for livestock feed may be due to communal grazing areas commonly used for grazing. Fallow land which can also be a sources source of grazing constitutes only about 0.05 ha.

#### **4.1.3 Household ownership of different livestock species**

The mean and the standard deviation of livestock holding in the study area are given in Table 8. On average, a household owned 3.6 cattle; 3.6 sheep; 2.1 goats; 0.2 equines and 2.7 chickens. There was significant ( $p < 0.05$ ) differences among areas classified by the small ruminant density groups of the study area in holding different species of livestock. Farmers in goat dominant areas own significantly higher number of cattle per HH; this may be due to relatively larger land holdings and more land covered by cereal crop in the lowlands of Goma. Farmers have larger cultivable land allocation for cereal crops in these areas. Significantly ( $p < 0.05$ ) higher proportion of sheep were observed in highlands which are already categorized as sheep dominant area. Less proportion of sheep was observed in lowland as these areas dominated by goats. According to key informants, lowland areas of Goma are not suitable for sheep because of diseases; and farmers usually consider sheep as highland animals. The critical limitation for sheep in the lowland is acute deaths mainly due to respiratory diseases. The lowland areas, which are represented by four kebeles, had higher concentrations of goat population. According to key informants, in lowland areas of Goma, goats are more adapted and productive than sheep because they are more resistant to diseases. Unlike most lowland areas of the country, Goma lowlands are endowed with varieties of trees and shrubs that goats

can utilize. The rainfall is also much higher than most lowland areas of the country so that better quantity and quality of forage is available throughout the year.

Table 8. Mean (standard error) number of livestock holding/household in the three areas categorized according to small ruminant density.

<b>Species</b>	<b>Group</b>			<b>Overall</b>
	<i>Sheep Dominant</i>	<i>Goat Dominant</i>	<i>Mixed Flock</i>	
Cattle	3.3(0.3) <sup>b</sup>	4.8(0.6) <sup>a</sup>	3.1(0.5) <sup>b</sup>	3.6(0.3)
Sheep	4.7(0.3) <sup>a</sup>	2.3(0.3) <sup>c</sup>	2.8(0.4) <sup>b</sup>	3.6(0.2)
Goat	1.1(0.2) <sup>c</sup>	3.6(0.5) <sup>a</sup>	2.5(0.5) <sup>b</sup>	2.1(0.2)
Equines	0.3(0.0) <sup>a</sup>	0.2(0.5) <sup>b</sup>	0.03(0.0) <sup>c</sup>	0.2(0.0)
Chicken	2.1(0.4) <sup>b</sup>	5.5(0.7) <sup>a</sup>	1.1 (0.4) <sup>c</sup>	2.7(0.3)

*Superscripts with different letters across the rows differ significantly ( $p < 0.05$ )*

## 4.2 Small Ruminant production system

### 4.2.1 Flock structure and production objectives

The age distribution of sheep and goat is presented by Figures 3 and 4 .The distribution by age almost follow similar trend for both sheep and goats except for age 3-6 months and breeding males. Breeding females represent larger proportion while suckling age are the second largest age group in the flock; and the castrates represent the lowest proportion in the flock for both species. From the sheep flock, 33.9%, 18.6%, 13.1%, 12.8%, 11.2% and 10.7% are represented by ewes, lambs, rams, ram lambs (3-6months), ewe lambs (3-6 months) and castrates, respectively. There are 35.1%, 25.9%, 12.5%, 11.7%, 9.8% and 5.0% does, kids, doe kids (3-6month), buck kids (3-6 month), bucks and castrates, respectively.

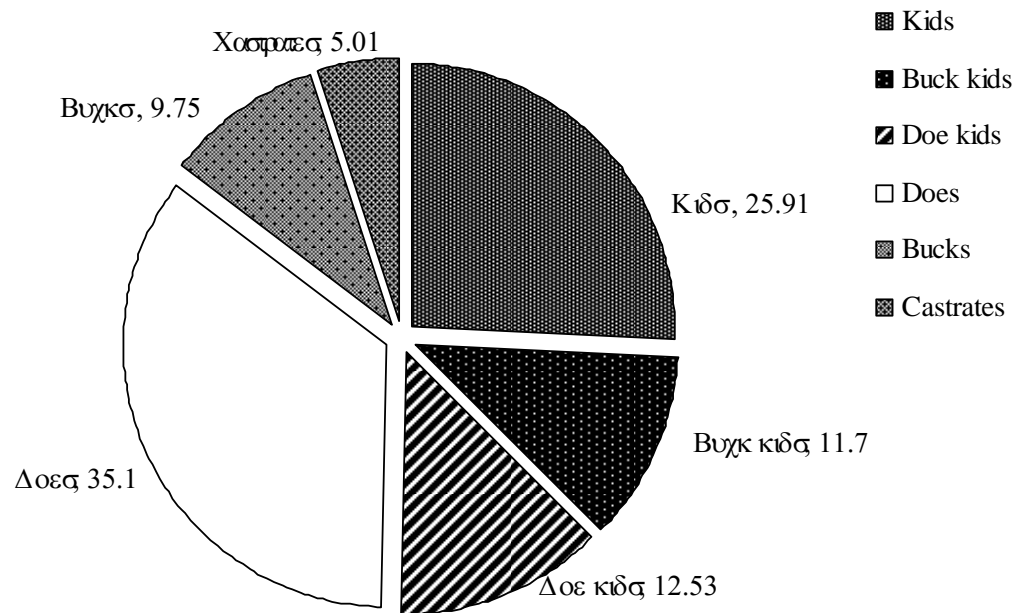


Figure 3. Flock structure of goats (numbers represent percentages of respective groups).

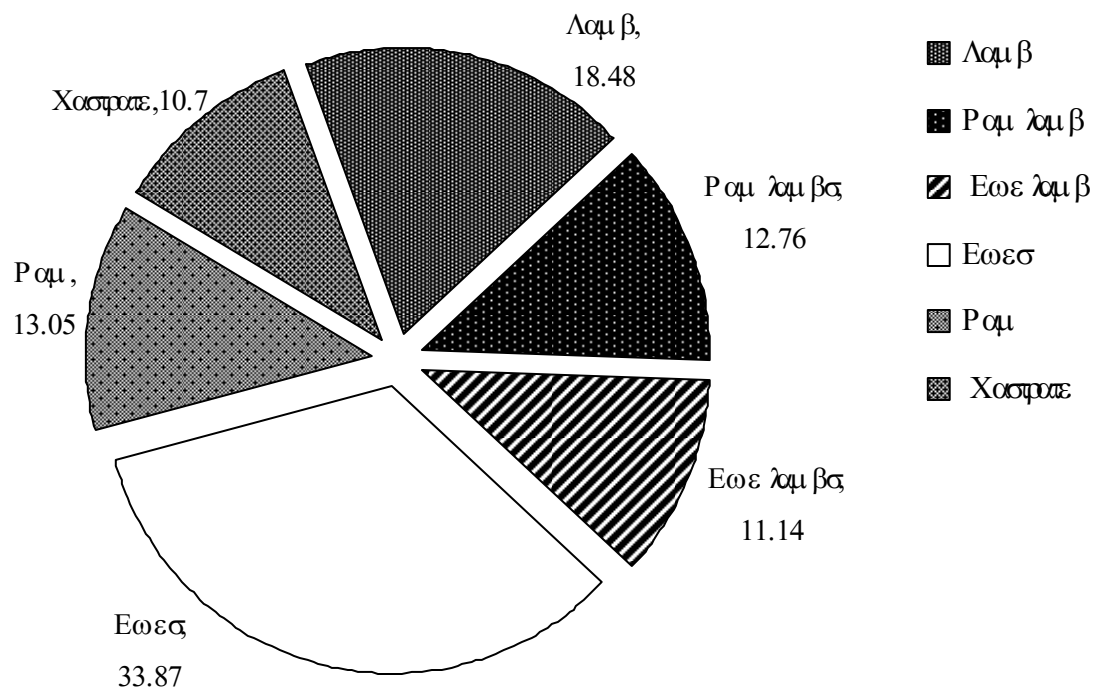


Figure 4. Flock structure of sheep.

The higher proportion of females may be attributed to the prevalent practice of retaining females for breeding while males are either castrated in order to fetch higher price or sold when they reach market age. The higher proportion of breeding females in the flock followed by suckling age group for both species was in agreement with report from Alaba (Tsedeke 2007); and CSA (2008) stated higher proportion of females than males in national small ruminant structure.

In Goma district, small ruminants are kept for different purposes (Table 9). About 94% of the small ruminant keepers keep them mainly for income generation. Similar to this finding, small ruminants are rear in many parts of the country mainly for income generation (Markos, 2006; Sisay, 2006; Endeshaw, 2007; Tsedeke 2007; Getahun, 2008).

The second main reason for keeping small ruminant in the study area is for saving purpose. According to group discussion participants and key informants in the area, coffee is the main cash crop followed by chat. For most farmers, however, their economic profitability is highly limited by various factors. In most cases, there is fluctuation of coffee yield; so farmers nowadays keep small ruminants as saving and insurance. Keeping small ruminant for meat and manure purposes were ranked as third and fourth important reason. Although its amount is small, in most households farmers prefer small ruminant manure to cattle manure. Other important reasons include for risk distribution, sacrifice and social heritages.

**Table 9.** Purpose of keeping the small ruminants and ranked by owners in the study area.

Purpose	Households ranked purpose of keeping small ruminants					Index
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	
Income	150	8	0	1	0	0.44
Saving	7	53	24	10	3	0.19
Meat	1	33	21	13	1	0.13
Manure	0	15	38	18	5	0.12
Risk/benefit distribution	1	17	20	15	7	0.1
Sacrifice	0	1	0	6	2	0.01
Social heritage	0	5	2	0	0	0.02
<b>Total</b>	<b>159</b>	<b>132</b>	<b>105</b>	<b>63</b>	<b>18</b>	<b>1</b>

Index =[(7 for rank 1)+(6 for rank 2 )+(5 for rank 3)+(4 for rank 4 )+(3 for rank 5 )+(2 for rank 6 )+(1 for rank 7)] divided by sum of all weighed purposes mentioned by respondent.

#### 4.2.2 Feeds and Feeding systems

##### 4.2.2.1 Major feeds available and their utilization

Grazing is the common feed source for small ruminants in the study area. Common forms of grazing and non-conventional feed sources and their season of utilization are given in Figure 5 and 6. Communal grazing land, roadside grazing, riverside grazing and aftermath grazing are the major types of grazing for sheep and goats. From the interviewed Households, 59.4%, 23.5%, 19.4% and 32.1% of them utilize communal grazing, roadside grazing, riverside grazing and grazing aftermath, respectively. Although there is difference in utilization across months of the years, communal grazing lands are utilized throughout the year. Similarly many



reports (Abule 2003; Teshome, 2006; Tsedeke, 2007; Tesfaye, 2008) indicated that natural pasture is the main feed resource for small ruminants and cattle. The availability and quality of forages are not favorable and uniform in nutrient quality all year round. As a result, for animal that is not supplemented the gains made in the wet season is totally or partially lost in the dry season (Alemayehu, 2003). Indigenous browses are other sources of feed in the study area especially for goats while concentrates are not common. Similar to this finding, Yeshitila (2007) also reported the utilization of indigenous browses as feed resources in Alaba district of SNNPR.

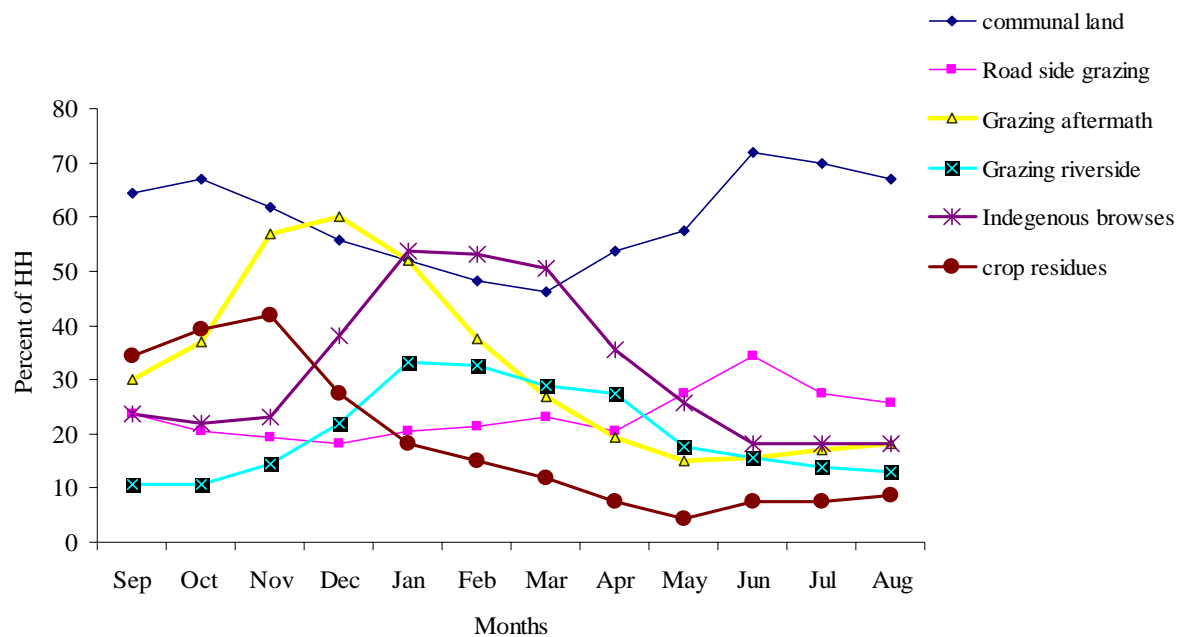


Figure 5. Common grazing sources and their seasonal utilization.

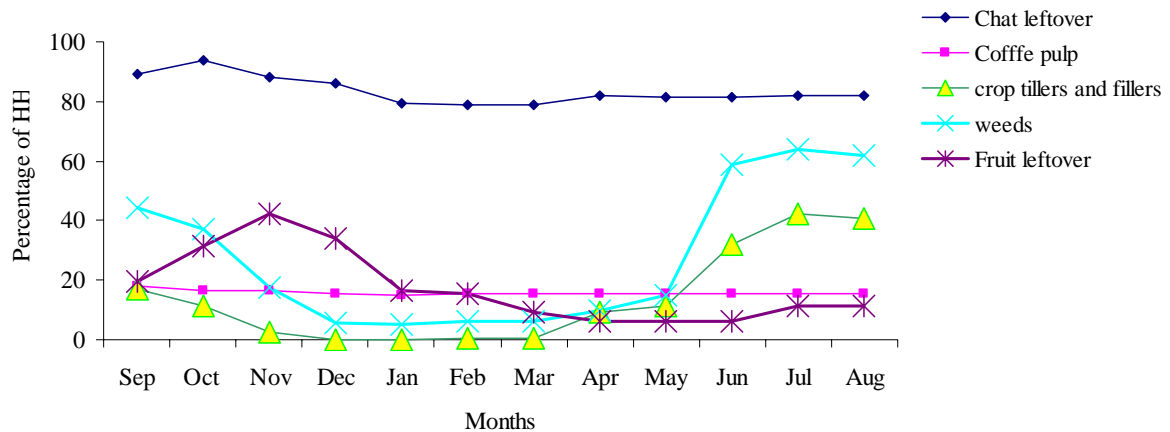


Figure 6. Common non-conventional feed sources and their seasonal utilization.

The trend of feed utilization is described in Figures 5 and 6. Grazing river side is utilized in dry season and short rainy seasons while intensity of its utilization then declines until October. This may be due to the utilization of communal grazing lands in wet months. During the rainy seasons farmers do not cut browses to feed small ruminants cut-and-carry is much common during the dry season. Grazing aftermath is an important source of sheep and goat feed from the start of the dry season to the start of the short rainy season after which their importance declines. Indigenous browses are important sources animal feed from October to May when other sources of feeds are becoming coarse and low in quality.

In Goma there is a wide utilization of non-conventional feed sources such as chat left over, home left over, fruit left over, enset and banana parts, weeds and crop tillers and fillers. From the interviewed households, 83.5% fed their animals (particularly castrates) with chat and home left-over. According to group discussion participants, after being utilized by family members chat is not dropped rather collected and put for small ruminants. So its utilization was throughout the year for most of the households.

Weeds and crop tillers of maize and sorghum are also other common feed sources for sheep and goats. Similarly other reports indicated that farmers use crop fillers and tiller during wet season in Alaba of SNNPR (Tsedeke, 2007; Yeshitila, 2007). When the farmers move to crop field for weeding they take their animals with them and feed them. However, their sources limited to rainy seasons although small number of farmers have access to irrigation and then weed their crop during other times of the year too.

Gazing lands are communally owned while some households have small private grazing areas locally called *kallo* between their cropping fields. While working on their cropland they keep their animal with them in these small grazing areas.

In the current study area sheep and goats spent most of their time being sheltered in the house. On average they only spent about 6 hours in days grazing/browsing during the day time. They are under close supervision through out the day and in all seasons of the year to prevent them from damaging crop cultivation and to protect them from predators. In the highlands where sheep are dominant there is small grazing time; small ruminants are protected from cropland (coffee cultivation and fruit plantation) and from predators especially leopard and hyena. In lowlands areas, where goats are dominating and grazing lands are relatively larger they are also protected from damaging cropland and to be protected from wild animals like leopard, hyena and monkey. Monkeys were treat for kids/lambs; according to key informants, they take out the eye of kids/lambs first, then kill them to predate. There is no significant ( $p < 0.05$ ) variation across the three areas classified according to small ruminant density in allowing

grazing or browsing time for sheep and goats; however, according to group discussion there is a difference in allowable grazing time between the two species with more restriction to goats.

