The Impact of Small Ruminant Diseases on Food Availability and Accessibility of Pastoral Households in Ethiopia: The Case of Liben District in Oromiya Region.


A Research Project Submitted to Van Hall Larenstein University of Applied Sciences in Partial Fulfilment of the Requirements for the Degree of Masters of Development, Specialization in Rural Development and Food Security

SUBMITTED BY

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DEDICATION

This thesis is dedicated to the Lord Jesus Christ for his grace upon my life and to beloved mother and father for their continuous support and encouragement during my overall stay and study in the Netherlands.

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ACRONYMES

CAADP	Comprehensive African Agriculture Development Program
CBPP	Contagious Bovine Pleuropneumonia
CCPP	Contagious Caprine Pleuropneumonia
DA	Development Agent
DFID	Department for International Development
ESGPIP	Ethiopian Sheep and Goat Productivity Improvement Project
ETB	Ethiopian Birr
FAO	Food and Agricultural Organization (United Nations)
FEWS NET	Famine Early Warning Systems Network
FGDs	Focus Group Discussions
GDP	Gross Domestic Product
GIT	Gastro-Intestinal Tract
GZPDO	Guji Zone Pastoral Development Office
HHs	Households
IFAD	International Fund for Agricultural Development
LDAO	Liben District Administration Office
LDDPPO	Liben District Disaster Prevention and Preparedness Office
LDHO	Liben District Health Office
LDPDO	Liben District Pastoral Development Office
OIE	*Office International des Epizooties* (World Organization for Animal Health)
PA	Pastoralist Association
PPR	Peste des petitis ruminants
PRA	Participatory Rural Appraisal
SLF	Sustainable Livelihood Framework
SNNPR	South Nations Nationalities People's Region
US	United States
WFP	World Food Program

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ABSTRACT

This thesis studies the impact of small ruminant disease on food availability and accessibility of pastoral households in the Liben district of the Oromiya Regional State in Ethiopia.

Case study approach was employed with focus group discussions, individual interviews (respondents, key informants and expert interviews) and participant observation. The researcher clustered the respondent into pastoral and agro-pastoral households to see the difference in the impact of sheep and goat diseases among the households and identify the elicited coping strategies in these categories.

Both exploratory and topical participatory rural appraisal (PRA) tools such as social mapping, ranking, proportional piling, and income and expense trees were used to collect data.

Recurrent loss of sheep and goats, milk reduction and loss of income from sheep and goat sales in the district was attributed to impacts of infectious sheep and goat diseases such as PPR, CCPP and Anthrax as well as parasitic disease like coenuorosis.

These diseases substantially resulted in loss of the milk that the pastoral children rely during critical times of the year. Moreover, it also reduced the income that the household could get from the sale of the animals through limiting market access.

Though the community has various coping strategies to lessen the impact of sheep and goats diseases, the impacts of the diseases were more significant in poor pastoral economy than the Agro-pastoral one.

The diseases have a significant impact on the poorest segment of the population in reducing milk availability, killing individual animals and limiting market access.

Key Words: Small Ruminants, Infectious Disease, Household Income, Pastoral Food.

Chapter 1 INTRODUCTION

1.1 Background of the study

Ethiopia is located in East Africa west of Somali (Figure: 1). It is a landlocked country bordering Djibouti 349 km, Eritrea 912 km, Kenya 861 km, Somalia 1,600 km, South Sudan 837 km and Sudan 769 km (World Fact book, 2013). Ethiopia is the second –most populous country in sub-Saharan Africa with a population of about 86 million (UNDP, 2013). Ethiopia's economy is based on agriculture, which accounts for 46% of GDP and 85% of total employment; coffee has been a major export crop (World Fact book, 2013).

Figure 1: Map of Ethiopia (source: World fact book, 2013.

It follows that livestock is an important means of livelihood for developing countries like Ethiopia. Livestock are an important sources of cash income, are one of the few assets available for the poor, good for their manure and draft power, help the poor to exploit common property resources, their products helps farmer to diversify income and livestock provide a vital and often the only source of income for the poorest and most marginal of the rural poor, such as pastoralists, sharecroppers, and widows (Delgado et al. 1999).

According to FAO (2013) at regional level, the greater Horn of Africa collectively exports several million live animals annually to the Arabian Peninsula (3 million in 2011). Livestock play an important role in the socio-cultural life of the farming communities as a partial determinant of wealth and offering of bridal dowry, their value as rapidly convertible assets is equally important (Alhassan et al. 1999).

For low income countries, mutton has predicted an increase of 177 percent, second only to poultry, making it an important livelihood and food security asset (FAO, 2013).

Ethiopia is the largest livestock producer in Africa and ranks eighth in livestock ownership in the world (Rich et al. 2008). Accordingly, pastoralism is one of the oldest socioeconomic systems in Ethiopia, which represents the major means of subsistence. Pastoralists constitute about 12-15% of the total population (Bayissa, et al. 2011).

The country possesses about 47.6 million cattle, 26.1 million sheep, 21.4 million goats, 1.0 million camels, and 7.7 million equines and 39.6 million chickens (Bayissa et al. 2011). Livestock plays an important role in the Ethiopians economy in terms of its contribution to both agricultural value added and National GDP (FAO /WFP, 2012). It has been argued that

economic growth is fundamental to poverty reduction and livestock is a sunrise industry that can make a substantial input to national economy (Perry and Grace, 2009).

According to Reda (1998), many natural and man-made factors have squeezed the Borana livestock resources during the last century. Among these factors render pest claimed over 90% of the cattle population in 1988. Animal diseases may pose the greatest immediate threat when they result in epidemics, or when newly introduced in ecologically favorable conditions in which case disease often have the most evident economic impact and in many cases also severely affect marginalized people (Otte et al. 2004). They tend to have multiple impacts which have been highlighted from different perspectives. They can have a dramatic impact on food production and disrupt food supply chains (Ilbery, 2012).

FAO (2002), suggested endemic diseases are mainly felt at farm level while broader economic impacts can occur with epidemic diseases that restrict trade in livestock and livestock products. Animal diseases reduce herd and flocks dramatically, which, in the case of pastoral people, is the major blow to food insecurity and the ability to survive.

The prevalence of livestock disease outbreaks is the common hazards to livelihood security resulting in loss of assets in pastoral areas. In case of Ethiopia, notably in the Liben district of Oromiya Regional state, the prevalence and recurrent outbreaks of sheep and goat disease is the greatest obstacle for the livelihood of the communities.

Consequently, diseases tend to result in asset erosion and hit hardly the livelihood of the poor segments of the population with least diversified livelihoods.

The poor are highly exposed to a wide range of animal diseases (a hundred or so in Africa), due to strong pressure from diseases (associated with climatic conditions, ecosystems, and animal movements and livestock management practices) and to a poor capacity to control the markets (Le Gall and Leboucq, 2002.)

The absence of diversified livelihood for poor pastoralist and agro-pastoralist towards lessening the impact of sheep and goat disease could have a greater detrimental impact on the systems thereby threatening survival of such households.

Therefore, the vital role of sheep and goats in the livelihoods poor pastoralist and agro-pastoralist means that the entry or presence of disease in the system can be devastating to the livelihood as well as the resilience of the communities (FAO, 2013). The study aims at identifying impacts of sheep and goats infectious diseases with elicited different coping strategies among poor pastoral and agro-pastoral groups.

1.2 Problem statement

Despite its large inventory of Livestock in Africa, poverty, malnutrition and food insecurity have been serious problems in Ethiopia, specifically in pastoral areas. There are high numbers of livestock population in Liben district consisting of 249,946 head of goats which is the largest number followed by 223,416 head of cattle, 209,062 head of camels, 108,031 head of sheep, 69,180 head of poultry, 20,401 head of equine and 12,000 bee colonies (LDPDO, 2013).

It has been argued that, in the highlands of East Africa, increased population pressure and land fragmentation are leading to increased demand for more intensive dairy and meat goat system (FAO, 2013) whilst in pastoral areas of Ethiopia, small ruminant production can be seen as a form of herd diversification from sole cattle rearing and reduces the risks associated with heavy cattle death due to recurrent drought. According Coppock (1994),

small ruminant is important to the household economy as they produce food and generate income for the pastoral households in the Liben district.

It follows that, similar livelihood based study in the area showed the shifts of households to keep more small ruminants (relative to cattle) as the forage base is altered and people become more sedentary (Desta and Coppock, 2004), which provide the basis for the later arguments of the author. Other studies elsewhere suggested that small ruminants (sheep and goats) play a greater role in the socioeconomic well-being of poor pastoralists in terms of food source, income and intangible benefits, for instance: savings, insurance in emergencies, cultural and ceremonial purposes (Kosgey et al. 2008). Additionally, small quantities of milk from goats provide a useful supplement of food for children during an average rainfall years and for all family members during drought (Coppock, 1994).

However, sheep and goat diseases in pastoral areas have created the heaviest impact on the assets of the pastoralists. The impacts of animal diseases on animal keepers are complex, involving direct and indirect effects, multiple pathways, operating at a variety of levels depending on the particular disease or syndrome (Perry et al. 2003). It generates a wide range of biophysical and socioeconomic impacts that may be both direct and indirect, and may vary from localized to global problems (Perry et al. 2003).