From the interviewed households 53.8% of them herd sheep alone, 12.5 % goat alone, 22.5% sheep and goats together and 11.2% keep small ruminants with large ruminants while grazing. The tendency of keeping small ruminants with large ruminant is lower, this because of their feeding behavior. According to group discussion with participants, farmers prefer feeding goats alone instead of grazing/browsing them with sheep. This may be due to the fact that the goats have the ability to browse many plant species within short period and less time is required to fill their gut than sheep.

In wet seasons of the year when the major feed source is communal grazing, 79.4% of households use herded grazing system so that sheep and goats do not go into crop fields as herders are closely following. In this time road-side grazing and private grazing are also used though the size is much smaller. About 13% of household uses both herd grazing and tethered grazing (*i.e* herded grazing then tether or vice versa). Tethering and cut and carry methods were practiced in wet season.

In dry seasons, majority of households (54.4%) tether their animals while 25.6% of households use cut and carry methods and only few of them herd (12.5%) their flock. Although the intensity and the purpose differs similar practices were also reported by different authors; Tesfaye (2008) reported tethering of goat in wet season in Metama district of Amhara

and Getahun (2008) also reported herded grazing as common practice for small ruminant management in Kofele district of Oromia.

Table 10. Grazing management of sheep and goats by small ruminant density groups.

Particulars	Group			Overall
	Sheep	Goat	Mixed	
	Dominant	Dominant	Flock	
Grazing ways				
• Sheep alone	63.8	50	37.5	53.7
• Goat alone	5	22.5	17.5	12.5
• Sheep and goat alone	26.2	15	22.5	22.5
• Sheep and goats with other livestock	5	12.5	22.5	11.3
Grazing/Browsing in dry season				
• Free grazing	15	10	10	12.5
• Tethered grazing	56.3	52.5	52.5	54.4
• Cut and carry	17.4	37.5	27.5	25.6
• Free grazing and tethered grazing	11.3	10	7.5	7.5
Grazing/Browsing in wet seasons				
• Free grazing	87.5	72.5	70	79.4
• Tethered grazing	2.5	5	15	6.25
• Cut and carry	5	7.5	2.5	2.5
• Free grazing and tethered grazing	5	15	12.5	13.1

According to key informants, higher proportions of households tether their animals during dry season because in dry season there is limited grazing potential. As a result sheep and goats tend to wonder long distance and damage annual and perennial crops. They can also be attacked by wild animals.

Although the practice of supplementing sheep and goats with concentrates is not common, farmers supplement their sheep and goats with non-conventional supplements. During dry season about 92% of the households supplement their animals from which two-third of them supplement in both seasons of the year. Similar finding was also reported by Getahun (2008); small ruminants are supplemented in two farming systems of southern Ethiopia by the majority of farmers. In goat dominating and mixed flock areas of the current study farmers, do not supplement during the wet season.

Figure 7 presents the supplemented group by age and supplemental feeds. In Goma, the majority of farmers usually supplements breeding females and castrates. This may be because the farmers in study area have few animals in which they do not separately supplement specific group. Almost all castrates targeted for fattening were supplemented. Farmers supplement salt, chat left-over, food-leftover, fruit left-over for all age. Similar finding was also reported by Yeshitila (2007) in Alaba, the utilization of non-conventional feeds for animal supplementation (chat left over, brewers recipes and fruit leftovers).

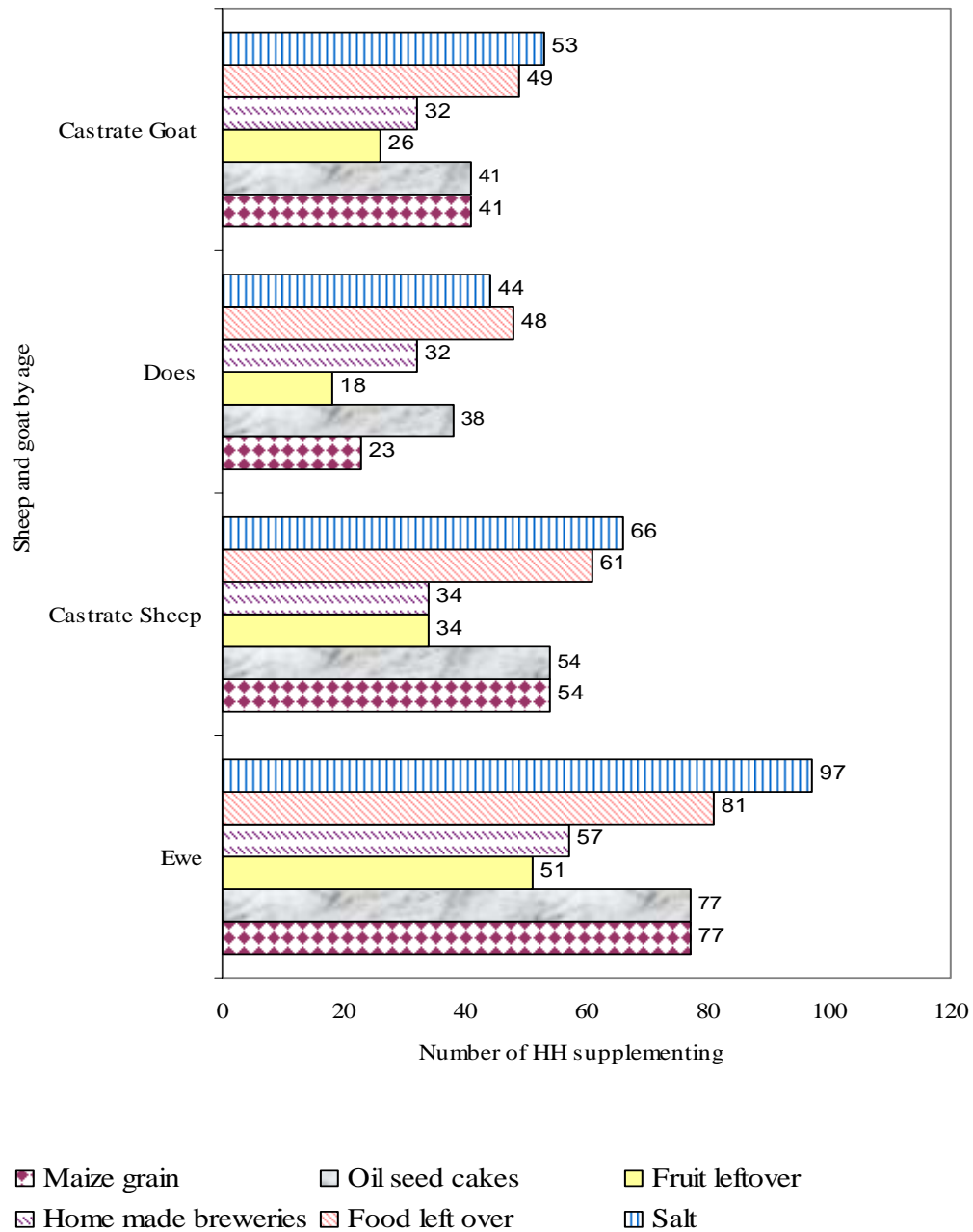


Figure 7. Supplementation practices of households.

Majority of the farmers supplemented small ruminant during both seasons (55.1%) followed by dry season (37.4%) than wet season (7.5%) (Table 11). According to key informants, in

these sites relatively better feeds are available in wet season and farmers who tether their animals and fatten are supplementing their animals in both seasons. In most cases, the farmers supplement sheep and goats when the feed is available; but farmers who practice tethering are supplementing their animal's once (23.1%) or twice (11%) a day.

Table 11. Season and frequency of supplementation of small ruminants in three areas. Body of the table gives percentage of households under the respective category.

Particulars	Group			Overall
	Sheep	Goat	Mixed	
	Dominant	Dominant	Flock	
Season of Supplementation				
Dry season	32	48.7	36.4	37.4
Wet season	14.7			7.5
Both	53.3	51.3	63.6	55.1
Frequency of supplementation				
Daily	29.3	12.8	21.2	23.1
Twice a day	9.3		27.3	10.9
When ever available	61.3	87.2	51.5	66

#### 4.2.3 Reasons for tethering sheep and goats

The majority (86.3%) of the interviewed households are accustomed to tether their animals in the study area. The major reasons includes: avoid crop and vegetation damage (93.5%), protect from predator (53.6%) to save labor (50%) and to reduce aggressiveness in case of male animals (1.45%) and to utilize marginal land (1.45%) (Table 12). Tsedeke (2007) also reported the importance of tethering animals mainly to avoid crop damage and to save labor.



Chi-square analysis showed that there was no significant ( $p>0.05$ ) difference in practice of tethering across the three areas. Most households in the three areas agree that the main reason for tethering small ruminants is to prevent them from damaging crops. On the other hand, significantly higher proportion of households in the sheep dominant areas tether small ruminants to protect them from predators (63.9%) in particular compared to those households that gave these reasons in mixed flock site and to some extent goat dominant site. This may be because of higher risk of predation in the high lands that has resulted from dense forest cover which harbored relatively more population of predators.

Table 12. Reasons for tether feeding of sheep and goats reported by households (%).

Reasons	Groups			Over all	Tests	
	Sheep Dominant	Goat dominant	Mixed flock		$X^2$	<i>p-value</i>
Practice of tethering	88.8	80.0	87.5	86.2	1.792	0.408
Reasons of tethering						
• To avoid crop and vegetation damage	93.1	96.9	86.1	93.4	2.882	0.237
• To save labor	51.3	42.5	27.5	50	6.931	0.31
• To protecting from predators	63.9	56.3	27.8	53.6	12.15	0.002
• To utilized untapped areas	2.5	0	0	1.45	1.916	0.784
• To reduce aggressiveness	1.4	0	2.8	1.45	0.930	0.628

#### **4.2.4 Feed shortage**

Feed shortage is one of the limitations for small ruminant production in the area. From the interviewed households, 86.3% of the respondents reported feed shortage in the area. Chi-square analysis showed that there is variation within the district with higher intensity of feed shortage in highland areas where sheep dominates. Although the shortage is indicated across all seasons of the year higher percentage (47.1%) was reported for dry season, while 33.3% and 19.6% were also reported for wet and both seasons, respectively. The higher feed shortage during the dry season may be due to the majority of farmers use communal grazing land which provides little forage in dry season; as most lands are covered by perennial crop, the animal are not allowed to move freely. The reasons for higher intensity of feed shortage in the high lands may be associated with the higher intensity of annual and perennial crops cultivation and corresponding shrinkage of grazing lands.

Feed shortage as a constraint for small production is similarly reported by many authors in different parts of the country (Abule, 2003; Kedija, 2006; Teshome, 2006; Endeshaw, 2007; Getahun, 2008; Tesfaye, 2008).

Various reasons have been viewed by respondents for the prevailing feed shortage in the area (Table 13). Most households (95%) in the study area agreed that the main reason for feed shortage in the area was expansion of arable farming and increase allocation of land for perennial crops particularly for coffee cultivation which in turn reduced grazing lands. According to the information obtained from OoARD office of the district (Ato Serawit Hailemariam; personal communication), several millions of coffee seedlings have been

distributed in recent years for new plantation and replacement. Correspondingly, larger area of new land which used to be grazing/forest land cover has been allocated for coffee plantation each year. Majority of the interviewed respondents (57%) also viewed that decrease in size and productivity of grazing lands and increase in human population were also responsible for the prevailing feed shortage (Table 13). In addition, considerable proportion of the respondents attributed to the problem of feed shortage to the increase in livestock density (44%) and erratic nature of the rainfall causing reduction in forage yield (25.5%).

Table 13. The relative importance of various reasons for the prevailing feed shortage as suggested by households in the three studied areas classified according to the density of small ruminants. Values in the body of the table are % of households that viewed the respective reason

Reasons	Group			Overall
	<i>Sheep</i>	<i>Goat</i>	<i>Mixed</i>	
	<i>Dominant</i>	<i>Dominant</i>	<i>flock</i>	
Increase land allocation for crop cultivation(coffee, other cash crops)	97.1	94.1	90.9	94.9
Decrease in size and productivity of grazing lands	46.5	55.9	65	56.9
Increase in human population	52.5	52.5	48.5	57.7
Increase in animal population	40	44.1	51.5	43.8
Erratic rainfall condition in reduction in forage production	22.9	41.2	12.1	24.8

The problems of feed shortage was more sever in the highlands where sheep are dominantly reared and this may be due to presence of relatively higher density of livestock in the area as

well as high intensity of annual and perennial crop cultivation which in turn causes shrinkage of grazing lands. In low land areas where goats are dominant relatively higher proportion of households reported the problem of rainfall shortage as a limitation for low fodder production. This may be due to low and erratic nature of rainfall in lowlands than in relatively wetter highlands.

Farmers in study area have limited practice of feed conservation. Only about 13% of the interviewed households reported for practicing feed conservation in the form of hay while other feed conservation methods like silage are not known in the area. The major reason for not practicing feed conservation techniques were lack of awareness, skill and experience (85%) and absence of surplus feed to be conserved feed (56.1%). According to key informants, the farmers in the area have no experience of conserving feed. During the old days, the district had more forest cover and receives better rainfall almost throughout the year; as a result the animals used to graze all year round. Nowadays the grazing lands are limited and almost there is no grass/legume to be conserved.

#### **4.2.5 Water sources and utilization**

River water was reported to be the major water source (56.9%) for small ruminants in the study area. Other water sources include ponds, deep well, pipe water and rain water during rainy season consist 6.8%, 5.6%, 4.4% and 6.9%, respectively while others (19.4%) do not take sheep and goats to watering points rather supply at homestead. There are bigger and smaller rivers which are water sources during entire year in Goma. The district also receives

relatively higher rainfall amount across periods of the year than most part of the country (IPMS, 2007). Similar result was also reported by Tesfaye (2008) that water was not a limiting factor in small ruminant production in Metama district. However, Abule (1998) reported river was the major water source in mid rift valley area for small ruminants especially for goats and water was limiting factor. For Kereyu pastoralists Abule (2003) also indicated that water is a limiting factor in livestock production. Relatively smaller time (on average 9 minutes) was reported for traveling to main water in the area and 7.7 minute travel to ponds in the study area.

The watering frequencies of sheep and goat in dry and wet seasons are shown in Table 14. Shorter watering frequencies were used to water sheep and goats in the study area. This may be due to easy accessibility of watering points in close distances in most part of the district. In dry season one-third of households watered goats once a day. The proportion of households that water their goats once a day and twice in a day are 79.4% and 15.6%, respectively. Watering with more than a day frequency is very minimal. Sheep in the area are watered once a day (46.3%) and twice a day (50%) in the dry season. Similarly, watering frequency of more than once in a day is small.

Table 14. Watering frequency (%) of sheep and goats in three areas classified by small ruminant density groups.

Frequencies	Group			Overall
	<i>Sheep</i>	<i>Goat</i>	<i>Mixed</i>	
	<i>Dominant</i>	<i>Dominant</i>	<i>Flock</i>	
<i>Goat dry season</i>				
Any time	2.5	0	12.5	4.38
Once a day	77.5	92.5	70	79.36
Twice a day	20	7.5	15	15.63
Ever other day	0	0	2.5	0.63
<i>Sheep Dry season</i>				
Any time	1.3	2.5	5	2.5
Once a day	52.7	50	30	46.25
Twice a day	43.5	47.5	65	50
Ever other day	2.5	0	0	1.25
<i>Goat wet season</i>				
Any time required	1.3	2.5	30	20
Once a day	17.5	7.5	15	14.36
Twice a day	3.8	0	5	3.13
Ever other day	1.3	40	0	4.38
Ever three day	3.8	2.5	5	13.75
No watering	72.3	47.5	45	44.38
<i>Sheep wet season</i>				
Any time required	1.3	22	10	8.75
Once a day	37.5	60	35	42.5
Twice a day	8.8	0	37.5	13.75
Ever other day	0	7.5	0	1.88
Ever three day	3.8	0	2.5	2.5
No watering	48.6	10.5	15	30.6

In wet season, there is no shortage of water so the majority of households do not water sheep and goats. Sheep and goats utilize rain water on land surfaces so about 20% of households watered goat water anytime required. While about 42.5% of households watered sheep once a day. The shorter watering frequencies reported in study area may be due to ample water resources and most of households water their flock from what they consume; as most of them tethered in most part of the year.

From the interviewed households, only 8.1% reported water shortage. More households (12.5%) responded water shortage in mixed flock site. According to key informants, there are coffee processing plants in mixed flock zones that use excessive water that has negatively influenced its utilization by livestock. So the source of problem is not natural; it can be resolved by proper policy on utilization of water resource by different community groups.

#### **4.2.6 Small ruminant management and husbandry**

##### **4.2.6.1 Small ruminant housing**

All farmers in Goma district shelter their animals during the night to protect them from predators and adverse climatic conditions. From the interviewed households, 95.6%, 98.3% and 4.4% shelter their sheep and goats for reasons of protecting from bad weather, predators and to provide supplement in the evening respectively (Table 15). Small ruminant are sheltered for protection in most rural communities such as, southern part of Ethiopia (Endeshew, 2007; Tsedeke, 2007); in central rift valley (Abule, 1998; Samuel, 2006); and in

Metama district of Amhara region (Tesfaye, 2008). However, places of sheltering and type of house vary.

Table 15. Reasons of housing small ruminants by households (%).

Particulars	Group			Overall
	<i>Sheep</i>	<i>Goat</i>	<i>Mixed</i>	
	<i>Dominant</i>	<i>Dominant</i>	<i>Flock</i>	
Bad weather	93.8	95	100	95.6
Predator	96.3	100	100	98.1
Supplementation	3.8	0	10	4.38

Sheep and goat sheltered in most cases in separate house. Places of confinements are given in Table 16. From the interviewed households, 39.4%, 38.2% and 22.5% of households shelter their animals in adjoin house, separately constructed house and main house with a family respectively. In sheep dominant sites, the number of sheep and goats owned is smaller than goat dominant sites, so the farmers may use part of their house for sheep and goat confinement. Places of sheltering varies in different places; small ruminant are sheltered in main house with a family (Tsedeke, 2007) in Alaba of SNNPR while Coppock (1994) reported corrals used for adults while family house used for lamb/kids in Borena pastoralist.