Livestock disease is particularly damaging as it threatens one of the few assets that the poor keep from dealing with other shocks (Perry et al. 2003). These diseases erode the assets thereby reducing the income of pastoralist causing severe food shortage and access at household level.

Low incomes and few assets mean that the poor pastoralists have few options available for managing crises thereby becoming less resilient to shocks and slower to recover.

1.3 Research objective

- To assess the impact of sheep and goats diseases, especially of infectious diseases, on food availability and accessibility for pastoralists in Liben district.

1.4 Main research questions and sub-questions.

1. What are the major income sources of pastoralist in Liben?
   - 1.1 What are the roles of sheep and goats in pastoral income?
   - 1.2 What are the other income sources for pastoralist other than livestock?

2. What is the socioeconomic importance of sheep and goat disease?
   - 2.1 What are the important infectious sheep and goat diseases in Liben district?
   - 2.2 What are the impacts of sheep and goat diseases on household food available for consumption?
   - 2.3 What are the impacts of these diseases on marketing of sheep and goats?
   - 2.4 What are the impacts of these diseases on the food purchasing power of pastoralists in Liben?
   - 2.5 What are the pastoral coping mechanisms to these sheep and goats diseases?

1.5 Limitations of the study

The researcher faced difficulty in extracting relevant information which directly links food security to sheep and goat diseases. The broad nature of food security concepts, complexity of livestock disease impacts on the livelihood of the poor and limited studies on food security linked to livestock disease were among the challenges.

Moreover, it was revealed that in the study area there were no direct preceding research and baseline studies which were conducted on food security. This might have linked livestock diseases with food security that could have been substantial input for this research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Livestock and stored grain are among the main forms of wealth available to households to meet needs imposed by production shortfalls periodic cash requirements (Reardon et al. 1988).

Livestock is important in food security, income generation and improving the small holder's livelihoods and poverty alleviation strategies offering the poor the way out of the poverty trap (FAO/OIE, 2012).

It has been argued that, livestock production is an important source of income for the rural poor in developing countries (Delgado et al. 1999), enabling the poor and landless farmers to earn income using public common-property resources such as open range lands.

It follows that livestock underpin the livelihoods of the poor through the developing world (Delgado et al. 1999; Perry et al. 2002), and provide income, quality food, fuel, draught power, building material and fertilizer, thus contributing to household livelihood, food security and nutrition (FAO, 2009).

In the varied agro-climatic zones of Ethiopia, small ruminants are important sources of income for rural communities and are one of the nation's major sources of currency for export (Esayas and Abebe, 2001). Furthermore, sheep and goats are widely distributed and adapted to a wide range of environmental diversity (Kocho, 2007).

Accordingly, they are of great importance as major sources of livelihood and are very significant for resource-poor smallholder systems of rural Ethiopia due to their ease of management and significant role in the provision of food and generation of cash income (Kocho, 2007).

At the national level, sheep and goat account for about 90% of the live animal/meat and 92% of skin and hides export value of the country (Gizaw et al. 2010).

The rich potential from sheep and goat is not efficiently exploited and constraints like disease are affecting the productivity of these animals (Esayas and Abebe, 2001).

Consequently, lower productivity and lower return from the animals tend to affect the food security of rural community who rely on sheep and goat production.

According to World Food Summit (1996), food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preference for an active and healthy life.

On the other hand, food insecurity incorporates low food intake, variable access to food, and vulnerability; a livelihood strategy that generates adequate food in good times but is not resilient against shocks (Devereux and Sussex, 2000).

Accordingly, the above outcomes correspond broadly to chronic, cyclical and transitory food insecurity, and all are endemic in Ethiopia (Devereux and Sussex, 2000).

2.2 The concepts of food security.

It has been widely argued that, animal production contributes to food security by providing a source of energy, dietary protein of high nutritional quality and micronutrient.

Animal production contributes directly and indirectly to countries GDP and to the income and purchasing power of the various operators in the production, processing and marketing chains, at both the national and international levels (FAO/OIE, 2012).

It follows that, literatures have identified four fundamental dimensions of food security. However, three of them are applicable to products of animal origin: availability of food, access to food, and effective and safe utilization of food (Barret, 2010; Bonnet et al. 2011).

The three dimensions were described below:

2.2.1 Availability

Availability of food in the country indicates the production stage by suppliers of food commodities and also the balance of international *trade*. International trade achieved either through imports or food *aid* from abroad. Consequently, livestock contributes directly to food availability and access for small holders often in complex ways (FAO, 2009). Thus, small holders often consume their home production directly, but they often choose to sell high-value eggs or milk in order to buy lower-cost stable food (FAO, 2009).

2.2.2 Access

It follows that, access addresses the *physical* and *financial* ability of households to provide them with food. The first factor considers the effect of distance between producers and consumers. Consequently, it considers the stability of temporal *supply cycles* and the regulating role of any stocks (Bonnet et al. 2011). This includes the processing of delicate foodstuffs into more stable products. The other component addresses consumers access to a variety of products offered at prices compatible with their income and purchasing power, which also relates to market segmentation and demand elasticity among the various categories of consumers. *Physical access can be* shown in several levels of the production system; for instance, in the case of *on-farm* consumption one can observe direct dependence on food commodities produced within households where they are both producers and consumers of these products (Bonnet et al. 2011). Mostly, consumers are dependent on local producers or on *distribution* and *marketing* channels for unprocessed or processed food products (Bonnet et al. 2011).

Additionally, in livestock or fish productions these differences can be seen between systems where animal products make a strong and direct contribution to the producers own dietary intake (such as milk in some pastoral systems).

The *Financial access* refers to the point of view of the consumer faced with a range of *prices* for available food products, and to the capacity of households to acquire various categories of food (plant products and animal products), obtained on the market or under the terms of a balanced exchange transaction, monetary or otherwise (Bonnet et al. 2011).

For livestock or fish producers, the critical point is the direct or indirect contribution that animal production (milk, meat, etc.), and their accumulated assets (livestock) make to safeguarding and improving their *family income*, thereby increasing their food purchasing power. Thus, the intensive livestock systems are an important source of affordable animal-based foods for urban consumers and by making efficient use of resources; they provide abundant low-cost food contributing to the availability and access to food (FAO, 2009).

2.2.3 Utilization

Basically, small quantities of animal-based foods can provide essential nutrients for maternal health and the physical and mental development of small children (FAO, 2009). Moreover, utilization of food relates to the *quantities* ingested, the overall *quality* (nutritional, organoleptic, sanitary, etc.) of the products (intake of proteins, micronutrients or energy).

It is also related to the socio-cultural preferences (religious customs, and so on) and food consumption patterns.

2.3 Livestock diseases

In view of Perry, et al. (2001) animal diseases could be clustered into four general groups of endemic, epidemic (or transboundary), zoonotic and the food-borne.
Therefore, the four animal disease categories were:

2.3.1 Endemic diseases

Endemic diseases include the vector-borne and blood parasites, the multitude of parasitic diseases, the intestinal bacterial diseases of the new borne, and the bacterial and the viral causes of reproductive failure are among the others. Consequently, endemic diseases tend to be those that exert their greatest effect on the farm, village and community level, even though the accumulation of all the farm-level effects can of course be translated into national level losses.

2.3.2 Epidemic diseases (Tansboundary diseases)

Epidemic diseases are those that typically occur at an occurrence above the predicted level. These diseases are highly infectious and exert their impact at both farm and national level of local marketing and international trade. Therefore, some epidemic diseases can result in devastating shocks to the poor tending to wiping out their entire livestock population.

Tansboundary disease is those diseases which have considerable economic as well as food security impacts for many countries. The diseases tend to spread to other countries requiring cooperation between those countries (Otte et al. 2000).

2.3.3 Zoonotic diseases

These diseases may cause significant production loss in livestock (or in other domestic or wild animal species). The impact of Zoonotic disease is usually reflected in causing human disease and suffering.

2.3.4 Food-borne diseases

Food-borne diseases are of particular problems to the poor due to hygiene and sanitation related gabs.

Livestock diseases are of social and economic importance especially those of highly contagious and transboundary nature. They are among the major restrictive factors for livestock production (FAO/OIE, 2012).

The impact of livestock disease can vary from reduced productivity and limited market access to the elimination of entire flocks or herds (FAO/OIE, 2012). Additionally, it prevents access to local and international markets through export bans thereby causing the country to lose income from export. According to FAO (2009), the economic and socioeconomic threats from livestock diseases were classified into three broad categories.

Consequently, the occurrence of such diseases impacts both poor and rich livestock producers by marginalizing them from higher price livestock markets and restricting their

capacity for value-added trade (FAO, 2002). According to (Le Gall and Leboucq, 2002), livestock diseases have impacts on the income of the poor, human nutrition and access to local and international markets.

2.4 Livestock and pastoralism

Though it was found to be too simplistic, the most common categorization of pastoralism is by the degree of movement, from highly nomadic through transhumant to agro-pastoral (Blench, 2001). Pastoralists can be defined as households that gain more than 50 percent of their income from livestock on unimproved pasture, while agro-pastoralist would be households that gain more than 50 from cultivation (Lai, 2007). While mobile pastoralists relay heavily on dairy and livestock products, agro-pastoralists rely on both livestock and agricultural products (Lai, 2007).

In poor countries with pastoralist populations, traditional herders support subsistence livelihoods and sell live animals through local markets. In some countries in the Horn of Africa and the Sahel, pastoralists also supply cattle, sheep, goats and camels to traders who export live animals to traditional partners (Otte et al. 2012). Livestock are kept by households across all wealth groups, but households in the bottom expenditure quintile are more likely to have livestock in their asset portfolio than wealthier households. The depth of poverty among livestock keepers is particularly high in Sub-Saharan Africa, where it is estimated that more than 85 per cent of poor livestock keepers live in extreme poverty (Otte et al. 2012).

In these areas, climate change appears to induce extreme weather effects whereby floods, diseases and droughts tend to exacerbate the widespread poverty.

In the context of the study, poverty was viewed as a lack of animal ownership (Tache, 2008). Since livestock is the key asset and the primary source of such a livelihood, lack of animals is an obvious and important rural poverty indicator (Tache, 2008).

The study further suggested that, '*a household is said to be poor when the family herd features the following characteristics: (1) when the total herd size is too small to provide adequate direct products or to attract enough exchange value to buy food (the food security aspect); (2) when the herd size is too small, it becomes more vulnerable to depletion due to shocks, necessary sales, slaughter, and gifts, etc. (The asset protection aspect); (3) when the female stock is too small to produce enough female calves for productive capital, or when the number of male stock is too small to provide insurance for the female stock against disposal, a family is in poverty or vulnerable to it (the sustainable herd growth aspect)'* (Tache, 2008; p. 10).

According to Gemtessa, et al (2008), the wealth status in Borana is determined by sources of income and major occupations, which determine the livelihood of the household. Livestock production is the most important source of income (Gemtessa et al. 2008). Hence, the number of cattle, camels, goats or sheep is a good indicator of the wealth status in the community. Moreover, the nature of occupation such as trading and the income generated through such an employment is also an indicator of wealth group (Gemtessa et al. 2008).

Furthermore, the study further revealed that '*according to the key informants at one district community, about 13% of the households are rich, 50% medium, 27% poor, 10% is destitute; and rich households own up to 150 cattle, 2 camels, 40 goats, 2 donkeys, a mule and 2 hectares of farmland whereas, the medium households own up to 80 cattle, a camel, 20 goats, a donkey, and 0.5 hectares of farmland.*
The poorest households own up to 12 cattle, 5 goats, 2 chicken, and 0.25 hectares of farmland. The destitute households own a goat and up to 5 chickens' (Gemtessa et al. 2008; p. 14).

2.5 Conceptual framework

2.5.1 Unravelling the concept of food security

While unravelling the concept food security case as shown (Figure:2), the research will concentrate on household food availability and accessibility of the four dimensions of food security that will help to reveal the situation in order to discover the food availability and access of the Liben district pastoral community of Sothern Ethiopia.

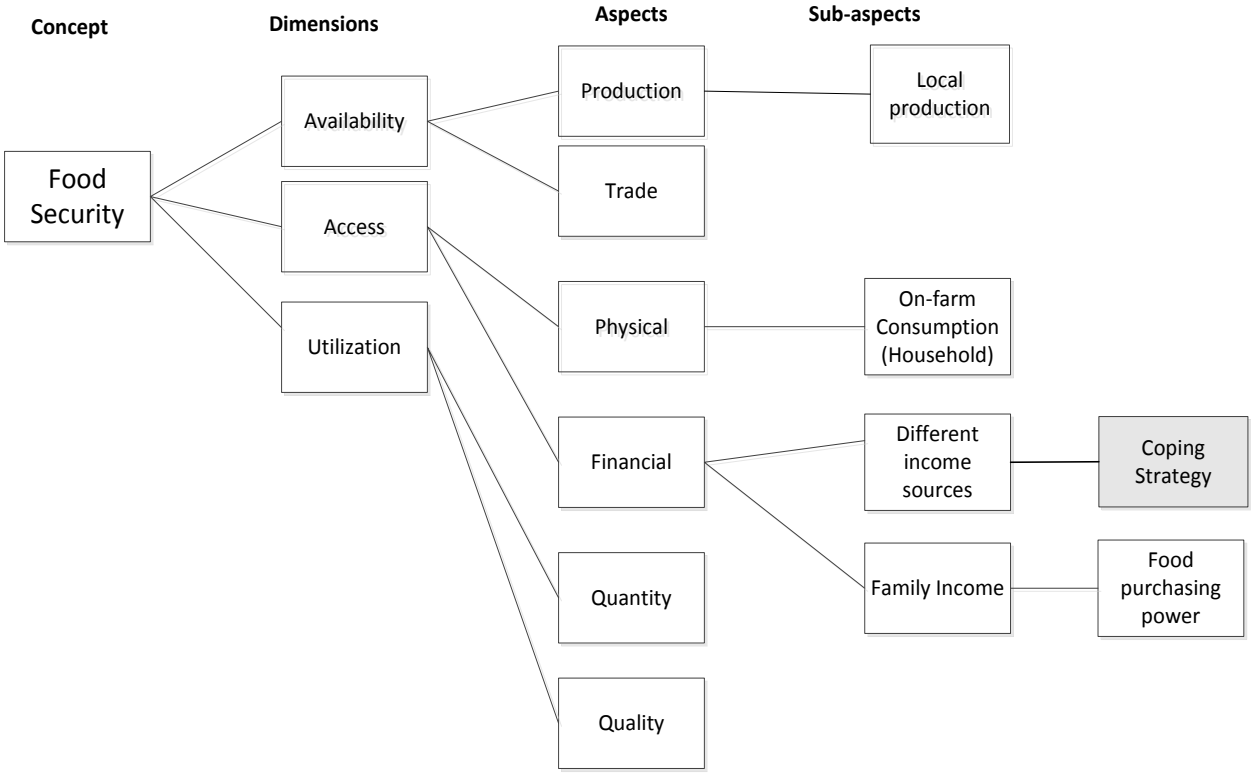

Figure 2: Unravelling the concept of food security.

Source: Theory adapted from Bonnet et al. (2011).

2.6 Research frame Work

The research utilized the sustainable livelihood framework adapted to the local context based on the livelihood concepts *(*Figure: 3) to see the disease impact on household food availability and access. According to Perry, et al. (2003), the livelihoods approach (DFID, 1999) offers a valuable framework for handling these dimensions such that the study used the framework with slight adjustment based to suit the purpose of the study. The frame work provides the way to realise and analyse the objective of the research.

On the components of the framework the areas of focus were:

2.6.1 The sustainable livelihood frame work

The sustainable livelihood framework is a tool to help to understand livelihood dynamics, most notably that of the poor. It has five major components which were discussed below:

1. Livelihood assets: The financial, social, human, natural, physical and political assets of pastoralist communities, and their relative strengths and importance.

According to Perry, et al. (2003), animal diseases can threaten each of the five types of the household assets:

- Financial capital (mortality and morbidity reduce the financial investment value of livestock assets , and the income flows derived from them);
- Human capital (Zoonosis and food-borne diseases can temporarily or permanently impair an individual's ability to work, depriving a household of income generated);
- Social capital (in many societies livestock serve as a mechanism for establishing relationships of trust within social networks; disease lowers the number and quality of animals available for this).
- Natural capital (in mixed crop-livestock systems, manure often plays a critical role in maintaining soil fertility, and disease can reduce its availability).
- Physical capital (livestock can be considered as farm tools, for example in ploughing, and disease can affect their quality and availability) (Perry et al. 2003). It in turn affects the food security of the poor community whose livelihood is largely dependent on sheep and goat production as high mortality is the major factor for the observed low sheep and goat off-take rates in Ethiopia (Gizaw et al. 2010).

2. Vulnerability context: Vulnerability is central to understanding chronic food insecurity in pastoralist area. It relates to the risk environment of rainfall variability, conflict and governance issues, weak service and infrastructure, limited economic options other than livestock production, trends in population growth, environmental changes; displacement of pastoralists and reduce access to grazing lands. Considering shocks, the important to pastoral livelihood are those which cause sudden loss of livestock assets, especially if large numbers of animals are lost. Such events are not only important due to the immediate effects such as reduced availability of milk animals to sale, but also because the rebuilding of livestock assets takes years to achieve (CAADP, 2009). The total livestock losses in pastoralist areas are caused by preventable diseases are substantial, with major direct impact on food security (e.g. direct consumption of milk by children; fewer animals to sell).

These shocks also affect the integration of pastoralist into national economies (CAADP, 2009).

3. Processes and structures: The formal and informal institutional and policy arrangements at local, national, regional and international levels which support or hinder pastoralist livelihoods.
4. Livelihood strategies: are composed of activities that generate the means of household survival. These are the choices, opportunities and diversity of activities to be taken advantage of by the household in order to achieve food security.
5. Livelihood outcomes: This is the achievement of the people's livelihood strategies i.e. income and food security in this case.