Table 16.Types of houses where small ruminants are confined during night for protection (%).

Housing system	Group			Overall
	<i>Sheep Dominant</i>	<i>Goat Dominant</i>	<i>Mixed Flock</i>	
Main house with a family	31.3	5	22.5	22.5
Adjoin house	45	35	32.5	39.4
Separately constructed house	23.8	60	45	38.1

#### 4.2.6.2. Culling sheep and goat

Farmers practice culling of small ruminants due to various reasons. The major reasons include sickness (95.1%), fertility problem (82.2%), physical defect (82.2 %), old age (61.4%), and unwanted physical characteristics (60.4 %) (Table 17). Chi-square analysis showed that there is significant variation among the three areas classified by small ruminant density groups for reasons of culling except for sickness; with higher percentages of goats were culled due to fertility problem (90.9) and unwanted physical characteristics (81.8) in goat dominant site, for physical defect (85.4) in sheep dominant site and for old age (88.9) in mixed flock sites. Group discussion participants also confirmed that farmers cull seriously sick animals, infertile females and animals with body deformation. Culling of small ruminants was also reported by Agyemang *et al.*, (1986) due to either old age or infertility or during financial problem.

Table 17. Reasons for culling sheep and goats by household in the study area (%).

Particulars	Group			Overall	Tests	
	Sheep dominant	Goat Dominant	Mixed flock		$X^2$	<i>p-value</i>
Old age	32.5	75.8	88.9	61.4	6.91	0.032
Health problem	100.0	93.9	88.9	95.1	2.17	0.33
Infertility	82.9	90.9	67.9	82.2	9.26	0.010
Physical defect	85.4	84.8	70.4	82.2	6.064	0.048
Unwanted characteristics	46.3	81.8	55.6	60.40	14.136	0.007

#### 4.2.6.3 Small ruminant castration and fattening practices

Castration of young male animals before selling is practiced by majority of households in Goma district (Table 18). Three fourth of households from sheep dominant and mixed flock sites and all households in goat dominant areas castrated their animals before market in order to fetch higher prices. Other main reasons for castration were to receive higher price, to reduce aggressiveness and to avoid mating. In agreement with the present results, the practice of castration has been reported in different parts of the county mainly to fatten and to obtain more prices (Agyemang k. et al., 1986; Takele et al., 2006; Tsedeke, 2007).

Body confirmation, age and physical characteristics were major characteristics used to select for small ruminant for castration in the district. Almost all households mentioned body confirmation as characteristics to select animals to be castrated. Age and physical

characteristics were also reported by 80.8% and 70.8% of households, respectively while breed was given least priority by the farmers. Selecting animals with good body confirmation by most farmers may be they usually have notice-able muscle development and fat deposition that make them attractive in the market after they are fed. Age is important during castration because very young animals can't recover easily and go to the fattening stage (fat deposition). Therefore, farmers select stronger animals with good body confirmation.

According to group discussion with participants, physical characteristics like body length and height were given priority when selecting sheep and goats for castration, while tail size and width are also preferred trends for sheep. This may be due to its relation with local market demand as it is area of fat deposition which is the interest of local consumers. In most cases, brown, white or mixture of the two are the dominant colors in the area; so color is not given special attention in the study area for sheep. Although some colors are preferred for some ritual ceremonies, there is no such a specific preference of color for fattened goats.

Age has been one of the criteria in selecting small ruminants for castration. The average age for castrating sheep is about one year while the average age for goats is slightly higher (13 months). However, a larger range of age (min 6 and max 24) was observed for both species in the study area.

Table 18. Reasons for castration criteria used in selecting rams and bucks (%) and mean age of castration in three areas.

Particulars	Group			Overall
	Sheep	Goat	Mixed	
	Dominant	Dominant	Flock	
Reasons for Castration				
To fetch more price	100	100	100	100
To avoid mating	22.95	5.128	20	16.92
To reduce aggressiveness	22.95	15.384		15.38
Criteria to select for Castration				
Body confirmation	96.72	100	100	98.46
Breed	4.918	5.128	13.33	16.15
Physical characteristics	65.57	79.48	70	70.77
Age	78.68	89.74	83.33	80.77
Mean age of castration				
Sheep	11.1(0.6) <sup>b</sup>	13.8(0.4) <sup>a</sup>	12.1(0.3) <sup>b</sup>	12.2(0.3)
Goat	12.5(0.8) <sup>b</sup>	14.4(0.7) <sup>a</sup>	12.0(0.5) <sup>b</sup>	12.8(0.4)

There is significant variation across the three density group in age of castration with higher age for sheep and goats in goat dominating site. Similarly the variation of age of castration in Debre Berhan was reported by (Agyemang k. *et al.*, 1986). Tsedeke (2007) reported 1.1 year for sheep which is similar with current report for sheep and 1.6 years for goats which is slightly higher than the current results.

#### 4.2.6.3.1 Castration and feeding methods of small ruminants

Castration is a widely used practice for adding value to the animals. In the study area farmers mostly took their animal to nearby veterinary clinic to be castrated by burdizzo ( 60.2%) while 38.3% used traditional methods and the rest use either of them (Table 19). On other hand, Tsedeke (2007) reported traditional methods of castration as the major method accustomed in Alaba and only 10% use burdizzo. In Goma district most farmers are accustomed to use Burdizzo may be due to the availability of veterinary clinic within the vicinity in most places and its wider usage in the area.

Table 19. Method of castration and feeding of castrates by households in the study area.

Practices	Percentage
<i>Methods of Castration</i>	
Local methods	38.3
Burdizo	60.2
Both	1.6
<i>Length of feeding</i>	
Until get fattened	63.2
2 to 3 month	10.4
3 to 4 month	8.5
4 to 5 month	10.4
5 to 6 month	7.5

Once they castrate the animal, they feed them for different lengths of time on different types of feed types; 59.4% of the households feed castrated sheep and goats maize grain, 31.1% feed them other available grains and food leftover including chat leftover, while the rest 8.5% and

0.91% feed beans and mill house wastes by products, respectively. About three fourth of fatteners feed until they get fattened while, 10.4% keep 2 to 3 months, and 8.5% keep 3 to 4 months and 10.4% 4 to 5 months while 7.5% keep 5 to 6 months (Table 19).

#### **4.2.6.4 Entry and Exit of small ruminant flock of households**

In the study area sheep and goat enter and leave the farmers flock through a number of ways (Table 20). Sheep and goats enter to flocks through births, purchases, and sharing arrangements in 56.9%, 26.9%, and 1.9% of the households, respectively. Chi-square analysis showed that there is no significant ( $p < 0.05$ ) variation across the three flock density areas except for home born entry in which significantly higher proportion (62.5%) was found in goat dominant site.

The flock exit of sheep and goats included sale (69.4%), death (46.3%), slaughter (28.8%), predator (33.3%), theft (5.63%) and share arrangements (3.13%). The overall figure shows that sale accounts for the major way of exit, followed by death and predator. However, Chi-square analysis showed that, there is no significant ( $p < 0.05$ ) differences across the study sites except for loss by death and predators. Significantly higher proportion (54.4%) of households reported for loss by death in sheep dominating site than the rest and 50% of households reported lose by predators in goat dominating site. According to group discussion participants and key informants these are one of the limitations in small ruminant production in the district and most disease causes are acute; their causes and treatments are not generally known. In addition, there is a vast forest cover in the area where wild animals are inhabited that can be a

threat for small ruminants especially the suckling age groups. The entry and exit of small ruminants through similar routes was also reported in southern and other parts of the country (Endashew, 2007; Tsedeke, 2007; Tesfaye, 2008).

Table 20. Routes of flock entry and exit (%).

Routes	Group			Overall	Tests	
	Sheep	Goat	Mixed		X <sup>2</sup>	p-value
	dominant	dominant	flock			
Exit Ways						
Sale	71.25	72.5	62.5	69.38	4.091	0.129
Death	54.43	30	47.5	46.25	6.390	0.041
Slaughter	36.25	15	27.5	28.75	4.211	0.122
Theft	7.5	0	7.5	5.625	5.957	0.051
Predator	32.5	50	17.5	33.125	16.645	0.000
Gift	2.5	0	2.5	1.875	1.028	0.598
Share arrangements	1.25	5	5	3.125	0.604	0.739
Entry ways						
Home Born	60	62.5	45	56.875	6.931	0.031
Share arrangement	1.25	2.5	2.5	1.875	3.028	0.220
Purchase	30	10	37.5	26.875	1.635	0.441
Not Replacing	23.75	22.5	27.5	24.375	8.618	0.013

#### 4.2.7. Consumption of small ruminant and their products

In Goma district, small ruminant meat was consumed during various occasions. However, the time is mostly restricted to holidays and some occasions like weeding, births in a family, funerals and during coffee harvest (Table 21). The majority (90.7%) of households consume

meat during festival times while 25 % of households consume small ruminant meat during coffee harvest season. According to group discussions, slaughtering small ruminants when coffee is to harvest is a common among farmers in area in “good coffee years”. Weeding time (23.1%) is also a time when small ruminants are slaughtered. Other reasons include birth in family (8.2%), during hosting guests (7.5%) and circumcision (6.7%) and funerals (10.6). However, the former three are becoming very rare these days while the later one is common.

Table 21. Occasions when households consume small ruminant meat in the three areas classified according to small ruminant density.

Occasions	Group			Overall
	<i>Sheep</i>	<i>Goat</i>	<i>Mixed</i>	
	<i>Dominant</i>	<i>Dominant</i>	<i>Flock</i>	
Holidays	90.0	95.0	87.5	90.6
weeding	27.5	22.5	15.0	23.1
when animal available	17.5	7.5	15.0	14.4
Births in family	12.5	0	7.5	8.1
Guests	10.0	5.0	5.0	7.5
Circumcise	3.8	5.0	15.0	6.9
Funerals	15.0	2.5	10.0	10.6
Crop(coffee) harvest	36.7	7.5	20.0	25

There is no report of small ruminant milk utilization in Goma farming community. However, other reports showed the utilization of sheep and goat milk in different parts of the country (Workneh, 2003; Tsedeke, 2007; Getahun, 2008). According to group discussion held with farmers and key informants, Goma community do not utilize small ruminant milk; may be due to the smaller number of small ruminants and their utilization of cows as a primary sources of



milk and its products reared and their preference for black coffee. Moreover, before some decades they were even reared by the majority of farmers in the area.

All interviewed farmers reported they sell the skin of small ruminants after slaughter. This may be due to higher price for the skin. Farmers sell skin to any agent in nearby town within a day time. No farmer responded as preserving small ruminant skin immediately after flaring. According to key informants, farmers in the area also use small ruminant skin in making equine saddle for transportation of both agricultural products and family members during market days. Currently, the use equine for transportation is becoming limited as most of the kebeles can be accessed by vehicles especially during the dry seasons.

#### **4.2.8 Productive performances of small ruminants**

The number of small ruminants at the beginning of the flock monitoring (by species and gender) is indicated on Figure 8 while the body weight changes during the study period are given by Figure 9 for sheep and Figure 10 for goats.

A total of 109 sheep out of which 72 (66.1%) females and 37 (33.9%) males and 76 goats out of which 53 (69.7%) females and 23 (30.3%) males were monitored during the study period (Figure 8). From both species there are no male animal observed greater than 2 years (Figure 8 and 10) this may be due to young weaned ram and buck are either directly sold/slaughter or castrated to be fattened and sold.

The monitoring activities were carried out for the period of six months (October 2008 to March 2009). During this period, the body weight of older age groups decreased except for the 0-1 age groups which showed increase in both species (Figure 9 and 10). While there was slightly maintenance of the initial body weight for the 1-2 years group for both species.

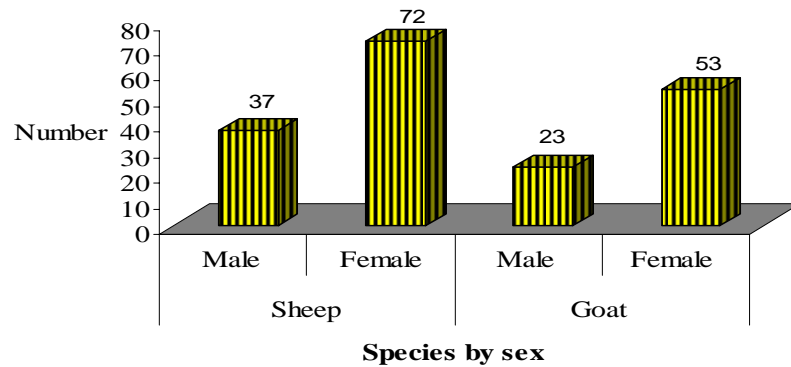


Figure 8. Number of male and female sheep and goats initially considered for monitoring.

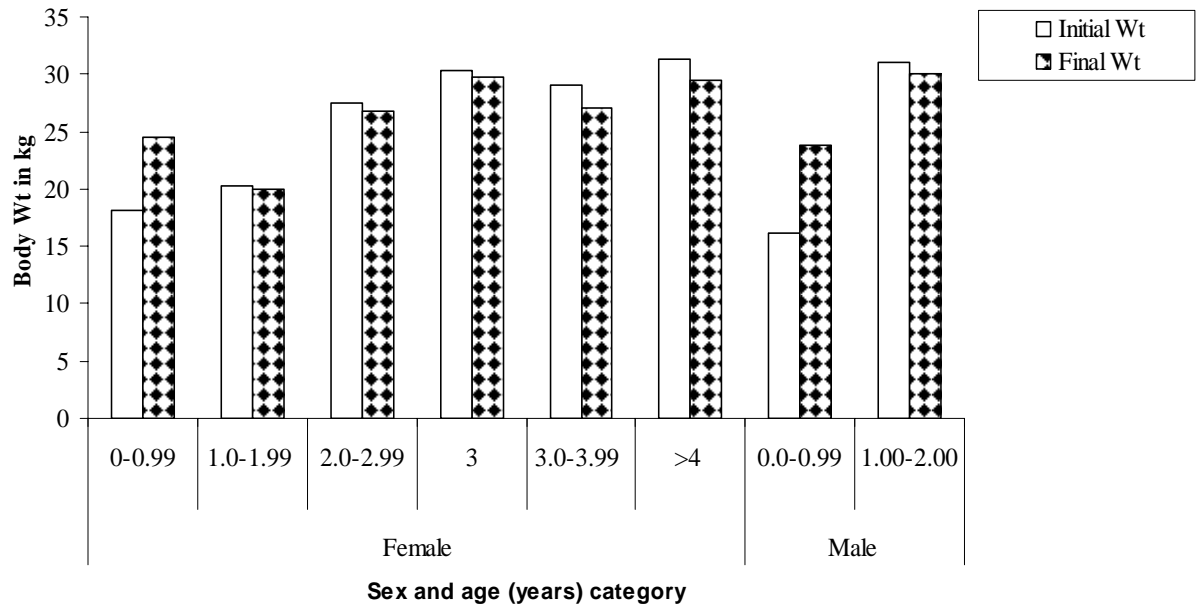


Figure 9. Body weight change of sheep over the study period

In the rest age groups, the body condition had declined implying feed shortage in the area in terms of both feed quantity and quality. In dry season, small ruminants are not freely allowed to graze or browse in crop aftermaths or in grazing area. Since greater proportion of the land is covered by permanent perennial crops and forest; small ruminants are restricted from free grazing across all seasons of the year. Therefore, the cumulative effects, the restriction in browsing and grazing with lower quality (*i.e* the higher fiber content and lower digestibility) reduce the nutrient supply.

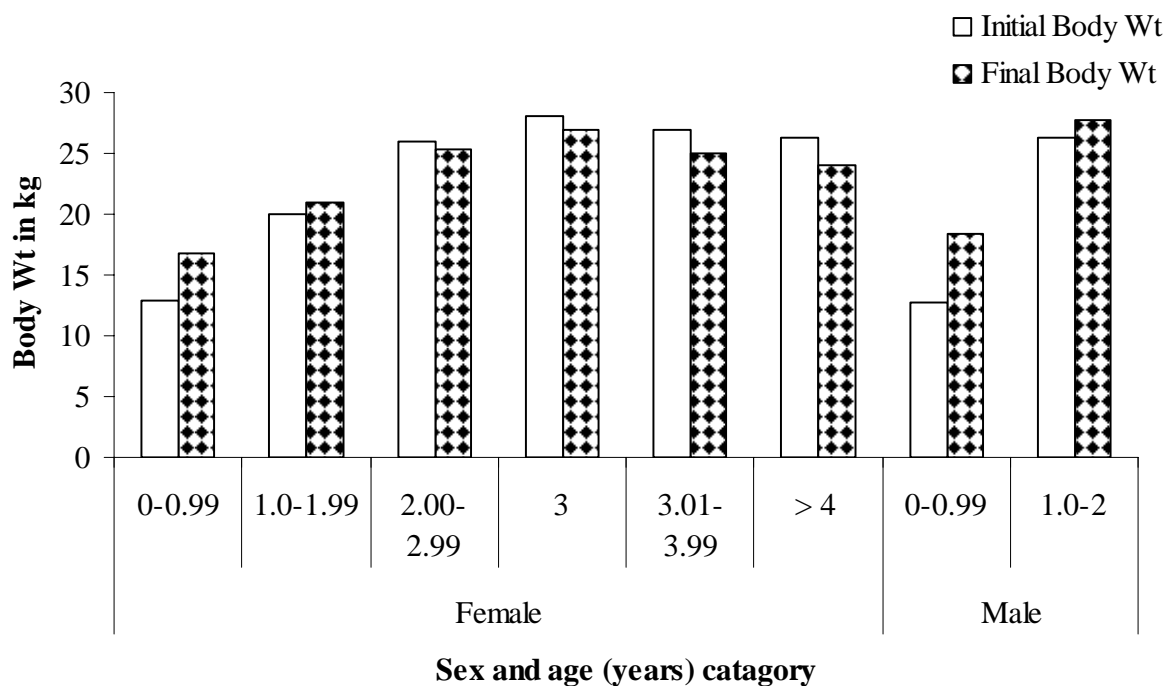


Figure 10 Body weight change of goat over study period

On the other hand, the increase in the 0-1 year age group may be due to the additional management and supplementation by family members as all suckling age groups are in this category. They are maintained around homestead for protection. As a result, there is a greater

opportunity to be supplemented. In addition, the nutrient requirement of animals in this category is relatively lower than their bigger and older counterparts.