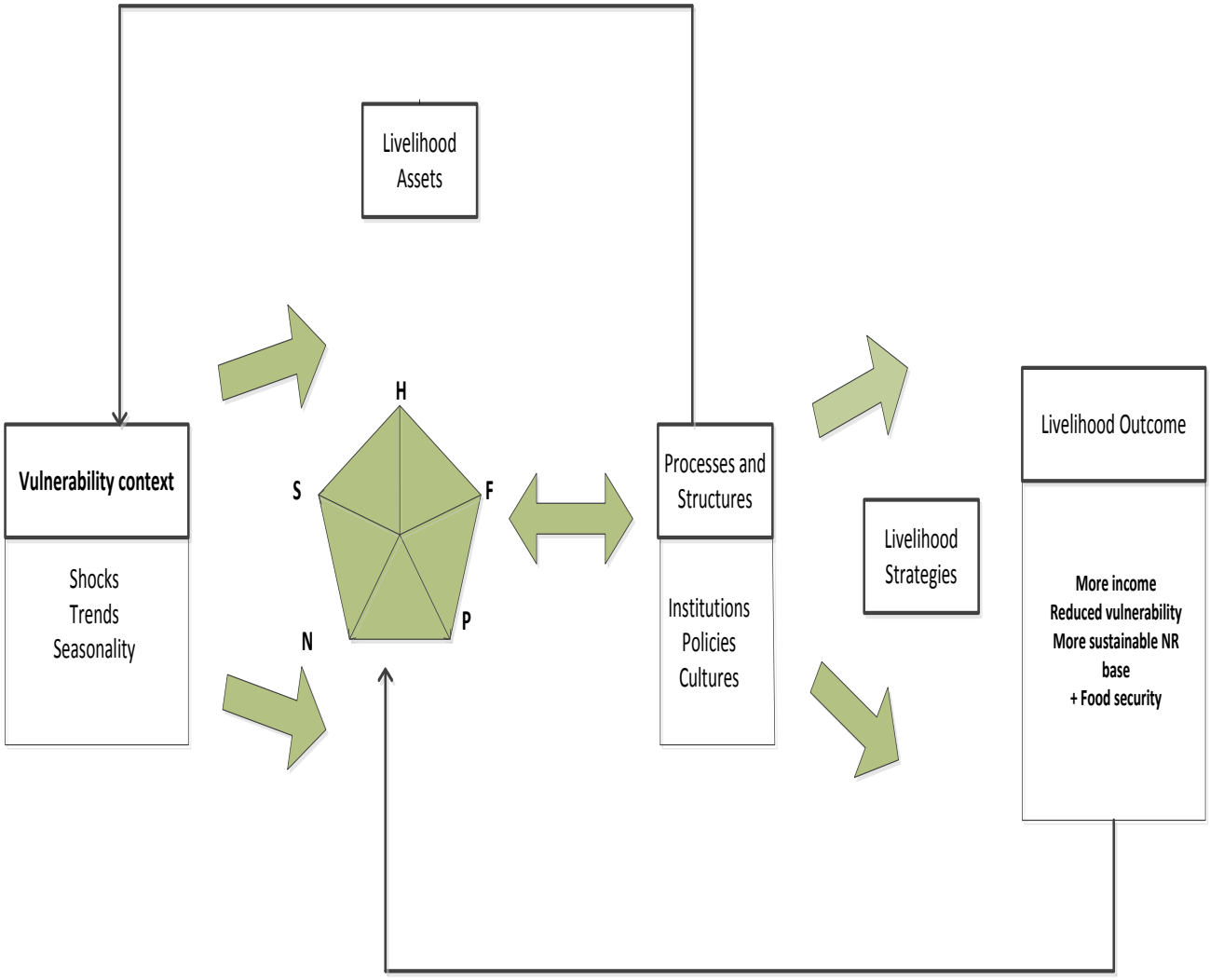

Figure 3: The sustainable Livelihood Framework (H=Human capital, F=Financial capital; S=Social capital; P=Physical capital; N=Natural capital).

Source: DFID, 1999.

CHAPTER 3: METHODOLOGY

3.1 Study area

Liben is one of the districts in Guji zone of Oromiya region. Liben district is located between $4^0$30'58''-$5^0$42'8'' northing latitude and $41^0$34'57''-$39^0$9'34'' easting longitudes, the district is boundaries of Somalia national regional state to the west, Bale zone to north, Oddo shakiso district to the east and GoroDola to the north direction (LDPDO, 2013).The capital town of this district is Negelle Borana town which is also the capital town of Guji zone, situated at the distance of 595 km from Addis Ababa (GZPDO, 2013). Liben district has an area of about 8950 km^2 (LDPDO, 2013). The topography of the area belongs to lowland which varies from gentle slopes to medium rugged escarpments from the Northwest to the southeast (Adi et al. 2003).

It is under the influence of bimodal monsoon rainfall type where 60% of the annual rainfall occur during March to May (*Ganna*) and 40% between September and November (*Hagaya*) (Adi et al. 2003). From June to September (*Adoolessa*) is the time of heavy cloud cover and small showers (Adi et al. 2003). The main dry season occurs from November to March. The mean annual temperature range is 24–30^0C (Adi et al. 2003). The main livelihood system in the area is pastoral and agro pastoral. Of all pastoral areas, Borana and Guji rangelands (pastoral area) have been and will increasingly serve as a source of livestock for use by small holders in the highlands and for export to generate foreign exchange (Reda, 1998). It has relatively the highest ecological potential among the major range area in the country. The livelihoods of the community are predominantly dependent on livestock keeping and in some area's agriculture. The inhabitants rely primarily on the pastoral economy (Sileshi, 2006).

Furthermore, reports from district pastoral development office revealed that 55% of the Liben district's households are pastoralists, 28% agro-pastoral, 11% croppers and 6% with off-farm activities (LDPDO, 2013). Out of the 17 pastoral associations in the districts (Annex: 1), 5 of them were regarded as pastoral PAs while the other 12 PAs majorly had communities with livelihood strategies of agro-pastoral, croppers and off-farm activities (LDPDO, 2013).

However, households with pastoral, agro-pastoral, cropping and off-farm activities existed within PAs of the district which is regarded as pastoral PAs as households may adopt either of these livelihood strategies in different years (CAADP, 2009).

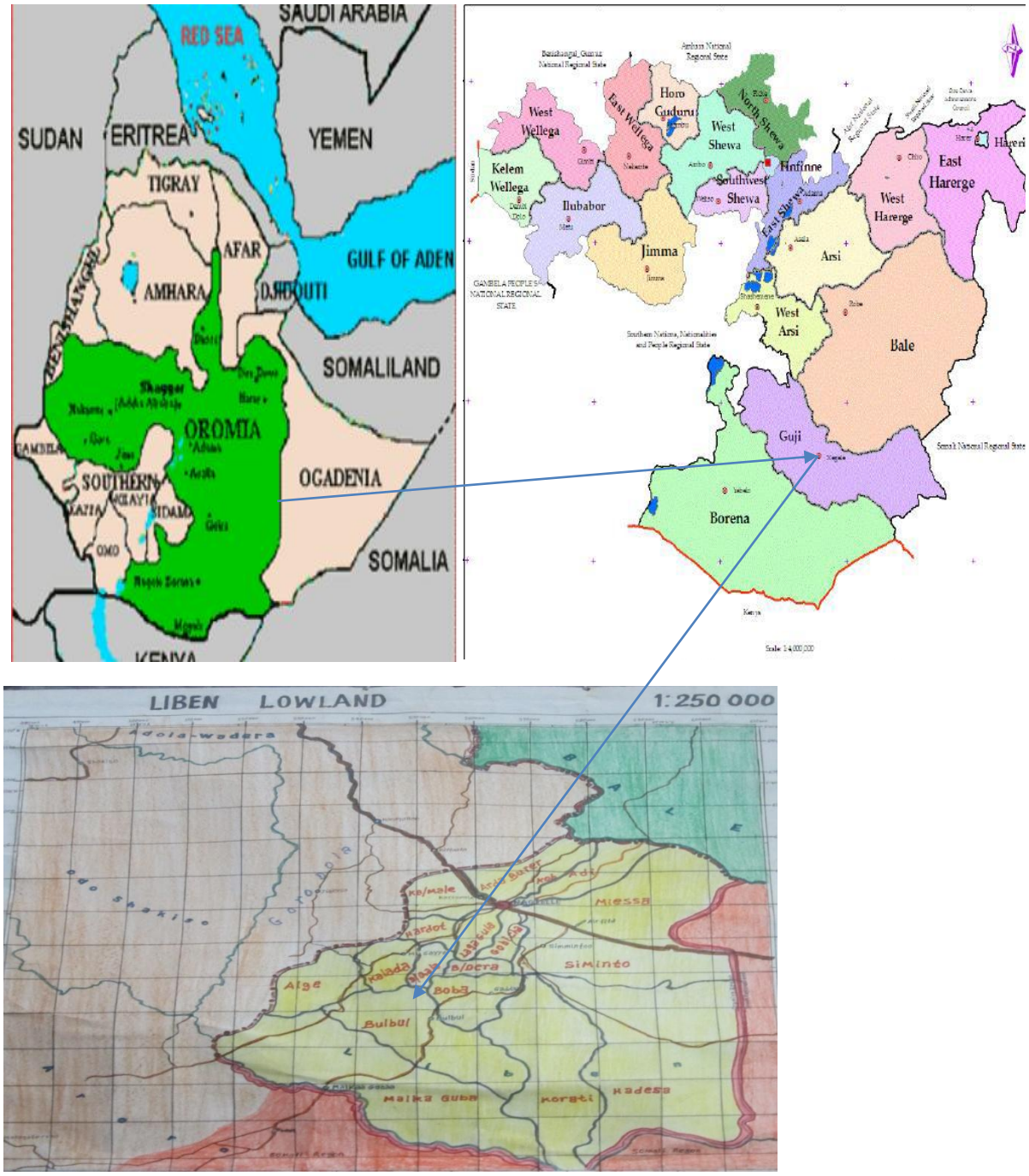

Figure 4: Map of the Guji Zone showing the study area.