#### 4.2.8.1 Birth weight and litter size

The birth weight obtained for sheep and goats was found to be 2.86kg for lambs and 2.78kg for kids (Table 22). The value obtained in this finding for birth weight for lambs was slightly higher than report for Horro (Solomon *et al.*, 2000) and Menz sheep (Dibissa, 2000) but comparable with the findings of Getahun (2008) for sheep around Kofele. This may be due to the larger sizes of sheep in the study area (Bonga) and better feeding conditions. For kids, birth weight obtained in the current study are higher reports for Arsi-Bale (Tatek *et al.*, 2004) but smaller than the report for Somali (Zelege, 2007).

Table 22. Mean (Standard deviation) of birth weights of lambs and kids.

Birth type	Species			
	n	Lambs	n	Kids
Single	7	2.99(0.02)	4	2.92(0.14)
Twins	5	2.75(0.18)	6	2.62(0.14)
Overall mean	12	2.86(0.2)	11	2.78(0.24)

Analysis of variance was not carried out for birth weight due to small number of observation.

Table 23. Mean (Standard Error) of weaning weight of lambs.

Effect	Weaning Weight (kg)	
	n	Mean(SE)
<b>Sex</b>		
<i>Male</i>	19	11.8(0.6)
<i>Female</i>	20	11.4( 0.7)
<b>Parity</b>		
<i>1</i>	6	11.4(0.6)
<i>2</i>	9	12.7(0.80)
<i>3</i>	18	11.3 (0.9)
<i>&gt;4</i>	6	11.0(0.4)
<b>Birth type</b>		
<i>Single</i>	24	12(0.3)
<i>Twins</i>	15	11(0.2)

The litter sizes found by monitoring the flocks were 1.6 for goats 1.37 sheep, while the values found out by the diagnostic survey were 1.74 for goats and 1.4 for sheep (Table 25). Although the values are comparable, the sample size was too small to reveal the true picture in monitoring.

#### 4.2.8.2 Weaning weight

The weaning weights of lambs were presented in Table 23. The weaning weights for male and female lambs were found to be 11.8 and 11.4kg, respectively. The weaning weights for single and twin born lambs were 12 and 11kg, respectively.

The weaning weights of lambs from ewes of 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and > 4<sup>th</sup> parities were 11.4, 12.7, 11.3 and 11.00 kg, respectively. There were no significance differences between sex, parity and birth types this may be due to smaller sample sizes used for analysis. The weaning weight obtained by this study were in agreement with the values of Getahun (2008) for Kofele lambs but higher than the values reported for Horro (Abegaz *et al.*, 2000) and Menz lambs (Tibbo, 2006).

Table 24 Mean (Standard Error) for weaning weight of kids.

Effect	Weaning Weight (kg)	
	n	Mean (SE)
<b>Sex</b>		
<i>Male</i>	16	8.9 (0.3)
<i>Female</i>	15	9.1(0.6)
<b>Parity</b>		
<i>1</i>	4	8.3(0.8)
<i>2</i>	7	8.7(0.4)
<i>3</i>	12	9.1(0.5)
<i>&gt;4</i>	8	9.4(0.3)
<b>Birth type</b>		
<i>Single</i>	19	9.6(0.6)
<i>Twins</i>	12	8.04(0.7)

The weaning weight of kids is shown on Table 24. The weaning weights (kg) for kids were 8.9 for males and 9 for females. The weaning weight for single born kids were 9.6 and it is slightly higher than the twin born kids (8.0) but the difference was not significantly ( $p>0.05$ ). The weaning weights of kids from does of 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and above 4<sup>th</sup> parities were 8.2, 8.7, 9.1

and 9.4kg, respectively. There were no significance differences between sex, parity and birth types, this may be due to smaller sample sizes used for analysis. The values obtained by this study for weaning weights for kids were greater than reports for Aris-Bale(Tatek *et al.*, 2004) and Somali kids (Zelege, 2007). This may be attributed to better feeding condition in the area as feeding has, an indirect effect on weaning weight. The milk production of ewes/does is highly dependent on the quality and quantity of feeds. The milk production in turn affects the pre-weaning growth.

#### **4.2.8.3. Months of kidding/lambing**

Months of parturitions based on the information collected through questionnaires are shown by Figure 11. There is increase in kidding/lambing starting from April to October while decrease was observed starting from October to February. It is observed those months of parturition follows similar trends for both species. This indicated that the majority of ewes/does gives birth during the rainy season. This may be attributed to the quality of forage and its fluctuation in different times of the year. The higher percentages of partitions for ewes/does were also reported (Mukasa-Mugerewa, 1996; Mukasa-Mugerewa *et al.*, 2002). Ewes/does that mated in higher fertility due to body reserve from previous wet season give birth in rainy seasons.

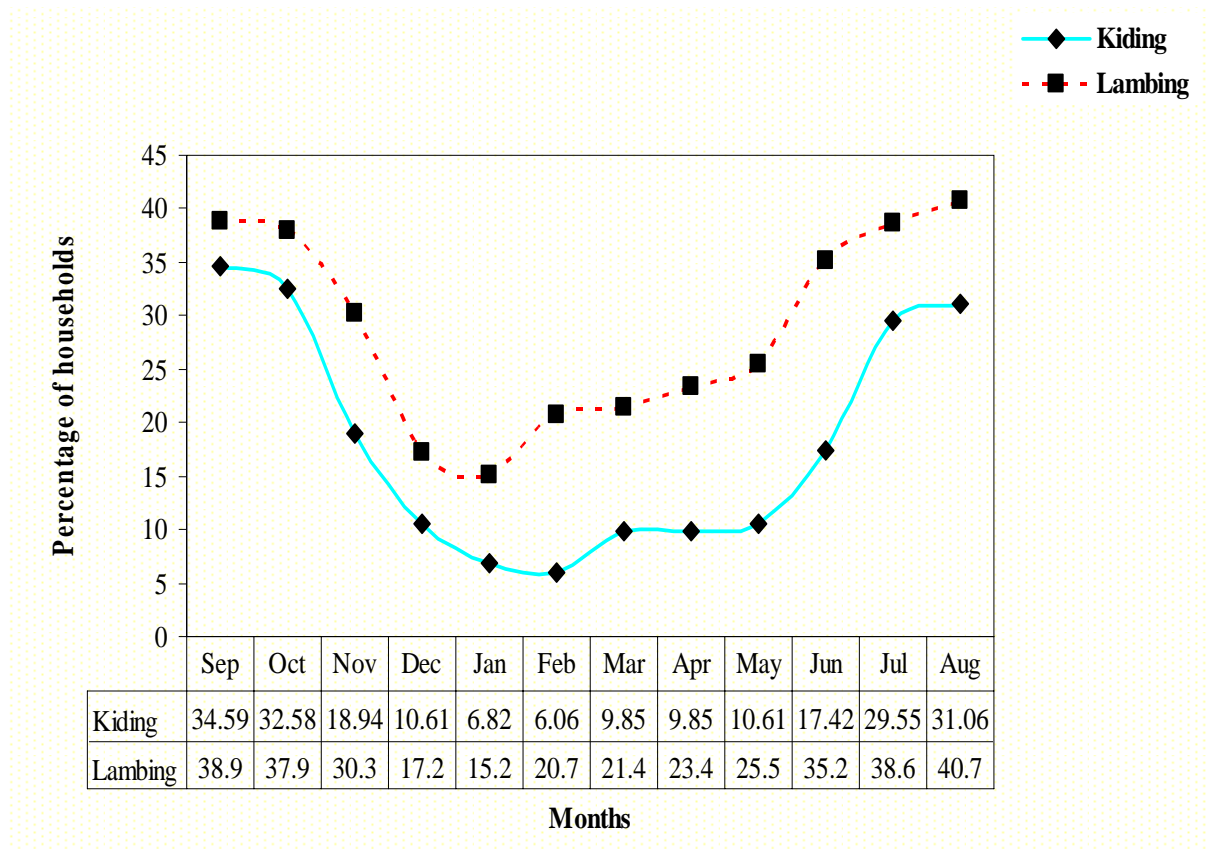


Figure 11. Months of kidding and lambing in the study area.

#### 4.2.8.4 Age at first parturition

Age at first parturition in the study area was reported to be 12.97 and 12.46 months for sheep and goats respectively (Table 25). This report is in agreement with Solomon *et al.* (1995) for Horro ewe that comes to first estrus at 7 months and values reported by Getahun (2008) in the southern highlands. It is smaller than those reported by Samuel (2005); 17.01 for sheep and 13.18 for goats.



#### 4.2.8.5 Partition interval

Parturition interval in the study area was reported to be 8.04 and 7.87 months for sheep and goats respectively (Table 25). That means, it is practically possible to attain three lambings in two years (Agyemang *et al.*, 1985; Mukasa-Mugerwa *et al.*, 1986; Wilson, 1991). Samuel (2005) reported 12.1 and 11.5 months for sheep and goats respectively at Yerer watershed and Adaa districts which is higher than the current finding.

Table 25. Mean (Standard Error) of some reproductive traits of sheep and goats.

Parameters	Group			Overall
	<i>Sheep</i>	<i>Goat</i>	<i>Mixed</i>	
	<i>Dominating</i>	<i>Dominating</i>	<i>Flock</i>	
<b>Sheep</b>				
Age at 1 <sup>st</sup> parturition (mo)	13.4(0.5)	12.9(0.3)	12.2(0.2)	13(0.3)
Parturition interval (mo)	8.0(0.2)	8(0.5)	8.2(0.3)	8.0(0.12)
Average litter sizes	1.4(0.1) <sup>a</sup>	1.6(0.1) <sup>b</sup>	1.4(0.1) <sup>a</sup>	1.4(0.0)
Min marketing age for male (mo)	5(0.3)	5.8(0.266)	5.7(0.4)	5.4(0.2)
Min marketing age for female (mo)	5.1(0.3)	5.7(0.3)	5.9(0.4)	5.5(0.2)
<b>Goats</b>				
Age at 1 <sup>s</sup> parturition (mo)	12.9(0.4)	12.5(0.6)	11.5(0.4)	12.5(0.3)
Parturition interval (mo)	7.3(0.3) <sup>a</sup>	9.1(0.6) <sup>b</sup>	7.9(0.3) <sup>a</sup>	7.9(0.2)
Average litter sizes	1.7(0.1)	1.8(0.1)	1.8(0.1)	1.7(0.0)
Min marketing age for males (mo)	4.8(0.3)	4.8(0.3)	5.1(0.3)	4.9(0.2)
Min marketing age for female (mo)	4.9(0.3)	4.6(0.3)	5.1(0.3)	4.9(0.2)

*Values with different superscripts are significantly different across a row (p<0.05)*

#### **4.2.8.6 Sources of breeding male and selection**

In the study area, majority of the households do not have their own breeding male. As a result they use their neighbors'. Only 26.9% of interviewed households owned breeding ram while 20.2% of households own breeding buck. According to key informants, the limited attention for breeding males is attributed to small size of their flock. If the male animals grow they are castrated to add market value.

Although there is little intention to keep male animals intact farmers in the study area select rams to mate their females (Table 26). The characteristics used in selecting breeding ram are based on body confirmation (94.5%), performance history (20.9%) and color (14.7%). Ram selection using performance history is significantly different across small ruminant density groups with sheep dominant site having higher percentage (33.8) than other groups. Body confirmation is given higher priority may be due to its phenotypic expression in offspring and its economic importance. While performance history is given least priority may be due to the small flock size in most households as a result they use limited animals for mating. Color has been given little attention may be due to the presence of few dominant colors (red, white, white and red in different proportion of mixtures) in the study area.

In buck selection, higher priority is given to body confirmation followed by performance history while color is given the least priority. Chi-square analysis showed that, there is significant variation across small ruminant densities in using body confirmation and performance history as a characteristic for sire selection for goats. Small ruminant breeding male selection is given less attention than larger ruminants. Wider practices have not reported

yet in the country. However, Tsedeke (2007) reported the selection of sire by farmers for breeding purposes in Alaba district of SNNPR.

Table 26. Desirable characteristics for selecting breeding male sheep and goat for mating.

Selection	Group			Overall
	<i>Sheep</i>	<i>Goat</i>	<i>Mixed</i>	
	<i>Dominating</i>	<i>Dominating</i>	<i>Flock</i>	
No households	65	34	30	129
<b><i>Ram</i></b>				
Body conformation (%)	92.3	97	96.7	94.5
Performance history (%)	33.8	1	13.3	20.9
Color (%)	20	0	20	14.7
<b><i>Buck</i></b>				
Body confirmation (%)	66.2	41.2	76.66	62
Performance history (%)	29.2	0	6	16.3
Color (%)	13.8	1	13.3	10.9

#### 4.1.8.8 Off-take

The off-take of small ruminants in the study area during the monitoring period is given by Table 27. It was calculated for a period of six months as sum of the percentages of sold, slaughtered and gifted/shared out. Sales accounted for 27.5% and 19.7% of the off-take for sheep and goats, respectively. It was the major off-take for both species while slaughtering during festivals and other reasons accounted for 26.6% and 15.8% of the off-take for sheep and goats, respectively. Gift accounted the least and it was not observed for goats.

The off-take rate of sheep through sales in the current study was lower than the finding of Getahun (2008) in two mixed farming system of Ethiopia *i.e.* 104% for Kofele and 64% for Adilo. This may be partly due to farmers in Goma district mainly depend on coffee and chat as a cash income generation. The time frame during which the monitoring carried out could be another reason since important markets like the Ethiopian New year and Easter did not fall in the study period.

Table 27. Analysis of the six month off take of sheep and goat based on flock monitoring (%).

<i>Species</i>	Total number of animal at start	<i>Sold</i>	<i>Slaughtered</i>	<i>Gift/share out</i>	<b>Total off-take</b>
<i>Sheep</i>	109	27.52	26.61	1.83	55.96
<i>Goat</i>	76	19.73	15.79	0	35.53
<b>Total</b>	185	18.92	22.16	108	47.57

#### 4.2.9 Small ruminant health and diseases

##### 4.2.9.1 Small ruminant mortality

One of the limiting factors in small ruminant production and marketing in the Goma district are diseases and parasites. Deaths reported by households over the last 12 months are shown in Table 28 and 29. Higher death for both species was reported for suckling age groups followed by 3 to 6 months age group while the least was reported for castrates. There was significant ( $p < 0.05$ ) variation among the three areas that differs in flock density mortalities of suckling group for both species. Significantly higher values were found for lambs (0.39) and

kids (0.29) in sheep dominating groups; Kids between 3 and 6 months also exhibited significantly higher deaths.

Table 28. Mean (Standard Error) number per household of sheep and goats died during a period of the last 12 months.

Structure by age	Group			Overall
	Sheep	Goat	Mixed	
	Dominant	Dominant	Flock	
Sheep				
Lambs (less than 3 months)	0.39(0.09) <sup>b</sup>	0.03(0.03) <sup>a</sup>	0.23(0.1) <sup>b</sup>	0.26(0.1)
Lambs (3 to 6 months)	0.16(.049)	0.25(.086)	0.36(.145)	0.23(0.05)
Ewes	0.18(0.05)	0.38(0.19)	0.13(0.05)	0.21(0.06)
Rams	0.14(0.05)	0.05(0.04)	0.23(0.1)	0.14(0.04)
Castrates	0.01(0.01)	0.08(0.08)	0.0(0.0)	0.03(0.02)
Goat				
Kids(less than 3 months)	0.3(0.07) <sup>c</sup>	0.03(0.03) <sup>a</sup>	0.08(0.08) <sup>b</sup>	0.17(0.04)
Kids(3 to 6 months)	0.23(0.07) <sup>b</sup>	0.0(0.0) <sup>a</sup>	0.10(.05) <sup>b</sup>	0.14(0.04)
Does	0.09(0.04)	0.0(0.0)	0.05(0.04)	0.06(0.02)
Bucks	0.08(0.04)	0.03(0.03)	0.03(0.03)	0.05(0.02)
Castrates	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

The morality rate of suckling(less than 3 months) age group was found to be the highest for both species followed by weaning age group (3-6months). The mortality rate of suckling age groups 20.9% and 22.6% for sheep and goat, respectively while for the post - weaning age group has 18.1% and 15.5% for sheep and goat, respectively (Table 29). The higher mortality among young animals is probably due to the susceptibility of these age group to diseases and parasites, decline in the condition of their dams as a result of parasitic burden that leads to

lowered milk production, coupled with parasitic infestation of the lambs themselves. This report is similar with many reports in the country (Solomon *et al.*, 1995; Yohannes *et al.*, 1995; Markos, 2000; Solomon and Gemed, 2000; Tsedeke, 2007) who found out higher mortalities of young groups in the flock.

Table 29. Death rate by age structure of sheep and goats as reported by respondent households.

Species	Structure by Age	Mortality rate (%)
<b>Sheep</b>	Lambs (less than 3 months)	20.87
	Lambs (3 to 6 months)	18.06
	Ewes	14.11
	Rams	17.98
	Castrate Sheep	2.74
	<b>Overall</b>	<b>14.16</b>
<b>Goat</b>	Kids(less than 3 months)	22.58
	Kids(3 to 6 months)	15.46
	Does	6.35
	Bucks	9.0
	Castrate Goat	1
	<b>Overall</b>	<b>14.21</b>

The mortality rate of breeding dam was found to be 14.1% and 6.4% for sheep and goat, respectively. On the other hand, the mortality rate for breeding male was found to be 18% and 9% for ram and buck, respectively. The higher deaths of breeding male than breeding female may imply that they are more prone for predators as they wander for mating.