Source: Google maps and LDAO, 2013.

3.2 Research strategy

The researcher adopted a case study design for this piece of study because of the distinctive character of the research problem. Moreover, the researcher opted to have in-depth information pertaining to the research problem and obtained qualitative and empirical data by use of group discussions (FGDs), one-to-one interviews and participant observations.

In rural areas poor households depend on sheep and goats for survival. When they lose their sheep and goats, the poor fall out of livestock production. These could lead to migration to urban areas where they practice sedentary life. Then, they tend to contribute to deforestation as they turn towards wood and charcoal sale.

In line with this concept, the study focused on third (poor) households which assumed to be vulnerable to sheep and goat diseases and related losses.

Furthermore, in the methodology, importance has been given to the perception of the community towards the importance of sheep and goats in the livelihood, impact of sheep and goats disease on food availability and accessibility to pastoral households, the elicited coping strategies in the event of diseases and the prevailing food security conditions in the area. Selected members of poor pastoral and agro-pastoral households were focused for the purpose of comparison.

3.3 Method of data collection

The questions on the interviews and FGDs checklists were categorized per research questions and followed for the ease of monitoring and analyzing the responses from the respective sources. Participatory rural appraisal (PRA) tools such as social mapping, wealth ranking, preference ranking, proportional piling and income and expense trees were used to collect data such as type of animals kept, income sources, various crops planted in the area, family income and expenses, important sheep and goat diseases in the area as well as the coping strategies followed by the community as described below:

3.3.1 Interviews:

1. Focused group discussions: Two FGDs were conducted. One with the group consisting of women, youth, and elders and the other with pastoral women's group. The FGD with women, youth and elders involved fourteen individuals (of which 3, 5 and 6 were women, youngsters and elders respectively). The women FGD involved 6 women.

   Both exploratory and topical PRA tools were used during a discussion with FGD participants. Among the PRA tools employed, social mapping was conducted as an entry point for the discussion and helped the participants to grasp the main theme of the discussion. It further helped the participants to anonymously locate each wealth category of the people in their village. The social map was sketched with selected participant from the community and the discussion was conducted on the process.

2. One-to-one interview: Individual interviews were conducted for in-depth extraction of data from respective interviewees categorized as respondent households, informants and experts. The interview was conducted with respondents with pastoral and agro-pastoral in livelihood strategies. Thus, 4 respondents of two (2) pastoral and two (2) agro-pastoral households were involved in the interview. The participants were visited three (3) times for in-depth data collection. First, they were given an introduction on

the objective of interview and overview of the process. Secondly, the main data collection was started in allocating time for subsequent and deep discussion. Lastly, additional information was collected, re-visited and summarized accordingly. Each interview took about 2 hours per person depending on the situation where the respondents exist. Finally, interviews were conducted with two (2) informants (a DA and a community elder as key informant) as well as with two (2) experts: an animal health and a food security expert from the district's pastoral development office. Each interviewee was visited two (2) times due to the fact that the experts were busy on their office business. The interview took 1-2 hours per person due to the above reason. The researcher used interview checklists (Annex: 3) throughout the discussions.

3.3.2 Observations

To study the dynamic situation like livelihoods and the impact of the disease on local food security and its related coping strategies, observation was used as a complementary method.

It helped to know the immediate socio- economic impact of the diseases and aspects of everyday life. Furthermore, it has helped to get an inside view of the realities and helped to focus on respondents as well as their livelihood more closely. The observation was conducted using the checklist (Annex: 3) to complement the validity of the responses. Thus, it helped the researcher to observe and gather information on the farm lands, households, in sheep and goat herds, sheep and goat market at village and at primary livestock market levels.

3.3.4 Secondary data

Qualitative and quantitative secondary data were reviewed in order to have in depth understanding and knowledge to answer the research questions. The secondary data were gathered through various articles, journals, books and reports including departmental reports in the district.

3.4 Data analysis

The two livelihood groups viz: poor- pastoral and agro-pastoral were analyzed using a sustainable livelihood framework (Figure: 3) to realize the overall aim of the research. The results from the PRA were presented using pi-charts with the qualitative summary of the discussions and pictorial income and expenditure trees. The data from all interviews were analyzed based on generating summaries of individual interviews, notes, and interview transcripts.

CHPTER 4: RESEARCH FINDINGS AND DISCUSSIONS

The main focus areas of this chapter as per the analytical tool (SLF) were:

1. The livelihood assets and income sources of the households;
2. Sheep and goat diseases constructing vulnerability on pastoral households;
3. Food availability and access to households in the event of sheep and goat diseases;
4. Process and structures in the context;
5. Households coping mechanisms to sheep and goat diseases and
6. The livelihood outcome of pastoral households during the study period.

4.1 The livelihood assets and income sources of the households

According to women, youth and elders focus group discussion participants and based on proportional pilling of piles of stones, about 17% of the households are rich, 53% medium, 27% poor, 3% are destitute: Rich households own more than 30 cattle, more than 10 camels, more than 50 sheep and goats, 1 hectare of farmland whereas, the medium households own 5-15 cattle, 5 camel, 20-30 sheep and goats and 0.5 hectares of farmland. The poorest households own up to 2 cattle, 5-10 sheep and goats , 2 chickens and 0.25 hectares of farmland. The destitute households only own one goat and 4 chickens (Table 1).

Table 1: Wealth Ranking by FGD participants.

Indicators	**Wealth Category**			
	Rich (*Sooressa*)	**Middle (*Jiddu-galeessa*)**	**Poor (*Mahessa*)**	**Destitute (*duwwaa*)**
Cattle	>30	5-15	1-2	-
Shoats	>50	20-30	5-10	1
Camel	>10	5	-	-
Chicken			2	4
Land (ha)	1	0.5	0.25	-

Discussion with the participant suggested that destitute people tend to leave the village as they did lose almost all of their livestock due to various natural calamities and decide to live with their relatives migrating to urban or peri-urban areas. The result tends to be closely related with study elsewhere (Gemtessa et al. 2008), who revealed about *13% of the households in a Borana community of one district are rich, 50% medium, 27% poor, 10% are destitute; and rich households own up to 150 cattle, 2 camels, 40 goats, 2 donkeys, a mule and 2 hectares of farmland whereas, the medium households own up to 80 cattle, a camel, 20 goats, a donkey, 0.5 hectares of farmland. The poorest households own up to 12 cattle, 5 goats, 2 chicken, 0.25 hectares of farmland. The destitute households own a goat and up to 5 chickens* (Gemtessa et al. 2008; p. 15).

The majority of the respondents and FGD participants have confirmed that livestock is the main asset constituting a large part of the pastoral income followed by farming and Petty trade. However, as per the view of respondents in Agro-pastoral in background, opportunistic farming became an important income source of the households in the area. The major crops grown in the area are maize, haricot beans, wheat, barley and teff. However, according to FGD participants, a vast majority of the people tends to sow only maize during main rains and haricot beans during the short rains.

The result of FGDs of the PA in the district (Figure: 5), with proportional pilling of income sources, appears to suggest that 76% of the income were from livestock, 16% of farming whilst petty trade constitute 8% of the income sources of the households of Bulbul PA in Liben district. It has been widely argued that livestock can have a critical contribution to help poor rural escape the poverty trap (Dettaan et al., 2001). Therefore, the main livestock species reared as per the importance of supporting the livelihoods were: cattle, sheep and goats as well as a camel (especially for better-off households). It follows that, as per the view of key informant (community elder), traditional beekeeping was also an alternative income sources and constituted part of an income of the community seasonally while it was included in petty trade in view of FGD participants since the product (honey) is being sold rather than the bees themselves. The FGD participants further indicated the importance of different species of livestock as income sources, especially based on the indicator that they described as: access and ease of use during emergency times (Figure: 6).

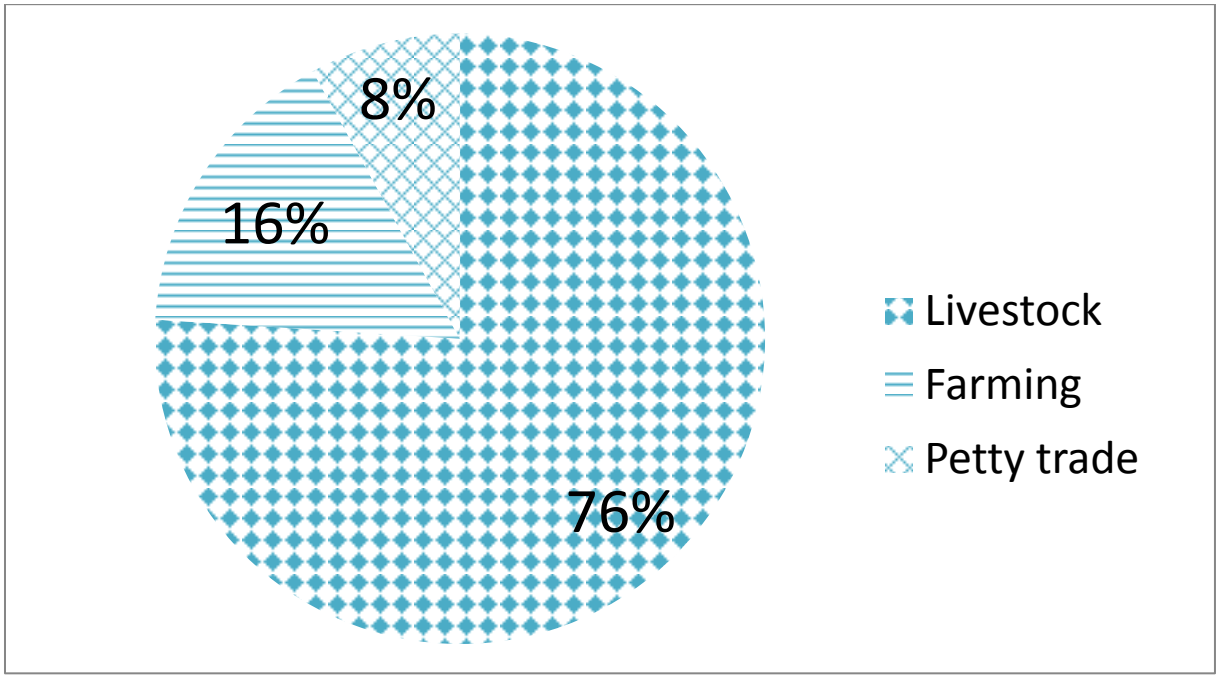

Figure 5: Major income sources of a community in Liben district.

The majority of the income from livestock came from sheep and goats together (44%), followed by cattle (32%) and camel (24%). The participants reasoned that sheep and goats tend to have a small gestation period (about 5 months) vis-à-this camel and cattle such that they timely support them in filling the gaps of food shortages in the household, especially during emergencies being marketed on time. The kids/ lambs in one year tend to make good market price. Furthermore, goats constitute an important milk source for children, most importantly when the cattle are unable to provide milk during drought and it withstands the drought surviving on low-value feeds.

Income generated from goat is used to purchase cattle (for draught power and milk) and donkeys (for transport of firewood and water) while the sale of goat protects depletion of large ruminants in times of food and economic crisis (FAO, 2013).

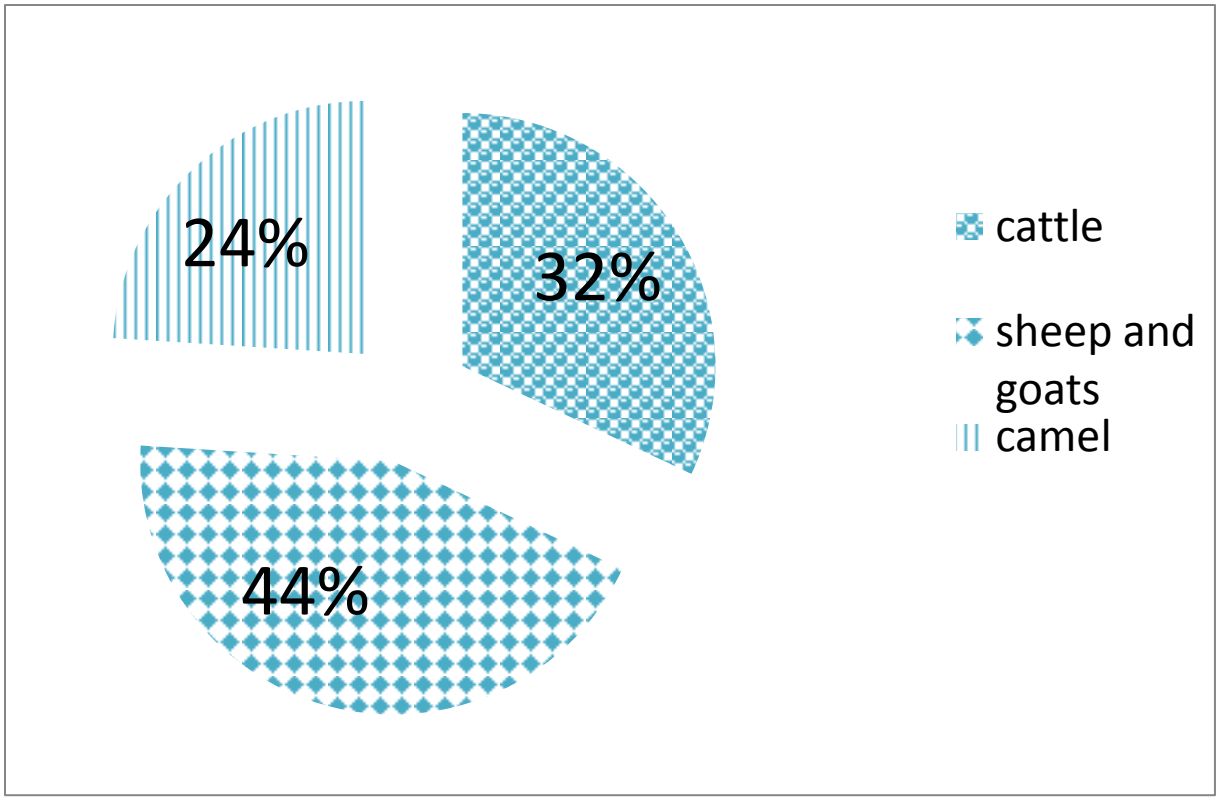

Figure 6: Relative Contribution of different livestock species in income.

Kosgey et al (2008) elucidated that small ruminants play a complementary role to other livestock in the utilization of available feed resources and provide one of the practical means of using vast areas of natural grassland in regions where crop production is impractical. Consequently, small ruminants supply their keepers with an enormous range of products and services. They can supply milk, meat, skins and wool throughout the year (FAO, 2013).

Small ruminants are not considered a store of wealth as are cattle, but they are very important for households to meet routine cash income needs (Desta and Coppock, 2000). Therefore, complementary to the trend happening in northern Kenya, it has been observed a growing interest among Borana to keep more small ruminants (Desta and Coppock, 2000).

Interviews with respondents in the study suggested that the reason for keeping goats was for milking purpose. The milk production through goats can be very important in the pastoralist community (FAO, 2013). Additionally, goats were also used to get meat during slaughter, to sell and have cash income which further helps the household to buy various household requirements. According to CAADP (2009), in terms of financial management small stock such as sheep and goats are a convenient asset to be sold to meet basic needs such as foods, medicines, or school fees. A larger stock represents more long-term savings whilst small stock fulfil the immediate cash requirements which is in agreement with Dettaan, et al. (2001) who suggested that as a capital asset livestock form a key source of petty cash paying for school fees, medical costs, and so forth and in many situations they are the sole instrument for saving and insurance.

FGD participants have described, as per the depicted income and expenditure tree (Figure: 7), that though livestock, farming and petty trade are the large income sources in the area,

the community tends to get a slight portion of income from casual labour and wood/charcoal selling which is currently regarded as an erosive type of activity being monitored by the district authorities. Thus, the community tends to spend the income gained from obtaining food grains, to conduct wedding ceremonies, child education, trade, house construction, purchase of cloth and health expenses (Table: 2).