It was found that the mortality rate of castrates was the least, this may be due to de-worming and intensive care castrates get. An overall mortality rate for sheep and goats in the study area was found to be 14.2%. In general mortalities for older age groups (breeding and castrates), the values in this study was smaller than the report of Tsedeke (2007) who found out 20.5% and 30.4%, mortalities for breeding males in sheep and goats, respectively. Similar author reported 8.7% and 8.6% mortalities for castrates and fattened sheep and goats, respectively.

#### **4.2.9.2 Causes for deaths**

Many causes of mortality were reported by the interviewed households. The signs for the disease that causes death in the area were: emaciation (22.6%), coughing (16.6 %), swelling around neck (13%), depression and loss of appetite (18.1%), and abnormal breezing with auscultation (14.8%), sudden death with bleeding in openings (4.5%) (Table 30). Previous reports indicated majority of deaths of small ruminants in Goma were due to diseases like Black leg, Pastureolosis, Anthrax, Fascioliasis and Trypanosomiasis (IPMS, 2007). Parasitic problems, ticks, mites, lice and insect flies are also prevalent in the area and cause weight losses. During the study period, farmers report sign of disease rather than a disease itself as some disease have some common symptoms it was beyond this study to clearly identify all the prevalent diseases in the area. Therefore, there should be a well planned project that can identify all disease types, their epidemiology, etiology and recommend for further interventions.

The prevalence of parasitic diseases may be due to the marshy nature of grazing areas. The higher humidity associated with warmer temperature in the area created favorable environment for diseases causing organisms and higher parasitic load that were responsible factors for the wide spread and dissemination of diseases in the area. The prevalence of parasitic diseases were also reported in other part of the country (Gemedo *et al.*, 2005; Markos, 2006; Tsedeke, 2007)

Table. 30 Common signs for causes of death of small ruminants as reported by households.

<i>Common reported signs</i>	<i>Percentage of households</i>
Emaciation	22.6
Depressions and loss of appetite	18.1
Coughing	16.6
Abnormal breezing with auscultation	14.8
Swelling (around the neck, tongue)	13
Discharge fluid from nose	10.5
Sudden death with bleeding in openings	4.51

#### **4.2.9.3 Treatments of sick animals**

There is a common practice of farmers in the study area to treat their sick animals with ethno-veterinary (traditional) medicines. From the interviewed households, 31.8% use traditional medicine. Others took sick animals to nearby veterinary clinics (24.7%). Slaughtering sick



animals was also practiced (18 %) if they consider the disease can not make any harm to human health. The use of drugs from illegal sources was also reported by 15.3% of interviewed. The Ethno-veterinary treatment in the area includes different parts of some plant species. Branding was also reported by 26.3% of households to be as a means of curing animals against some diseases although its limitation on skin quality was recognized.

About three fourth of households reported that they have access to veterinary services. The Oromia Office of Agriculture and Rural Development (OoARD) is the major (86.9) source of veterinary services. However, the services were provided by payment and farmers complain for higher price they pay to treat sick animals. Vaccinating their animal was also reported by 43.1% of households. It is mostly given by OoARD after report of the diseases and it was free of charge.

Health problems of small ruminant reported in the study areas are given in Table 31. Among the interviewed households, 65.6% reported the spread of disease and parasites causing serious problem. Shortage of diagnostic laboratories and medicaments (61.9%) is another critical limitation in providing efficient veterinary services for the farmers. Shortage of veterinary services, high prices of medicines and veterinary services, lack of veterinarians indicated by 55%, 48.1% and (41.3%) of the households, respectively. Inadequate nutrition was also reported by 26.3% of the households as a cause of small ruminant health problems.

Table 31. Major reported causes of health problems by households.

Major constraints	Percentages of households
Wide spread of disease and parasite	65.6
Shortages of medicaments	61.9
Shortage of Veterinary services	55
High prices of medicaments and veterinary services	48.1
Lack of veterinarians (health experts)	41.3
Shortage of feed increases susceptibility to diseases	26.3

### 4.3 Marketing of small ruminants

#### 4.3.1. Market places

In Gomma district, there are five permanent market places namely Agaro, Bashasha, Limu Shayi and Gembe. Four of them function one day per week while Agaro gives services for two days per week. In addition, the consumers in the town and restaurant owners can buy sheep and goats throughout the week from Agaro town; because, in addition to two days of marketing there are temporary places (*Gulit*) that cater small number of animals but they do not give services during regular market days. The market places and percent of their services are given in Table 32. The distribution of these market places in the district is Agaro at the center while the other towns are situated north east (Chago), north west(Limu Shayi), south

east(Bashasha) and west (Gembe) their distance from Agaro differs Gembe being the nearest (about 10kms) while Limu Shayi is the remotest (about 20km).

Table 32. Place of marketing where households sell and purchase sheep and goats.

<b>Market places</b>	<i>Percentage of HHs</i>	<i>Percentage of HHs</i>
	<i>Purchase</i>	<i>Sale</i>
Within the village	5.66	19.53
In the nearby villages	11.32	7.81
Agaro Town	33.02	32.81
Bashasha Town	15.09	10.16
Limu shayi Town	11.32	10.17
Gembe Town	9.43	9.38
Chago Town	14.15	9.38

Farmers in Goma sell and/or purchase their sheep and goats either in villages or take to the nearby towns. Out of interviewed households, (27.3%) and (72.7%) sale their animals in villages and towns, respectively while 17% and 83% purchase from villages and towns respectively. Farmers prefer selling in town due to higher prices. There are also small traders who take animal from villages to primary markets. Agaro town is central and the biggest market for the district. So more volume of buyers with better purchasing power can be found. According to key informants, most purchasers would like to purchase from these small towns and to sale in Agaro town due to lower cost in smaller towns and better price in Agaro.

### **4.3.2 Market participants**

#### **4.3.2.1. Farmers**

Farmers raise small ruminants and sell in times of cash need. Landless farmers and other, farmers during dry seasons or when prices cash crops (chat and coffee) fail will buy small ruminants for a reduced price. They then fatten them and sell during holidays or in coffee harvesting times. In addition, some farmers buy small ruminant at villages and take to towns.

#### **4.3.2.2. Small traders (Amateur Traders)**

Small traders are those who buy small ruminant from small towns like Gembe, Chago, Limu Shayi, Bashasha and sell them in Agaro or to bigger traders who transport to central markets. Usually they buy and sell small number of animals, not more than 20 animals. These traders also use other market days (*gulit*) in Agaro to sell their animals. They may or may not be engaged in other activities. According to Solomon (2004), these types of traders participate in trading business at the time of high margins (New Year, and religious festivals).

#### **4.3.2.3. Permanent traders (bigger traders)**

These traders buy small ruminants from farmers, small traders and supply to other bigger towns like Jimma and Addis Ababa. In most cases they use brokers to buy large number of animals and are actively involved in marketing throughout the year. Similar market participation was also reported from pastoral areas of Borena (Solomon, 2004).

#### **4.3.2.4. Butchers/Hotel/Restaurant owners**

In Agaro town, butchers also sell sheep and goat meat to consumers. Nowadays the trend to sell small ruminant meat has been increasing in other small towns in Goma district. Hotel/restaurant owners also buy small ruminant from farmers, small traders/larger traders and make local delicacies like Misto, Tibis, Dullet, Mofo, Key wot, Minchet, Kikil.

#### **4.3.2.5 Brokers/Delalas**

Brokers locally called *Delalas* are also major participants in marketing of small ruminates in the study area. According to key informants, without their involvement no animal can be sold. The role of brokers in marketing small ruminants in the area has two views; One group describes them favorably as they facilitate transaction between buyers and sellers while others see them as problems in marketing as they are the ones who mainly decide on the price. The fee they collect is also described by some as exorbitant and unnecessary as one can negotiate the price his/her animal with the buyers/sellers. In agreement with this report, the role of brokers is also described by other reports ( Endeshaw, 2007; Tsedeke, 2007; Deniel, 2008)

#### **4.3.3 Small ruminants marketing channels and routes**

In the study area, different small ruminant marketing channels (Figure 12) were identified through discussions with key informants from producers and consumers. The major channels identified were:

1. Farmers- consumers;
2. Farmers- butchers/Restaurants/Hotels-consumers;
3. Farmers- small/medium traders- Restaurants/Hotels-consumers;
4. Farmers-small/medium traders- Larger traders-Restaurants/Hotels –consumers;
5. Farmers- agents for exporters –Export Market;
6. Farmers-small/medium traders- agents for exporters –Export Market;
7. Farmers- small/medium traders - Larger traders -export market;
8. Farmers- Larger traders-export market;

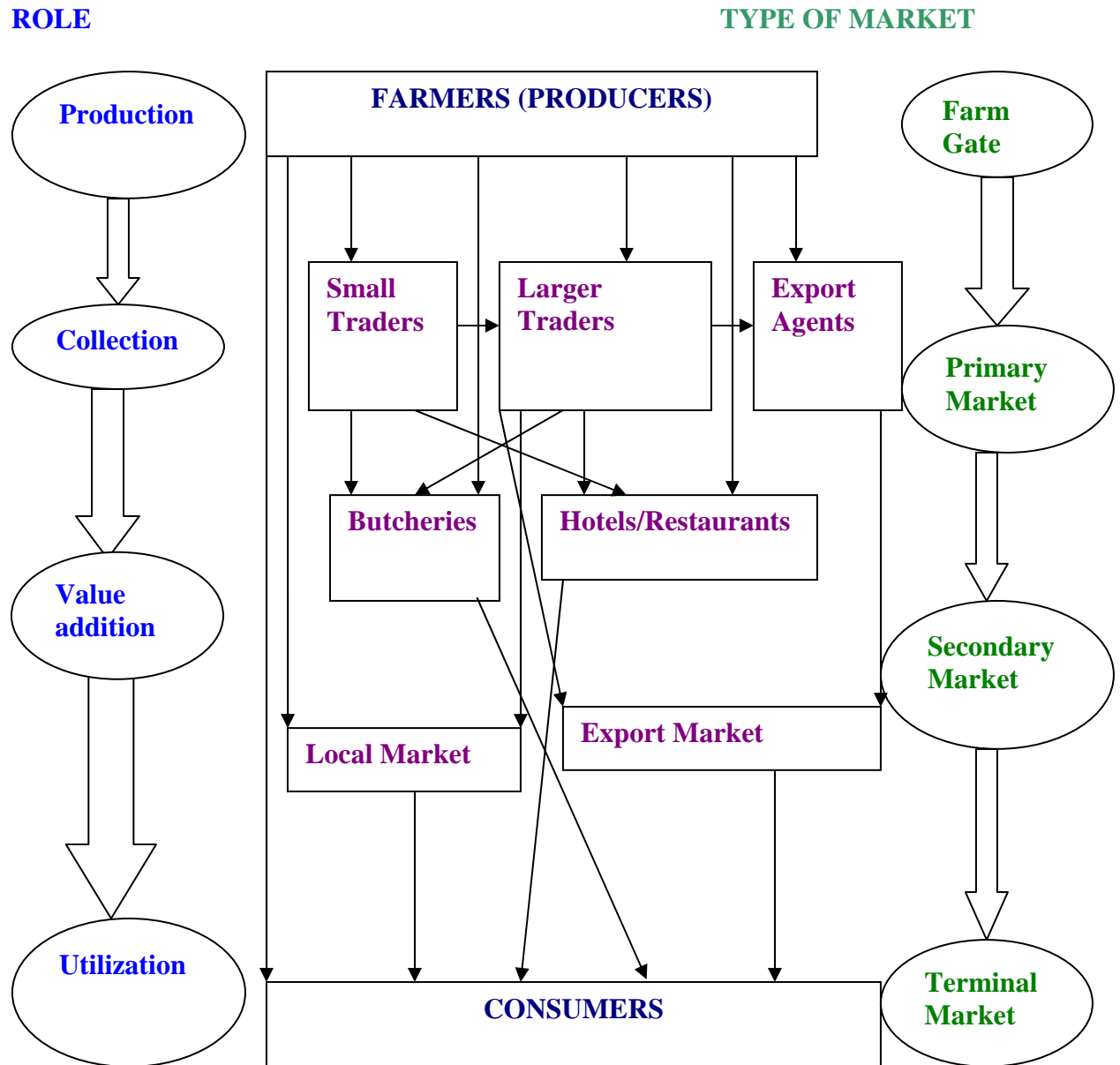
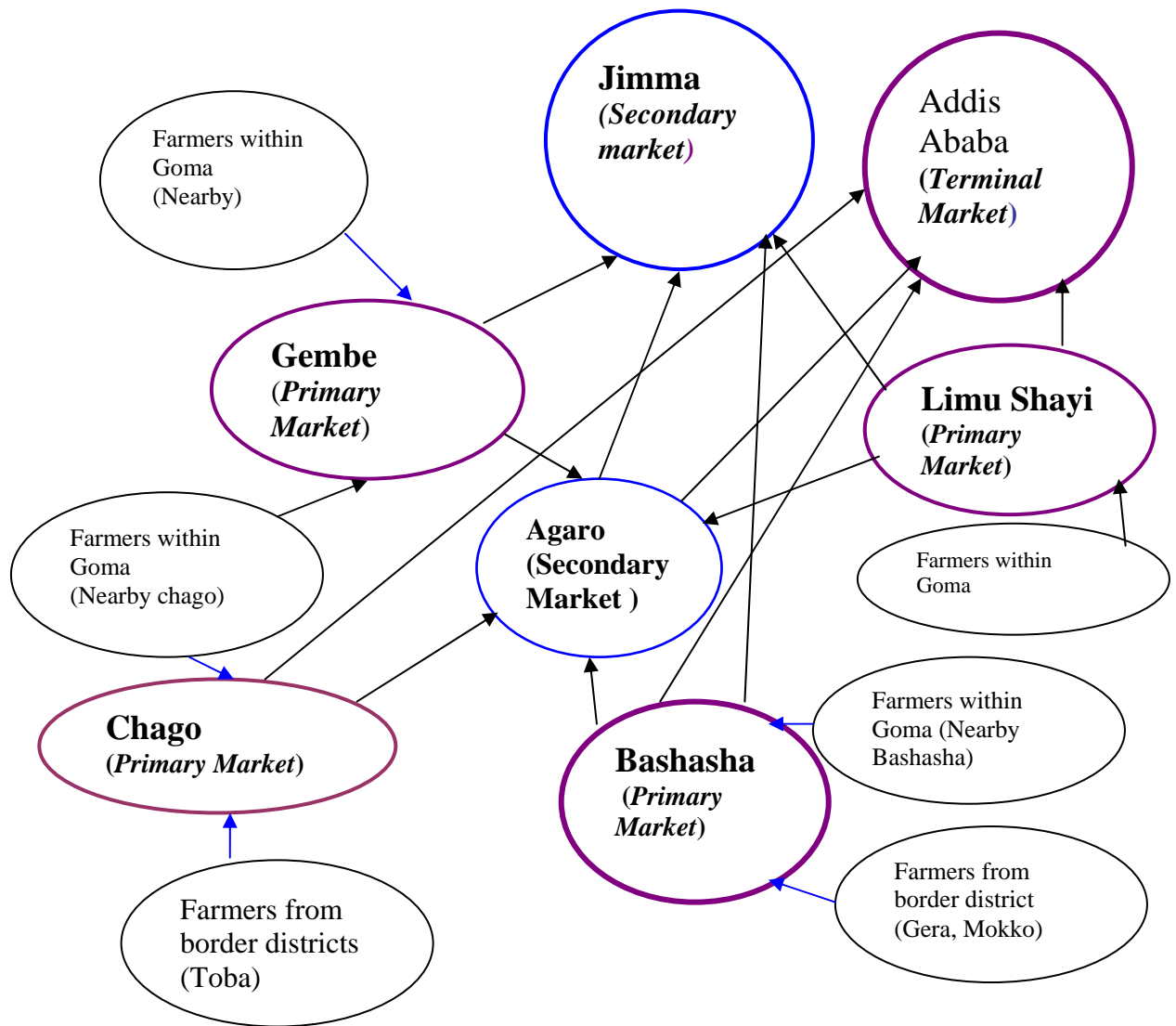


Figure 12. Marketing Channel of Small Ruminants

Source: Own Data



Source: *Own data*

Figure 13 Small ruminant marketing routes

Regarding the marketing route, there is one main small ruminant marketing routes in the study area. It starts from Agaro to Jimma then to Addis Ababa where there is relatively better demand and higher prices (Figure 13). However, according to key informants the volume of animals transported through this route varies across times of year mainly affected by harvest



of coffee *i.e.* when high production of coffee the local demand become high so that the price increases and traders do not take large volumes of animal.

#### 4.3.4 Small ruminant fattening and marketing

In Goma district, majority of households fatten their castrated animals to sale during holidays. The target seasons in the study area was given in Table 33. Arafa (66.9%) is the most important target time of marketing for fattened castrates. As the majority of Goma inhabitants are Muslims, Arafa is one of the holidays when almost all Muslims consume meat either by slaughtering within the household or share with other neighbors. There is no variation ( $p < 0.05$ ) across small ruminant density groups for Arafa targeted marketing.

Table 33. Marketing seasons targeted for fattening (%).

Festival	Groups			Overall	Tests	
	Sheep	Goat	Mixed		X <sup>2</sup>	p-Value
	Dominant	Dominant	flock			
New year	60	75	30	58.1	28.91	0.000
Ester	55	62.5	32.5	51.3	7.533	0.023
Christmas	33.8	57.8	15	35	12.661	0.002
Meskel	35	40	15	31.3	5.709	0.058
Ed Al fetir	40	35	17.5	33.1	6.776	0.034
Arafa	65	80	57.5	66.9	1.632	0.442

New Year, Easter, Christmas, Meskel and Ed al Fetir are also targeted by 58.1%, 51.3%, 35%, 33.1%, and 66.9% of households respectively. Chi-square analysis showed that there is

significant ( $p < 0.05$ ) variation across small ruminant density groups in targeting New Year, Easter, Christmas and Ed al Fetir, as a time of sale. This may be due to differences in the religion categories of the inhabitants in specific area. The lower percentages of targeting Christian holidays may be due to the small proportion of rural inhabitants who consume small ruminant meat during these holidays. According to key informants, in Goma unlike other parts of the country the proportion of small ruminant that goes to secondary and terminal markets are small. This is presumably due to the purchasing power of rural community and higher prices of the animal. It may not be profitable to take them to Addis Ababa and abattoirs. During the study period, there were no agents for abattoirs from Agaro but some traders went as far as Chago and Bashasha to transport animals to Addis and other towns. These markets were also preferred in times when coffee is not harvested. This situation, however, is only true for small ruminant. For cattle larger volume is supplemented to secondary and terminal markets. Targeting holiday markets for fattened small ruminants was also reported by different authors in other parts of Ethiopia (Jabbar, 1998; Ehui, 2000; Tsedeke, 2007).

Farmers' sell their animals in time of cash need but the age category determined for selling will depend on the need of the cash and its urgency. In Goma, farmers first sought cash from sale of coffee and chat but when there is no coffee to be sold; selling small ruminants is the next alternative. From the interviewed households, the majority sell the post weaning (rams and bucks)(41.3%) age group followed by castrates (36.7%) while the suckling age groups are the least targeted (6.2%)(Table 34). Suckling animals are mostly sold with their dams; this occurs during a time of serious problems and/or when own only breeding animals. They may also be sold when the farmer need to change the species (in most cases from goat to sheep).

When observed by density groups in goat dominant areas castrates are likely to be sold to meet the cash needs than in other category where rams and bucks will be the first to be sold.

Table 34. Preference of households for selling small ruminants by age groups in times of immediate cash need (%).

<b>Animals to be sold</b>	<b>Group</b>			<b>Overall</b>
	<i>Sheep</i>	<i>Goat</i>	<i>Mixed</i>	
	<i>Dominant</i>	<i>Dominant</i>	<i>Flock</i>	
Lambs and kids	5.4	1.69	14.6	6.21
Rams and bucks	52.7	40.9	48.9	41.2
Ewes and Does	1.35	11.9	17.1	15.8
Castrates	40.54	45.8	19.51	36.7

The reasons of selling small ruminants are shown in Table 35. From the interviewed households 80% had sold small ruminant last year (2007/2008) for different reasons. The major reasons include: school expenses for children, purchase of farm inputs (fertilizer, seed, farm items) and purchase of food, expenses for health and to pay back credit 46.1%, 37.5%, 31.3%, 28.1%, respectively.

Table 35. Reasons for selling sheep and goats by households during the last 12 months(%).

<b>Festival</b>	<b>Group</b>			<b>Overall</b>
	<i>Sheep</i>	<i>Goat</i>	<i>Mixed</i>	
	<i>Dominant</i>	<i>Dominant</i>	<i>Flock</i>	
No. of Households	67	34	27	128
<b><i>Reasons of sell</i></b>				
Children school free	59.7	41.2	18.5	46.1
Farm inputs	34.3	41.2	40.7	37.5
Purchase foods	62.7	82.4	51.9	37.5
Health related expense	49.3	29.4	40.7	31.3
To pay back credit	26.9	32.4	25.9	28.1
Shortage of feeds	8.95	14.7	14.8	11.7
Sell for replacement	5.90	2.90	11.1	6.25
Problem of predator	5.90	2.90	7.40	5.47

The interviewed households were also asked to rank reasons for selling of small ruminants. Accordingly, purchase of food, purchase of farm inputs (fertilizer, seed, and farm items), expenses for health, school expenses for children and to pay back credit and shortage of feed ranked 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup>, respectively (Table 36).

Table 36. Ranking reasons of sell for selling small ruminants.

Reason	Number of HH ranking				Index
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	
Cash to purchase food	54	22	5	2	0.27
Cash for farm inputs	27	12	8	5	0.23
Cash for family and animal health	7	12	32	5	0.196
Cash income for children school	14	31	21	0	0.16
To pay back credit	23	9	5	3	0.16
Shortage of grazing land and feed	0	6	1	0	0.02
<b>Total</b>	<b>126</b>	<b>92</b>	<b>64</b>	<b>15</b>	

*Index = [(6 for rank 1)+(5 for rank 2)+(4 for rank 3)+(3 for rank 4)+(2 for rank 5)+(1 for rank 6)] divided by sum of all weighed reasons mentioned by respondent*

From the interviewed Households in Goma, two-third of them purchased at least one small ruminant in year 2007/2008 (last 12 months). Table 37 shows reasons for purchasing small ruminant during the last 12 months. The major reasons purchasing were for breeding purpose (63.2%), followed by fattening (33.0%) while slaughter for different purpose (12%).

Table 37. Reasons of purchasing small ruminants by households by density group(%).

<b>Reasons</b>	<b>Group</b>			<b>Overall</b>
	<i>Sheep Dominant</i>	<i>Goat Dominant</i>	<i>Mixed Flock</i>	
No of Households.	54	25	27	106
Reasons				
Slaughter for holidays	18.5	16	11.1	10.4
Slaughter for social ceremonies	1.85	4	0	1.9
Breeding	64.8	56	66.7	63.2
Fattening	38.9	12	40.7	33.0

The preferred times for sells and purchases of small ruminants in the area was shown on Figure (14). There was similar trends for both species in selling and purchasing times during periods of the year. About two-third of the farmers sell small ruminants, respectively in holidays while the proportion of farmers who purchase during the same time was 2.3% and 7.3% for sheep and goats, respectively. During crop planting, 24% and 21.9% of the farmers sell sheep and goats, respectively while during the same time 41.8% and 39.5% of farmers purchase sheep and goats, respectively. In times of crop harvesting, 16.5% and 16% sale sheep and goats respectively while the proportion of farmers who purchase during crop harvesting as high as 50.9% for sheep and 53.2% for goats.

In general higher proportions of farmers sell sheep and goat in holidays followed by crop planting. This may be due to higher prices during holidays. In spite of the lowest prices during crop planting period, shortages of feed may force farmers to sell their small ruminants. On the other hand, high percentage of farmers purchases small ruminants during crop harvesting.

During this season, coffee can be harvested and the purchasing power of farmers increase. In addition, farmers slaughter small ruminants when they start harvesting coffee and it was evidenced by larger volumes of skin sold in the time of coffee harvest.

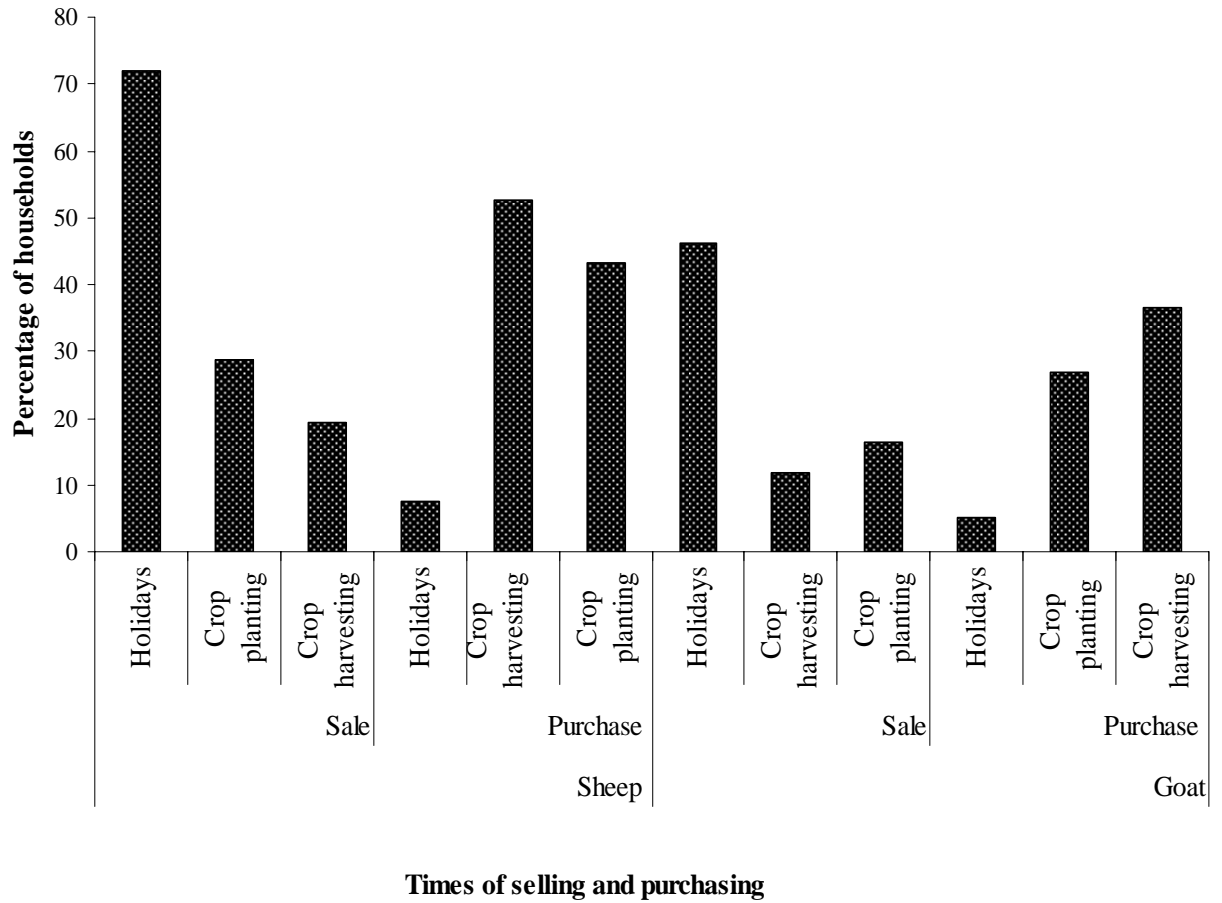


Figure 14. Preferred times of the year for households to sell and purchase sheep and goats.

#### 4.3.5 Mode of marketing and price setting

The reasons of eyeball estimation and sources of information for market prices are given in Table 38. In general the method of price setting is done by eye ball estimation; however, some buyers and traders estimate prices by traditional methods of body condition estimation. By touching the back of the animal by their palm and estimate its size and fill of muscle as well as tail (in case of sheep). The eye ball used by most (88.2%) due to purchasers preference, incentive prices (5.3%) and avoid mischief if they use weighing scales (5.3%). According to key informants, this is the only accustomed method of price setting in the area while weighting scale is not known by most farmers. In agreement with this finding eye ball pricing was reported for many places that practice informal marketing (Ayele *et al.*, 2003; Endeshaw, 2007; Tsedeke, 2007)

Table 38. Reasons of eye-ball price setting and sources of information in small ruminant marketing by households

Particulars	Percentage
<b><i>Reasons</i></b>	
Purchasers preference	88.2
Incentive prices	5.29
Avoiding mischief	5.29
Its reliability	1.18
<b><i>Sources of information</i></b>	
Traders and neighbors	79.3
Visiting market at target day	15.5
DAs, and GOs	5.17



Among the interviewed households, 72.5% had access to information from development agents, some governmental organizations, traders and neighbors and by visiting market at target days. However, the majority (79.3%) of households get information from traders and neighbors who sell small ruminants (Table 38). Visiting market at target days (15.5%) is the second source of information while small proportion (5.2%) of them got information from development agents and some governmental organizations. In price setting and marketing brokers have the greatest role according to key informants which was one of the problem of marketing stated by farmers. Due to this problem and taxation some farmers sell their animals outside of catering areas or on road side during marketing days.

#### **4.4 Extension, cooperatives and credit services for small ruminant production**

In spite of extension activities in various aspect of agriculture, there has not been any specific extension package for small ruminants provided by NGOs or GOs in the district. The major focal areas in Goma include coffee production, distribution of improved seedling, grafting methods, seed collection and processing, tropical fruit production, improved seed distribution and management. Goma being a potential area for apiculture, there were also efforts to distribute hives.

Only one-fifth of interviewed households were members of different types of cooperatives. There are NGOs and GOs that provide credit in the Goma district. Their focus is mainly on coffee processing, small ruminant and cattle fattening. They usually give credits for the group

that forms cooperatives. Except the fattening activities, the role of credit services and cooperatives is limited in small ruminant production.

#### **4.5 Gender and labor allocation in sheep and goat management**

For the majority (61.3%) of the households, labor shortage was not a limitation for small ruminant production and marketing. From households who reported faced labor shortage, herding and tethering were the major tasks (37.4%) followed by taking care of sick animals (32%). Looking after lambs and kids, construction of shelter and watering were reported by 15.6%, 8.8%, and 6.1% of the respondents, respectively as important tasks.

The division of activities by different members of households in the area is shown in Figure 39. All family members are engaged in almost all activities of small ruminant production. However, husband, spouse and boys take larger share in almost all activities while hired labor took the least.

Herding is mainly undertaken by boys (37.7%) followed by husbands (29.6%). Hired labors share the least (0.6%) in herding. Husbands, spouses and boys took 31.1%, 30.1% and 29.4% of feeding activity respectively.

Activities that can be carried out around homestead are mainly handled by spouses. Shelter cleaning (63.9%) and taking care of suckling age groups (52.6%) took place around

homestead so the spouses are the ones primarily responsible for such tasks. Girls also share 25.5% of shelter cleaning and 12.6% of looking after and caring suckling age groups.

Husbands are primarily responsible for feeding, taking care of sick animals fattening, shelter construction and much of marketing tasks. Women do cleaning of barns and taking care of lambs and kids while children do herding and watering (Table 39).

Table 39. Division of labor by households in small ruminant production (%)

<b>Activities</b>	<b>Share of tasks by Households Members</b>				
	<i>Husband</i>	<i>Spouse</i>	<i>Boys</i>	<i>Girls</i>	<i>Hired labor</i>
Herding	29.6	20.8	37.7	9.5	1
Feeding	31.1	30.1	29.4	7.8	1.7
Watering	19.2	31.1	36.9	10.4	2.3
Shelter Cleaning	1.85	63.9	7.4	25.5	1.4
Taking care of lambs/kids	20.4	52.6	11.7	12.6	2.6
Taking care of sick animals	45.8	34.2	11.7	6.3	2.1
Fattening activities	48.2	31.2	15	4.45	1.21
Shelter construction	79.7	3.57	14.9	1	1.19
Marketing activities	63.8	21.7	12.6	0.97	1

Future plan of the households on small ruminant production is shown in Table 40. Nearly ninety four percent of the interviewed households showed future interest to continue and/or expand small ruminant production although there are some constraints. Except in lowland areas farmers in general are more interested in sheep than goats.

Table 40. Future plan and reasons for expansion of sheep and goat production of the respondents

Attributes	Percentage
No. of Households	150
<i>Sheep</i>	
High market demand	71.3
Increasing market price	73.5
Easy to manage and keep	72.2
Distribute benefit and losses	68.9
Immediate returns	67.3
Appropriate for slaughter	61.7
<i>Goat</i>	
High market demand	43.7
Increasing market price	47.7
Easy to manage and keep	28.5
Distribute benefit and losses	44.4
Immediate returns	40.7
Appropriate for slaughter	37.6

The reason for expanding sheep production includes high market demand, increasing prices, distribution of benefit and losses and immediate return. Among these reasons market demand and high prices are the most appreciated issues currently. In case of goats, these reasons are given by less than half of households. Due to management and feeding reasons it was observed that some farmers divert to sheep production and fattening.

## **4.6 Constraints and opportunities of small ruminant production and marketing**

### **4.6.1 Constrains in small ruminant production**

The major constraints in small ruminant production in the area are given in Table 41. Feed and grazing land shortage the most limiting constraint (74.4%) in small ruminant production in the study area. Feed shortage in both seasons (dry and wet) limits productivity of small ruminants and it was further worsened due to the absence of awareness and practice of feed conservation techniques. Moreover, forage development has been given less attention. There is a significant difference among small ruminant density groups with pronounced problem in sheep dominant sites (highland and mid altitudes); this may be due to more land is covered by perennial crops than left for grazing.

Water shortage and drought were reported by 20% and 27.5%, respectively in goat dominant sites this may be due to these areas receives relatively smaller rainfall and has shorter rainy seasons than their counterparts. Yet water shortage is not a critical problem that hinders small ruminant production in the area this may due to higher rainfall distribution and the existence of many rivers. Only 7.5% and 10% of the households who reported water shortage and drought as constraints.

Diseases and parasites hamper small ruminant production by causing high mortalities especially among suckling animals. From interviewed households, 60.6% indicated that diseases and parasites among the major constraints for small ruminant production in the area.

Almost all interviewed households lost one or more small ruminants during the last 12 months.

Table 41. Major constraints reported by households in small ruminant production by small ruminant density groups (%).

Problems	Group			Overall
	<i>Sheep</i>	<i>Goat</i>	<i>Mixed</i>	
	<i>Dominant</i>	<i>Dominant</i>	<i>Flock</i>	
Feed/ land Shortage	72.5	90	62.5	74.4
Lack of Input	62.5	90	70	71.3
Predators	70	80	52.5	68.1
Disease & Parasites	52.5	90	47.5	60.63
Lack of Credit	48.75	90	60	61.9
Marketing Problems	8.75	82.5	25	31.3
Labor Shortage	30	32.5	17.5	27.5
Drought	3.75	27.5	5	10
Water Shortage	2.5	20	5	7.5

The loss of small ruminants by predators is a common phenomenon in the study area and 68.1% of the interviewed households indicated its limitation for small ruminant production. Problems of input supply, credit services and appropriate extension services constitute 71.3%, 61.9% and 21.3% of the constraints of the interviewed households

### 4.6.2 Marketing Constraints

The marketing constraints in small ruminant production in the study area are shown on Table 42. The major problems of marketing as reported by respondents are seasonality of market price(71.9%), brokers (66.7%), and lack of market price information (65%).