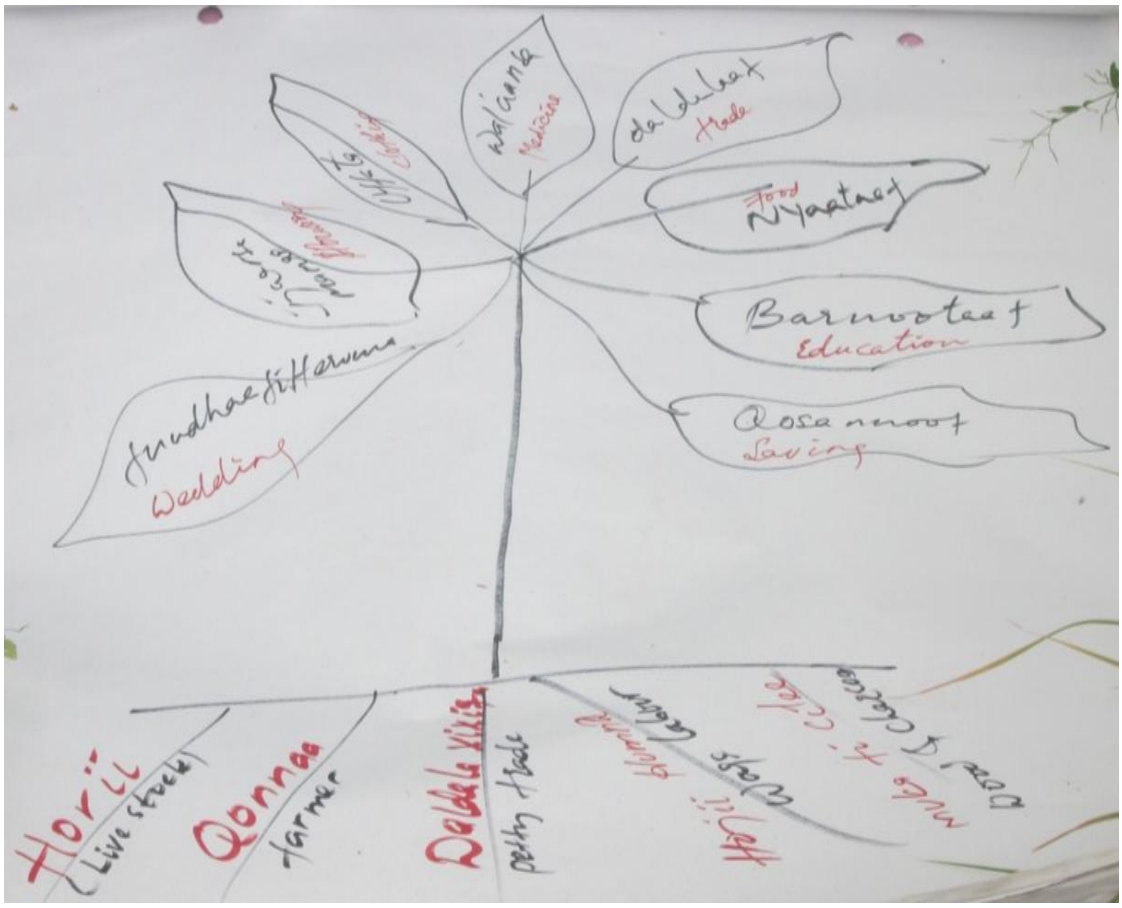

Figure 7: Income and Expenditure tree.

According to the interview with respondents, the respondents pastoral back ground tend to relay mostly on livestock (notably, sheep an goat keeping) while the agro-pastoral households tend to extend their income sources through farming and petty trade.

One pastoralist respondent stated that: "...*Other than occasional complement from opportunistic farming, sheep and goats are the main sources of livelihood in my household. They provide food, income and we use them for traditional purpose as well...*"

The income and expenditure tree can be presented using tables as:

Table 2: Income and Expenditures of the households.

Income	**Expenses**
Livestock	Clothing
Farming	Food
Petty trade	Education
Labour	Saving
Wood and charcoal	Trade
	Human Health
	Construction of houses

Goats were hardy and well-adapted to harsh climate due to their grazing habits and physiological characteristics; they are able to browse on plants that are normally not edible by other livestock species (FAO, 1986).

The traditional role of sheep shared by both FGD and individual interview participants was its medicinal value. The participants have elucidated that fat (notably the fat from the blackhead Somali breed) have been used as a remedy for a range of illness and used during various traditional ceremonies. Thus, both FGDs participants have stated that sheep and goats complement to the income gained from the large ruminants. Consequently, the key informant highlighted that: "....*Currently, the livelihood of pastoral people is dependent on sheep and goats...*; *The females tend to have a small gestation period, kids/lambs reach fast to sell so as increasing availability in the market, their milk was available for children and support the household even during critical times of the year when the cattle were unable to give milk....”*

It appears that women had access and control over small ruminant vis-à-vis large ruminant (FAO, 2013). In this context, in reference to FGD with women, the participants didn't expressed evidence of women access and control of income from small ruminants. However, the result tends to suggest that there was control of the husbandry and management of the animals. On top of that, women stated that they tend to sell the animals in the absence of their male counterparts and have access and control of small ruminant business that they were started parallel to their household responsibilities (Table:3).

One woman FGD participant used a proverb from Borana community and stated: "...*Sheep and goats resemble snot/mucus that someone blows his/her nose when needed...*" To express the easiness of the animal to use when needed and added: *"...Currently, someone who sold a goat will have an income which is equivalent to a monthly salary of a civil servant ...*"

Therefore, Interview with 3 out of 4 of the respondents indicated that they buy sheep and goats to replace the stock and as a means to engage in small business in agreement with

what was stated in Desta and Coppock (2000) suggested that small ruminant production and trading may play a vital role to initiate a saving and investment tradition among pastoral households that may lead to a broader economic diversification to the non-pastoral sector.

Table 3: Roles of women and men in the sheep and goat husbandry in Borana community

Link	**Activity**	**Women**	**Men**	**Children**
Production	Herding			√
	Milking	√		√
	Monitroing at herding	√		
	To go and cut grass and branches of trees for young animals.	√		
	Construction of shelter for small animals made from tree branches	√		
	Construction of strong enclosures		√	
	Cleaning shelter of dry manure/dirty			√
	Responsible for animals kept at the home stead	√		
	Caring for and counting the grazed animals as they come for the night	√		
	Monitoring before/during herding and signaling any problems (sickness, birthing, poor health, missing animals etc) to the head of the household.	√		√
	Watering of old animals		√	
	Watering of young animals	√		
Link	**Activity**	**Women**	**Men**	**Children**
Marketing	Selling		√	
	Utilization of income		√	

The role of women in the husbandry of sheep and goats tend to be much broader vis-à-vis their male counterparts. When girls are included, in the role of children, the contribution further extends suggesting that women are more close to the animal and have importance in pastoral households than men. They also timely signal poor health to the household heads for necessary actions.

4.2 Sheep and goat diseases constructing vulnerability on pastoral households.

All respondents involved in this research stated in agreement that the major constraint in sheep and goat production in the area is diseases. Consequently, preference ranking with the FGD participants has suggested various disease and specific disease symptoms which had impact on livestock keepers, especially the poor. Therefore, the mix of infectious and other types of diseases and their symptoms were repeatedly mentioned by respondents.

The common sheep and goats diseases/disease symptoms in the area ranked by the community as per their order of importance were:

- Diarrhoea and bloating- The participant reported it affect all ages of sheep and goats, especially the male one.
- Coenurosis- affects both sheep and goats; FGDs participants have confirmed that it is one of the devastating sheep and goat disease in the area.
- Fever-The infectious condition is reported to be common in goat kid and young females.
- Pneumonia- affects all ages and sex category of sheep and goats.
- Abortion- affects both female sheep and goats.
- Anthrax- affects all age and sex category of sheep and goats.

Furthermore, as per the view of FGD participants, loss in the above diseases is majorly occurred from diarrhoea and bloating killing about 15-20 goats from herds of 80 within one week. The diseases cause loss of weight, abortion thereby causing loss of milk which the pastoral children rely during critical times of the year. One respondent stated that "...*sheep and goat diseases have caused significant reduction in milk yield than to what the feed could do..."*

The febrile condition which is related to infectious diseases (noted as fever by participants) reported to affect female sheep and goats, kids of 2-5 months and cause death whilst coenurosis (which can be discussed later) cause reduction of milk yield with death thereby creating absence of replacement stock. The community also reported that such animals could not be marketed as the market require quality animals with good body conditions which often bought with hanging weighing scale (annex: 5).

The researcher wanted to strengthen the idea that pastoralist involved in the study showed their ability in naming the disease and their symptoms which was consistent with once provided with an expert.

The important diseases in the area according to their ranked order of importance were:

4.2.1 PPR

All respondent agreed that PPR is the most devastating disease of sheep and goats with young animals being most susceptible. It is the most constraint to small ruminant production especially amongst pastoral communities.

It occurred with diarrhoea in sheep and goats over the year as per the interview with the expert and was also being reported in its symptom in both FGD participants and one-to-one interviews of respondents. PPR occurred as epidemic severely affecting herds with former exposure to the disease.

4.2.2 CCPP

It was among the endemic diseases in the area.

All interview participants mentioned CCPP as one of an important sheep and goat disease in the areas. CCPP is a disease of goats caused by bacteria. The disease can be described as having one of the major economic importances in Africa and has been mentioned as the most serious infectious disease of goats in East Africa. It was one of the important sheep and goat infectious disease in the area which the community called after its symptom "*Pneumonia*".

4.2.3 Coenurosis

The disease is found to be common and devastating as per the view of FG and one respondent. The respondent explained that it caused weight loss, circling, head deviation and gradual death of the affected animal.

Coenuruses appears to be one of the important and devastating sheep and goat disease in the study area. It was one of the endemic diseases in the area.

Coenurosis, Grid or sturdy, is fatal condition caused by *Coenurus cerebralis*, the larval stage of the canine tapeworm, *Taenia multiceps*, which inhabits the small intestine of wild and domestic canids-dog family (Desouky et al. 2011). Sheep and goats represent the most common intermediate host for this tapeworm (Desouky et al. 2011).

4.2.4 Anthrax

FGD participants described that anthrax is the common disease in the area. The outbreak of anthrax occurred after rain fall and during dry seasons in relation to soil degradation.

Anthrax was one of the endemic diseases as well as zoonotic diseases. It also affects human being such that in times of disease outbreaks the pastoral community as well as animal health professionals who were in close contact with the animals had been the primary victims.

4.2.5 GIT parasites

It was not the major topic of the research and interviews with all respondents suggested that parasitic diseases generally got least attention as a major problem. The interview with FGD participant and from the district revealed that the diseases tend to kill sheep and goat in the area suggesting its economic the importance. Most parasitic diseases were among the endemic diseases in the area.