Table 42. Marketing constraints in small ruminant production reported by household(%)

<b>Problems</b>	<b>Percentage</b>
No. of Households	114
<b><i>Reasons</i></b>	
Tax burden	40.4
Brokers	66.7
Seasonality of market Price	71.9
Lack of road	10.5
Lack market and price information	65.8

### 4.6.3 Opportunity of small ruminant production and marketing

Goma is one of the districts in Oromia that is known for coffee production. However, the productivity and the price of coffee has been highly variable. So farmers face income shortage during times of coffee failure. The integration of small ruminant production is important as they can be intermediate cash sources during coffee failure time. Moreover, their high turn

over rate, easy to be managed by children and women are advantages to be integrated with crop production.

Goma is also highly endowed with natural forests and various annual and perennial plants that can be potential feed sources for small ruminant. The vegetation is endowed with spicy herbs that give demandable aesthetic property of the meat which may be valued for export markets. Moreover, the area receives enough amount of rainfall that can be used to develop various types of grasses, legumes and browses through different production strategies.

Landless youth and farmers, retired people and other members of society can be engaged in fattening activities that make them benefited as result of high market demand and higher prices.

High demand of the small ruminants in the local market as a result of population increase, urbanization, and increase in income (even within a district) can be considered as an opportunity for the small ruminant producers. It is evident that there was high consumption of meat during crop (coffee) harvest and less volume of animal were taken out of Goma.

The need for young males is also opportunity for the producers. Nowadays, many abattoirs flourish in the country; so agents and assemblers purchase small ruminant even at farm gate.



## **5 SUMMARY AND CONCLUSIONS**

Small Ruminants are integral part of livestock keeping in Ethiopian farming and pastoral community and they are mainly kept for immediate cash sources, milk, meat, wool, manure, and saving or risk distribution. They also play important role as sources of foreign currency through export of live animals or their products. In Ethiopia small ruminant production lack reliable marketing outlets that could provide the full benefits of indigenous small ruminant resources. Various constraints limit small ruminant production in Ethiopia that needs to be addressed by systematically describing the production and marketing systems thereby planning and designing appropriate research and development activities that will be relevant to specific systems.

The major purpose of this study was to generate baseline information on small ruminant production and marketing and the associated challenges and opportunities in Goma district, western Ethiopia. Goma is one of the districts in Oromia known for coffee production receiving reliable rainfall throughout the year; as a result agricultural activity has not been limited by rainfall.

The study was conducted in two phases in order to generate information on sheep and goat production and marketing. Based on secondary information sources and discussion with experts, the 36 kebeles were stratified in to small ruminants density groups according to their proportion of sheep and goats kept by household. Accordingly, 26, 6, 4 kebeles were found to be sheep dominant, mixed flock (almost similar proportion of sheep and goats) and Goat

dominant respectively. From these strata of kebeles 4, 2 and 2 kebeles were selected from sheep dominant, goat dominant and mixed flock groups respectively. Households that have a least 2 small ruminant or landless farmers who involved in fattening and has a minimum of one year experience in small ruminant production and/or fattening were randomly selected to participate in production system and marketing study between October 2008 and Jan 2009. Structured and semi-structured questionnaires were used to collect information on different aspects of production system and PRA tools were employed to collect marketing information. Group discussion with key informants was also done to understand problems in depth. The productive performances of small ruminant were conducted on 36 selected households who were continuously monitored for period of about six months. The statistical tools employed include: descriptive statistics, chi-square tests and analysis of variance using the statistical software called SPSS (version 13).

In Goma, where coffee and chat are the major cash sources for farmers small ruminant are mainly kept for cash generation and saving in time coffee failure. In general sheep are the dominant and most preferred species than goats by farmers and it was observed that most farmers who has larger perennial crop land do not choose to have small ruminants especially goats. These farmers who rear small ruminants kept larger proportion of female animals than male animals and it is rare to find males of advanced age because sold/ slaughtered or fattened and sold earlier.

The principal feed sources in the study area were grazing land (communal, road side), crop aftermaths, browse species and home leftover (Chat and food leftovers). Commercial

concentrates are not known by farmers except flour mills. Majority of the farmers supplemented small ruminant during both dry and wet seasons. Most small ruminants are either tethered or herded all the seasons due to perennial crops and predators. The major reasons for tethering animals include: to avoid crop and vegetation damage, to protect them from predators, to save labor and to reduce aggressiveness (in case of male animals) and to utilize marginal lands. All small ruminants are housed for protection from adverse weather condition and predators.

River water was reported to be the major water source for small ruminants in the study area. Other water sources include ponds, deep well, pipe water and rain water (during rainy season). Farmers practice culling of small ruminants due to various reasons. The major reasons include sickness, fertility problem, physical defect, old age, and unwanted physical characteristics. Fattening is a common practice by most farmers and nowadays getting higher attention due to high market demand and associated market prices. To castrate farmers mostly took their animal to nearby veterinary clinic to be castrated by burdizzo while some of them use traditional methods.

Sheep and goats enter to flocks through births, purchases, and sharing arrangements while leave the flock through sale, death, slaughter, predator, theft and share arrangements.

The main lambing and kidding periods were in the main rainy seasons. The average litter size, birth weights (kg), and weaning weights (kg) were found to be: 1.4, 2.9, 11.6 for sheep and 1.6, 2.8, 9.0 for goats respectively.

Although there is little intention to keep male animals intact farmers in the study area select rams to mate their females. The characteristics used in selecting breeding ram are based on body confirmation, performance history and color.

One of the limiting factors in small ruminant production and marketing in the Goma district are diseases and parasites. Deaths of small ruminants were reported by households over the last 12 months. Higher death for both species was reported for suckling age groups followed by 3 to 6 months age group while the least was reported for castrates. The signs for the disease that causes death in the area were: emaciation, coughing, swelling around neck, depression and loss of appetite, and abnormal breezing with auscultation, sudden death with bleeding in openings.

There are five towns in the district where small ruminants are marketed. In addition, villages are also places of marketing for small ruminants. Farmers, traders, brokers, restaurant/hotel owners, butcheries are the major market participants. There is one main market route; from Agaro to Addis Ababa. Market information sources, prices fluctuations and brokers are the major marketing problems.

Farmers in Goma target marketing in holidays. Arafa is the most important target time of marketing for fattened castrates. As the majority of Goma inhabitants are Muslims, Arafa is one of the holidays when almost all Muslims consume meat either by slaughtering within the

household or share with other neighbors. Other targeted holidays include new year, Meskel, Ed al fetir and Easter.

In Goma district, small ruminant meat was consumed during various occasions. However, the time is mostly restricted to holidays and some occasions like weeding, births in a family, funerals and during coffee harvest. On the other hand there is no report of small ruminant milk utilization in Goma farming community.

In spite of extension activities in various aspect of agriculture, there has not been any specific extension package for small ruminants provided by NGOs or GOs in the district.

Husbands are primarily responsible for feeding, taking care of sick animals fattening, shelter construction and much of marketing tasks. Women do cleaning of barns and taking care of lambs and kids while children do herding and watering

The major problems in small ruminant production and marketing were, feed and grazing land shortage, diseases and parasites; predators; marketing problems; inadequate extension support. Therefore, relevant development programs that participates the farming community under the prevailing farming system should be planned and effectively executed. In general;

- Feed development projects should be planned and implemented as the rainfall pattern and soil fertility can enable most annual and perennial forage crops plantation

effective. Moreover, integration of improved forage species by different strategies should also be area of intervention and then the issue of feed quality can be resolved.

- Diseases and parasites which are the major constraint in small ruminant production should be studied in depth and microbial causes should be identified; Epidemiology should also be clearly indicated and appropriate development intervention should be planned.
- Fattening is the emerging opportunity for land owning and landless farmers and other urban and per-urban communities; however, there are limited efforts in providing profitable feeding packages and so appropriate technologies should be generated and disseminated for the stakeholders.
- The reproductive performance of small ruminants in the area should be studied in depth involving larger sample size and longer time as this study has only covered 36 households and period of around six months.
- Minimizing the involvement of brokers in marketing processes, providing reliable and timely market prices information can solve the identified marketing problems. Barriers to local and export markets should minimize and small ruminant producers should be encouraged.
- Quantitative aspects of marketing (supply, demand, prices, producer and consumer behavior) require further study to provide complete marketing information.
- An extension package that is intended to improve the economic contribution and productivity of small ruminants should also be designed.

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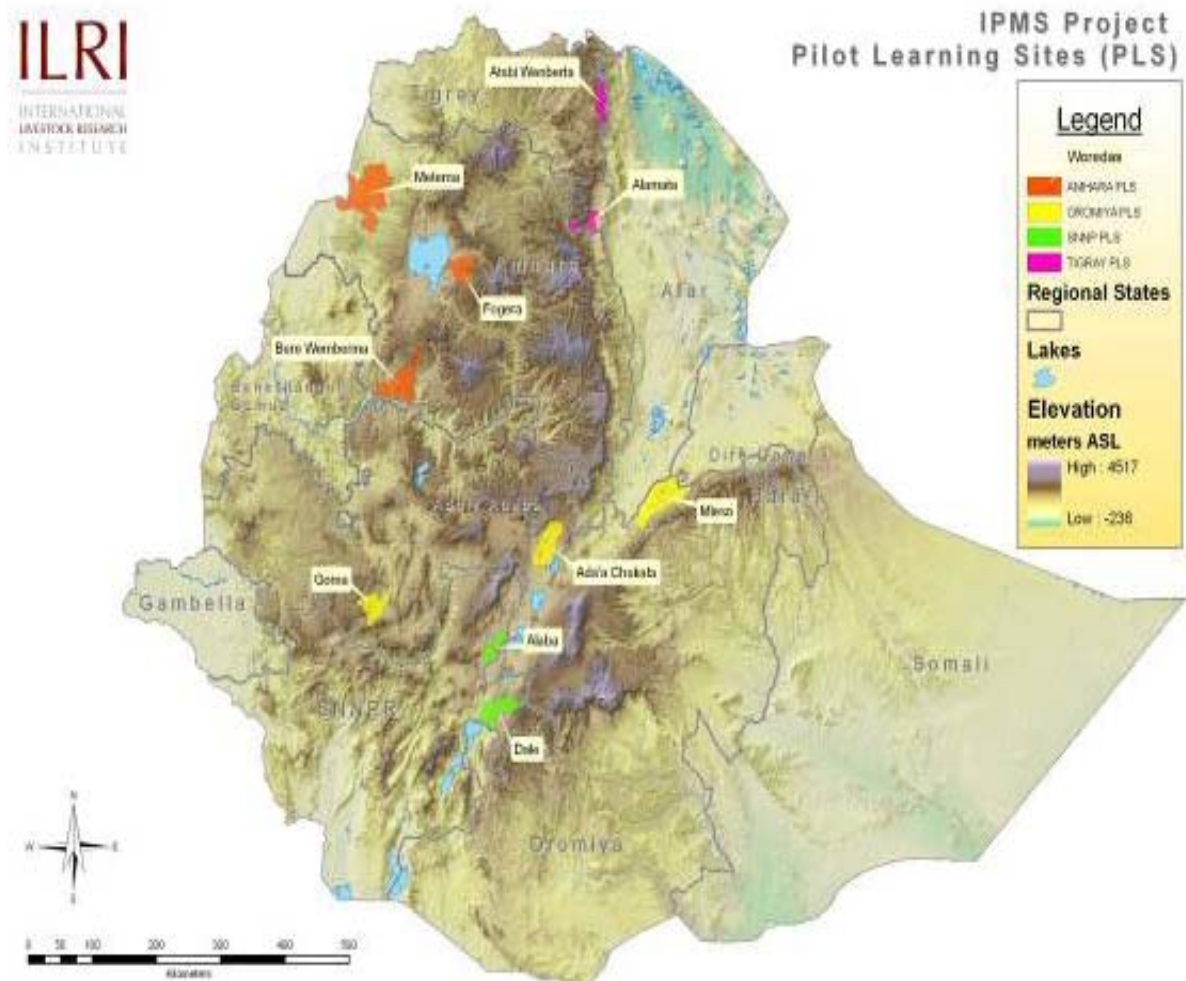
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## APPENDICES



**Source:** *IPMS ATLAS 2007*

Appendix 1. Location of Goma

## QUESTIONNAIRE

1. Enumerator's Name \_\_\_\_\_
2. Date of Interview \_\_\_\_\_
3. Kebele Name \_\_\_\_\_

### Section One: General information

1. Name of the interviewee \_\_\_\_\_
2. Sex of the interviewee  
Male \_\_\_\_\_ Female \_\_\_\_\_
3. Position in House hold: \_\_\_\_\_  
Head \_\_\_\_\_ spouse \_\_\_\_\_
4. Religion : \_\_\_\_\_
5. Family size
  - a. Children(<15 years): Females \_\_\_\_\_ Males \_\_\_\_\_
  - b. Adults (15-65): Females \_\_\_\_\_ Males \_\_\_\_\_
  - c. Adults(>): Females \_\_\_\_\_ Males \_\_\_\_\_
6. Educational level of Family members.
  - 6.1. Illiterate
  - 6.2. Grade 1-6 \_\_\_\_\_
  - 6.3 Grade 6-12 \_\_\_\_\_
  - 6.4. Higher education \_\_\_\_\_

### Land holding and land use systems

1. What is the size of your total land holding? \_\_\_\_\_ timad
2. How much is your land allocated for the followings?
  - 1 Cereal crop cultivation \_\_\_\_\_ *timad*
  2. Coffee cultivation \_\_\_\_\_ *timad*
  3. Tropical fruit \_\_\_\_\_ *timad*
  4. Spice cultivation \_\_\_\_\_ *timad*
  5. Forage cultivation \_\_\_\_\_ *timad*



6. Grazing/pasture land \_\_\_\_\_ *timad*
7. Fallow land \_\_\_\_\_ *timad*
8. Natural wood land \_\_\_\_\_ *timad*
9. Man-made wood land \_\_\_\_\_ *timad*
10. Others, specify \_\_\_\_\_ *timad*

**Purpose of keeping Sheep and Goats (Rank them)**

1. Income source (sale)      2. Meat      3. Milk
4. Manure      5. Sacrifice/rituals      6. Social/cultural function
7. Saving (Insurance)      8. Risk/Benefit Distribution with other animals
9. Other reasons \_\_\_\_\_

### Compositions, structures and ownership of household livestock (in past 12 months)

1. How many of the following animals you keep?

<i>S</i> <i>N</i>	<i>Structure</i>	<i>Number</i> <i>Owned</i>	<i>Ownership</i>			<i>Origin</i>			
			Own	Share	<i>Ribi</i>	Family	Home born	Purchased	Gift
	<b>Cattle herd</b>								
1	Cows								
2	Bulls								
3	Heifers								
4	Male calves								
5	Female calves								
6	Oxen (draft)								
7	Oxen (fatten)								
	<b>Sheep flock</b>								
1	Lambs <6 months								
2	Males 6-12 months								
3	Females 6-12 months								
4	Ewes								
5	Rams (intact)								
6	Castrates								
	<b>Goat flock</b>								
1	Kids <6 months								
2	Males 6-12 months								
3	Females 6-12 months								
4	Does								
5	Bucks								
6	Castrates								
	<b>Equines</b>								
1	Stallion /male horses								
2	Mare/female horses								
3	Female donkey								
4	Male donkey								
5	Mules								
	<b>Chicken</b>								
1	Total in the household								

## **Section Two: Sheep and goats production**

### **A. Feed and water resources, seasonal calendars and feeding managements**

1. What are the major basal feeds sources available for sheep and goats & their availability?

No	Feed types and water sources	Seasonal availability											
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma	Jun	Jly	Aug
1	Communal grazing land												
2	Road side grazing												
3	Grazing aftermath												
4	Grazing in riverside												
5	Private grazing land (kalloo)												
6	Crop residues												
7	Conserved feeds(hay , ect)												
8	Indigenous browses												
9	Fodder leaves/improved forages												
10	Enset and banana corms, leaves, stem												
11	Root crops tubers, leaves, corms												
12	Home leftover foods and drinks												
13	Coffee pulp/haul												
14	Fruit leftover												
15	Concentrates												
16	Weeds												
17	Crop tillers and fillers												
18	Others, specify												

2. Do you graze your sheep and goats? 1=Yes 2=No

3. If yes, for how long? \_\_\_\_\_ days in a week \_\_\_\_\_ hours a day

4. How sheep and goat graze? 1= Sheep alone 2=Goat alone 3= Sheep + Goat  
4=Together with other livestock

5. How you practiced grazing your sheep and goats in the dry season?

1=Free grazing 2=tethered grazing 3= cut and carry

6. How you practiced grazing your sheep and goats in the wet season?

1=Free grazing 2=tethered grazing 3= cut and carry



14. Do you conserve feed? 1=Yes 2=No
15. If yes in what form? 1=Hay 2=Silage 3=Others
16. If not why? 1=Not skilled and experienced 2=Shortage of grasses/fodder  
3=Labor shortage 4=others, specify
17. Do you practiced tether feeding of sheep and goats 1=Yes 2=No
18. If yes, why? 1=To avoid crop and vegetation damages 2=Save labor  
3=Protect from predators 4=Utilize marginal land and hillsides  
5= control breeding 6=Others, specify
19. Is there feed shortage or constraint for your sheep and goats? 1=Yes 2=No
20. If yes, when? 1=Dry season 2=Wet season 3=Both
21. If feed shortage in your locality, why? (rank)  
1=Shrinking and decline in productivity of grazing lands  
2=Increase of animal population  
3=Cultivation, settlement and protection on grazing lands  
4=Drought  
5=Increase of human population  
6=Others, specify
22. What are the common water sources of sheep and goat in this area?

No	Sources of water	Estimated distance(1hr=5kms)	Rainy season	Wet season
1	River			
2	Pond			
3	Rain water			
4	Water harvest			
5	Deep well			
6	Pipe			
7	Any other sources			

23. In what intervals you offer sheep and goats with water?

No	Frequency	Sheep		Goat	
		Dry season	Wet season	Dry season	Wet season
1	Any time required				
2	Once a day				
3	Twice a day				
4	Every other day				
5	Every three day				
6	Others, specify				

24. Is there any water shortage or problem to sheep and goats? 1=Yes 2=No

25. If yes, when? 1=Dry season 2=Wet season 3=Both

26. Why shortage of water? 1=Drying of water sources

2=Far distant from water sources 3=Not

allowed to use sources

4=Provide other livestock than sheep and goats

5=others, specify

### **B. Sheep and goats health management**

1. What are the common diseases and parasites that affect health and production of sheep and goats

No	Local name	Affect			Symptoms	Seasons/months
		Sheep	Goat	Both		
1						
2						
3						
4						
5						

2. What would you do when your sheep and goats sick?

1=Treat with ethno veterinary practices 2=Sales immediately

3=Slaughters immediately 4=Takes to veterinary center

5=Take to or treat with treatments of local traders 6=Others, specify

3. Are you accessible to veterinary services in your locality/near distance? 1=Yes 2=No

4. If yes, how far? \_\_\_\_\_ Km

5. From where you usually obtain veterinary services?

1=OoARD 2=DA offices 3=NGOs 4=Private institutions 5=Open markets

6. How you obtain services in these institutions?

1=Free of charge 2=Payment 3=Credit 4=Others, specify

7. Did your sheep and goats vaccinated? 1=Yes 2=No

8. If yes, how? 1=After report of disease cases 2=After certain animals died

3=Others, specify

9. Do you use medicines and drugs from illegal traders/open markets for sheep and goats?

1=Yes 2=No

10. If yes, why? 1=Cheap 2=Not accessible to veterinary center

3=Not want to use veterinary center 4=Others

11. If not use, why? 1=Not cures 2=DAs and health experts advised not to use

3=Expensive 4=Not accessible 5=Others

12. Do you cut and/or brand with hot iron your sheep and goats? 1=Yes 2=No

13. If yes, why? 1=Ethno veterinary treatment to sick animals

2=Identify/tag the animals 3=Others, specify

14. If not, why? 1=Learnt that it affects quality of skin 2=Reduce price of skin

3=Others, specify \_\_\_\_\_

15. Has there been any death of sheep and goats over the last 12 months? 1=yes 2=No

16. If yes, (specify the number)

No	Sheep		Goats	
	Structure	Died	Structure	Died
1	< 3months		< 3months	
2	3-6 months		3-6 months	
3	Ewes		Does	
4	Rams		Bucks	
5	Castrates/fattening		Castrates/fattening	

17. What are the common problems of sheep and goats health management in this area?

1=Widespread of diseases and parasites 2=Shortage of feeds and water in the area

3=Lack/shortage of veterinary institutions 4=Lack of animal health professions

5=Lack/shortage of drugs and medicines 5=Unaffordable prices for services

6=Drought in the area

6=Others, specify

### **C. Sheep and goats breeding and reproductive managements**

1. Do you select your male animals for breeding purpose? 1=Yes 2=No

2. What are the criteria for sire(Ram) selection? 1=color 2= body conformation 3=pedigree

3. What are the criteria for sire(buck) selection? 1=color 2= body conformation 3=pedigree

4. Do you have your own breeding male animals (ram & buck)? 1=Yes 2=No

5. What are common sources of breeding males from your flocks?

No	Sources of breeding males	Ram	Bucks
1	Own		
2	Neighbors		
3	Others, Specify		

6. When (season/months) during the year you observe intensive lambing & kidding?

No	Species	Intense breeding and conception months											
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
1	Lambing												
2	Kidding												

7. How is the reproductive performance of sheep and goats in your farm?

S N	PARTICULARS	SHEEP		GOATS	
		Male	Female	Male	Female
1	Age at first parturition (months)				
2	Parturition interval (months)				
3	Average litter sizes(single, twin, triplets)				
4	Infertile				
5	Slaughter age (months)/marketing age				

#### **D. Lamb and kid rearing, castration and culling**

1. Do you provide lambs and kids any feed in addition to their mother's milk until they begin grazing? 1=Yes 2=No

2. If yes, what types of feed resources and feeding?

Feed types

Feeding systems

Lambs \_\_\_\_\_

Kids \_\_\_\_\_

3. Do you practice weaning lambs and kids? 1=Yes 2=No

4. If yes, when? Lambs \_\_\_\_\_ months Kids \_\_\_\_\_ months

5. Do practice castration of sheep and goats? 1=Yes 2=No

6. If yes, why? 1=To fetch more price (by fattening)

2=To avoid mate their flock with these males

3=Others, specify \_\_\_\_\_

7. At what age you castrate? Sheep \_\_\_\_\_ months Goat \_\_\_\_\_ months

8. How you select sheep and goats for castration and fattening?(rank)

1=Conformation (height, length and appearance)

2=Breed (known local ecotypes)

3=Physical characteristics (color, horn, tail length and width, ear etc)

4=Age

5=Others, specify \_\_\_\_\_

9. If you practices to select with physical characteristics, rank each

1=Color 2=Horn 3=Ear 4=Tail 5=body Length and height 6=Others

10. Do offer specific feeding and other management practices for castrated sheep and goats?

1=Yes 2=No

11. If yes, what and for how long?

Feed types

Duration

Castrate sheep \_\_\_\_\_

Castrate Goat \_\_\_\_\_

12. What is the common ways of castrating your sheep and goats?



1=Local methods (stone, stick, metal, others) 2= Burdizo (OoARD) 3=others

13. Do you practice fattening of sheep and goats for target market seasons and market places?

1=Yes 2=No

14. If yes, which season/months and rank?

1=New Year festival 2=Ester 3=Christmas

4=Meskel 5=Ed al Fetir 6=Others, specify \_\_\_\_\_

15. Is there and emerging opportunity of increased demand and incentive price for fattened sheep and goats? 1=Yes 2=No

16. Do you practice culling of sheep and goats from flock? 1=Yes 2=No

17. If yes, why (rank)? 1=Oldage 2=Sickness 3=Lambing and kidding problems

4=Physical defect 5=Unwanted physical characteristics

7=Others, specify \_\_\_\_\_

18. How do sheep and goats left from your flock over the last 12 months?

1=Sale 2=Death 3=Slaughter for home consumption 4=Theft 5=Predator 6=Gift

7=Share arrangements 8=Others, specify \_\_\_\_\_

19. How do you replace/own sheep and goats left the household flock in various ways?

1=home born 2=share arrangements 3=gift 4=purchase 5=Not replace 6=others, specify

20. If you sale sheep and goats for urgent income needs, which do you prefer to sale?

1=Lambs and kids 2=Rams and bucks 3=Ewes and doe 4=Castrates

5=Others, specify

21. How you sale young male sheep and goats?

1=Sale all when reach to marketing age 2=Sale holding some for breeding

3=Sale holding some to castrate and fattening 4=Others, specify \_\_\_\_\_

22. Do you cut tail of female sheep/ewe? 1=Yes 2=No

23. If yes, why and when (age, months)? \_\_\_\_\_

### **E. Housing of sheep and goats**

1. Where you confine sheep and goats?

1=Main house 2=Adjoin house(in the house) 3=Separate constructed house

4=Grazing area (open kraals) 5=Others, specify \_\_\_\_\_

2. How you confine house sheep and goats?

1=Sheep alone 2=Goats alone 3=Sheep and goats alone

4=Sheep, goats and all other animals together 5=Others, specify \_\_\_\_\_

3. Why you provide sheep and goats with shelter?

1=Protect from sun, rain and frost 2=Protect from predator

3=Provide convenient climatic condition

4=To provide supplement

5=Others, specify \_\_\_\_\_

### **G. Sheep, goats and their products utilizations**

1. If you slaughter sheep and goats for home consumption, usually when?

1=For festivals                      2=weeding                      3=Whenever slaughter age animals available  
4=Births in a family 5=for guests 6=circumcise 7=At funeral ends 8=Others, specify \_\_\_\_\_

2. Which sex of sheep and goats you usually slaughter?

1 Sheep    1=Male            2=Female 3= Both

2 Goats    1=Male            2=Female 3=Both

3. Is milking and use of milk and milk products from sheep and goats common in your area? 1=Yes                      2=No

4. If yes, which animals?            1=Sheep            2=Goats            3=Both

5. If no, why?    1=Cultural taboo    2=Religious taboo    3=Not common in the area  
4=Others, specify \_\_\_\_\_

6. For what purposes you usually use the milk?

1=Children consumption            2=Adult consumption 3=Processing 4=Medicine 5=Others, specify \_\_\_\_\_

7. who in the family is given priority for consume milk? 1=children 2=sick 3=old people 4=all 5=others

### **SECTION THREE**

#### **Marketing of sheep and goats, their products and by-products**

1. Have you sold sheep and/or goats in the past 12 months? 1=Yes                      2=No

2. If yes, why?(rank)

1= Obtain cash for farm inputs (fertilizer, seed, others)

2= Obtain cash income for children school

3= Obtain cash for family and animal health treatments

4= Shortage of grazing land and feeds

5= Cash to purchase foods

6=To pay back credit

7= Others, specify \_\_\_\_\_

3. Where you sell your animals?

1= Farmers in the same village                      2= Farmers in nearby village 3= Agaro

4=others small towns specify

4. Have you purchased sheep and/or goats in the last 12 months? 1= Yes                      2= No

5. Why did you purchas sheep and goats?

1=slaughter for festivals 2=slaughter for ceremonies/rituals 3=Breeding 4=fattening 5=others

6. If yes, from where did you purchased?

1= Farmers in the same village                      2= Farmers in nearby village 3= agaro 4=other towns specify

7. How many sheep and goats have you sold and purchased in the past 12 months and how much?

S N	CLASSES OF ANIMALS	SOLD				PURCHASED			
		Number	When/ Months	Unit Price	Total price	Number	When/ months	Unit Price	Total price
	Sheep								
1	Ewe								
2	Ram								
3	Male lamb								
4	Female lamb								
5	Castrate								
	Goat								
1	Doe								
2	Buck								
3	Male kid								
4	Female kid								
5	Castrate/fatten								

8. When in the year you prefer to sale or purchase sheep and/or goats?

No	WHEN	SHEEP		GOATS	
		Sale	Purchase	Sale	Purchase
1	During festivals (specify)				
2	During crop planting				
3	During crop harvesting				
4	Others, specify				

9. How you sales or purchases your animals?

1= Live weight basis 2= 'Eye ball' Estimation 3=Both

10. Why you prefer this mode of marketing?

1= Incentive prices 2= Traders make mischief with weighing scale

3= Purchasers like this it 4= Reliable and saves my time

5= Other, specify

11. Did you ever get animal price and market information?

1= Yes 2= No

12. If yes, from where?

1= DAs 2= Governmental organizations, specify

3= NGOs 4= Others, specify

13. Do you face any problem in marketing of your animals? 1= Yes 2= No

14. If yes, what?

1= Tax burden 2= Unwanted broker disorder and high commission fees

3= Seasonality of market demand and prices 4= Lack of market road from my areas

5= Lack of market and price information 6= Others, specify

15. Do your family sales milk products from sheep and goats? 1= Yes 2= No

16. If yes, what is the price per your local unit (approximated in kg?) \_\_\_\_\_ Birr

17. If not market your products, why not?

1= Not produce at all 2= Produce but consume at home 3= Not fetches reasonable price 4= Don't have any market demand in my locality 5= Others, specify

18. What did you do with the skin(s)?

- 1= Sales      2= Used for making household materials (seat, bed materials, containers) 3= Used for ride horse/mule seat 4= Others, specify

19. If sold, how much was the average prices?

- 1= Sheepskins \_\_\_\_\_ Birr 2=Total Goat skins \_\_\_\_\_ Total prices

20. Do you preserve/process skins at home immediately after flaying? 1= Yes      2= No

21. If yes, what? 1= Apply salts      2= Dry      3= Others, specify

22. After how many days (usually) you take the skins to the traders or collectors \_\_\_\_\_ days

23. Where and to whom you usually sales skins?

- 1=Sub-agents in my locality      2= In near by town for any traders  
3=Others, specify \_\_\_\_\_

24. Did any of your customers have complained on quality of the skins you sold?

- 1= Yes      2= No

25. If yes, what were the defects they complained?

- 1= Cut during flay      2= Cut during drying      3= Spoiled with bacteria and dirt  
4= Too much dried on the sun      5= Others, specify?

26. What are the common problems you encounter in skin production and marketing?

- 1= Lack of market information and markets  
2= Lack of capacity building on skin production, preservations and marketing  
3= Lack of local organization (farmers' coops) in preservation, storage and marketing  
4= Animals produce poor quality skins  
5= Others, specify

## **SECTION FOUR**

### **Constraints and Prospects of Sheep and Goats Production and Marketing**

1. What are major constraints hinder production of sheep and goats in this area? (Rank)

- 1=Disease and parasites      2=Feed and grazing land shortages  
3=Water shortage      4=Labor shortage  
5=Drought      6=Predators  
7=Marketing problems      8=Inadequate/lack of inputs  
9= Inadequate/lack of extension and support  
10=Inadequate/lack of technologies and innovations  
11=Lack of credits 12=Others, specify

2. Do you want to expand sheep and goats flock sizes and production in the future?

- 1=Yes      2=No

3. If yes,

No	Reasons for expansion	Sheep	Goats	Both sheep and goats
1	High market demand			
2	Incentive market price			
3	Easy to manage and keep			
4	Distribute benefits and losses			
5	Immediate returns			
6	Appropriate for slaughter and home consumption			
7	Others, specify			

4. If no, why?

- 1=Shortage of grazing lands and feeds      2=Shortage of labor  
 3=Prefer another animal species      4=Marketing problem  
 5=Lack of capital to purchase animals and inputs      6=Others, specify

### **SECTION: FIVE**

#### **LABOUR, EXTENSION and SOCIO ECONOMIC**

##### **A. Gender, labor allocation and decision on benefits from sheep and goats**

1. Do you encounter labor shortage in sheep and goat production aspects? 1=Yes

2=No

2. For what major tasks you face labor shortage?

- 1=Herding and tethering      2=Watering      3=Looking after lambs and kids  
 4=Construction of shelter      5=Take care of sick animals      6=Others, specify \_\_\_\_\_

3. How you overcome the labor shortage?

1=Hire laborer 2= use family labour 3=use fence 4=keep turn by turn with neighbor 5=Others specify

4. Who do the different tasks and decides on benefits obtained from sheep and goats?

S. N	Particulars	Husband	Spouse	Boys	Girls	Hired Labor	Others, Specify
1	Herd and/or tether						
2	Feeding animals						
3	Take to water points						
4	Clean sheep and goat barns						
5	Take care of lambs and kids						
6	Take care of sick animals						
7	Fattening managements						
8	Construction of shelter						
9	Milk						
10	Process milk						
11	Sale animals						
12	Decides on use of income and benefits						
13	Owens sheep and goats in the family						

5. Is there any cultural, traditional and religious taboo in the area that prohibits use of sheep and goat products and by-products in your areas? 1=Yes 2=No

6. Is there any tradition or culture that exceptionally prefer/requires certain sheep and goat color in the area. 1=Yes 2=No

7. Do you sacrifice sheep/goats for any religious or traditional occasions 1=Yes 2=No

**B: Institutions and innovations in development of sheep and goats production**

1. Did you receive credit in recent years? 1=Yes 2=No

2. If yes in what form? 1=Cash 2=Kind 3=Both

3. If you received what is the source 1=micro-finances 2=Private banks 3=Credit institutions

4=Governmental offices (OoARD, etc) 5=NGOs 6=Cooperatives

7=Others, specify

4. What do you do with it?

1=for crop production 2=cattle and small ruminant fattening 3=trading 4=other

5. Who receives credit in your family? 1=Husband 2=Wife 3=young boys 4=young girls

6. How you made credit arrangements? \_\_\_\_\_

7. Are you satisfied with the lending regulations and terms to repay the credit?

1=Yes 2=No

8. Did you receive sheep and goats from any source 1=Yes 2=No

9. If yes, from which sources?

1=Credit 2=Gift from NGOs

3=Gift from GOs (safety net, credit, revolving funds)

5=Share arrangements 6=Exchange (crop, other livestock, inputs, etc)

10. If you received sheep and goats for share arrangements, why?

1=To keep or allocate labor 2=To House 3=To Fatten

4=To Breed 5=Others, specify \_\_\_\_\_

11. How share agreements made?

1=Share incomes from sale of animals received

2=Share new born animals

3=Share the original animals after certain years (\_\_\_\_ years)

4=Others, specify

12. Is there any cooperative in your area? 1=Yes 2=No

13. If yes, in what sector

1=Crop production (storage, marketing, deliver inputs to members, etc)

2=Livestock (Marketing, deliver inputs, assemble products, etc)

3=Inputs (deliver different inputs, credits, insurance, etc)

4=Others, species

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### **BIOGRAPHICAL SKETCH**

The author was born in Arsi, Digalu on Jan 12, 1976 GC. He attended elementary and junior schools in Digalu elementary and junior school. He had completed his secondary high school education in Bekoji High School. He successfully passed the Ethiopian School Leaving Certificate Examination (ESLCE), and joined the Awassa College of Agriculture (now Hawassa University) in 1997. After four years of rigorous study, he graduated with a BSc degree in Agriculture (Animal Production and Rangeland Management) in July 2000.

After graduation, in 2001, he was employed as Junior Research Officer at Adami Tulu Agricultural Research Center of Oromia Region Agricultural Research Institute (OARI) in East Showa Zone of Oromia Region. In September 2008, after 6 years of experience, he joined the School of Graduate Studies of the Hawassa University, Department of Animal and Range Sciences as a candidate for the Masters of Science degree in Animal production.