4.2.6 External parasites

In general, the importance of external parasites of sheep and goats as causative agent of the economically important disease gained little interest as per the outcome of the interview with all participants. The researcher assumes that this might be attributable to community-based animal health interventions, especially of external parasites, in the study area.

4.2.7 Bloating

Interview with 2 out of 4 respondents showed that bloating was the common problem in their herd.

Furthermore, discussion with an expert further revealed that bloating was mainly related to seasonal change in the feed of the animals which occurs in times of scarcity of pasture and

tree leaves for browsers. Since the community tend to feed sheep and goats with haricot beans and cereals, it caused bloating as the digestive system needs time to accustom with such new feeds.

4.2.8 The status of sheep and goat diseases

It follows that, interviews with all participants of the study have suggested that sheep and goat diseases, generally, have an increasing trend in the area. The number of new cases appears from one year to the other. On top of that, new emerging diseases were occurring due the fact that the participant reasoned to be climate change with increased temperature and unpredicted cold spell in the area. The common animal mobility in the area might have caused stress which further reduces the immunity of animal towards diseases.

The prevalence of such infectious and economically important animal diseases in Ethiopia excludes the country from profitable international markets thereby greatly reducing the country's foreign exchange earnings (ESGPIP, 2008).

According to FAO (2013), PPR can result in huge losses due to mortality in susceptible flocks from 10 to 100 percent and morbidity from 50 to 100 percent with significant economic, food security and livelihood impacts.

Consequently, the importance of Anthrax as animal health problem was also reported in the study conducted in the country (Duguma et al. 2012).

Furthermore, studies elsewhere in the country showed that loss due to helminth infestation significantly result from inferior weight gains, milk yield, condemnation of infested carcasses and the organs (Duguma et al. 2012).

On the other hand, one participant expressed his concern that the institutional response to these diseases was insufficient vis-à-vis the demands at grass root level as the response fail to consider the number of animals at risk of disease. On contrary, Interview with an expert revealed that some community members were unwilling to vaccinate their sheep and goat on time. They only search for the service when there was an outbreak in the area. However, the interviewee recognised the fact that the district was not either regularly follow the disease or respond timely to disease outbreaks. He added that it stemmed from shortage of budget as well as logistics in the district.

To that end, the researcher observed as there was a gap in awareness (notably disease outbreaks, timely surveillance and reporting) creation by extension workers. There were also gabs in identification of some disease and their symptoms.

The data gathered from the district revealed some of the disease and the outbreaks of the main important diseases in the area and the response provided (Table: 4).

Table 4: Summary of disease occurrence and vaccination in the district*.

Disease	No. of New out break	Species of animal	No. of death	No. of vaccination (doses)
Anthrax	1270	Shoats	814	20,000
Anthrax	645	Bovine	71	30,000
Rabies	645	Bovine	5	-
Lumpy skin disease	6	Bovine	19	280,000
PPR	8000	Shoats	>2000	190,000
CBPP	32	Bovine	-	120,000
CCPP	13500	Shoats	>2500	100,000
Black leg	470	Bovine	94	20,000

**NB: September, 2012-July, 2013.*

Source: LDPDO (2013)

Interview of both pastoral and agro-pastoral respondents suggested that the relative vulnerability to disease outcomes of pastoral and agro-pastoral households tends to be different though it was found to be not broad (Table: 6).

Interview with pastoral respondents suggested that the main source of vulnerability in their livelihood was drought which led to massive death and crop failures which led to distressed sale of assets. Exogenous shocks such as drought, floods, fires, disease, theft, or warfare threaten household well-being not only through a food availability crisis but also through the prospect that assets accumulated over many years will be suddenly swept away by such events (McPeack, 2004).

The agro-pastoral respondents reported of drought causing vulnerability in the livelihood. The drought was caused by shortage of rainfall. Shortage of rain fall further resulted in shortage of pasture and water meant for animals. It also resulted in crop failure. Therefore, rain fall is main determinant factor on the outcome of the sown crops as well as animal conditions.

It follows from above that, in terms of overall impact of animal diseases on poverty, the heaviest impact was on income of poor population, and then human nutrition and access to local and international markets (Le Gall and Leboucq, 2002).

Consequently, the farmers' greatest fear is diseases that shock systems by sudden and rapidly killing large numbers of animals or causing large-scale drops in demand (Perry and Grace, 2009).

Shocks represent a particular challenge to livelihood sustainability as events such as drought, pests and animal numbers in case of livestock diseases (Ellis, 2000).

4.3 Food availability and access to households in the event of sheep and goat diseases.

The FGD participant, the respondents, informants and experts agreed that the diseases have caused loss of milk due to abortions and abortion further caused absence of replacement stock as kids/ lambs were lost. For substantiation, one respondent highlighted that *"… the availability of food in the household depends on the number of animals that the household owns…."*

Diseases tend to decrease meat and milk availability in the household due to loss of individual animals in death as well as abortions. Additionally, the other respondent stated that *"…though death of sheep and goats due to disease was important in the community, the reduction of milk and meat to be consumed was more important in my family…"*

FGD participants further stated that sheep and goat diseases block access to food at household level as marketing of such diseased sheep and goats had been difficult. They also added that *"...the market require quality animals that were only purchased in weighing scale so that it was difficult to get something from sale of weak animals..."*

On top of that, interview with all respondents suggested that their livelihood was highly dependent on sheep and goat such that the diseases were affecting both milk yields from the goat. The disease also affected income from sale of the animals.

On respondent stated that: "... *last year, I purchased two male goats with 750 ETB each in attempt to sale them back to the market later. Unfortunately, I lost both in coenurosis causing trouble in my household..."*

In agreement to the information gathered from key informant who reported about the limited milk yield from goats, observation to the respondents' households revealed that the milk from goat was small in quantity. The observed households usually use the milk for child nutrition and to dilute it with tea.

Moreover, since sheep and goats tend to make good market based on the current livestock market, the loss of sheep and goats from poor pastoral households will be severe even if the crop price was in favor of pastoralist (Table: 5). The impact of sheep and goat diseases on poor pastoralist was significant when the crop price was higher.

Additionally, interview with all respondents suggested that the market price of sheep and goats during the study period was in favor of the poor pastoral economy. It was known that markets dictate the product required. The researcher observed in both village and primary market that the marketing of livestock largely depend on age, color and body condition of an animal. Thus, big male goat or sheep were sold about 1100 ETB without weighing scale whilst it was 23 ETB/kg/animal using a hanging balance (Figure: 8). The price situation means that, the sale of one big male sheep or goat will suffice to purchase about two quintals (200 kg) of maize to feed members of the household.

Furthermore, it could suffice to satisfy various household needs making the ratio of sheep and goats to crop price being double; when the average male animal is considered the ratio become equal.

However, interview with respondents suggested that they were not usually selling the animals when the market price is good. They rather tend to sell when there was desperate demand in the household or in the herd.

One respondent highlight that: "...*we tend to sale our animals when there was urgent need of cash in the household. On top of that, we sale them when there was sign of sickness in the herd...*"

The other respondent stated that: *"... we seldom slaughter our animals to eat. We keep them for reproductive purpose instead in view to sale them during critical times regardless of good prices..."*

Table 5: Market data of Crop, Livestock prices (Negelle borana Market).

Item	**Unit**	**Previous year(2012)**									**Current year(2013)**		
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
Cereals	**Qt.**												
Teff		1250	1275	-	1175	1110	1258	1436	1433	1450	1176	1225	1226
Maize		558	611	-	620	455	526	550	500	310	553	500	526
Wheat		700	621	-	760	552	585	550	573	576	610	658	685
Barely		550	550	-	725	500	555	566	450	491	535	650	563
Pulses													
H/bean		1200	891	-	1020	990	1176	1250	1115	1100	1153	1150	1200
Livestock													
Cow		5150	5300	-	4622	4190	4525	4433	4200	3900	4083	4250	5150
Oxen		6766	6700	-	5255	6160	4820	5433	5833	6500	6200	6450	6766
Goat		800	830	-	825	750	735	770	683	616	675	700	800
Sheep		650	685	-	725	766	675	676	583	516	525	550	650

Source: LDDPPO (2013).

Figure 8: Taking weight measurements using a hanging balance in a pastoral village.

Markets play an important role for many households in Ethiopia to access food and sale surplus (FAO/WFP, 2012).

An interview with one participant in the district suggested that diseases have heavy mortality and significant market effect as well. Accordingly, during out breaks of diseases the community tend to bring many animals to the market in fear of disease loss such that the market price will fall dramatically below the normal. It follows that, traders are smarter in using such an opportunity to enlarge their profit. An outbreak can lead to suddenly higher prices, if most production is domestically consumed or to lower prices if most production is exported (Otte et al. 2004).

In the above situation, the lower market price for sheep and goats overlap with higher crop price as the animals were meant for cash a purpose. Therefore, it became against the food security of the pastoral households resulting in reduced availability and access to food.

The resultant effect was shown by children school drop outs, food and nutrition insecurity in the community.

It has been argued that, market demands tend to influence the types of livestock reared (CAADP, 2009).

Consequently, sheep and goats disease tends to limit the marketing opportunity for poor pastoralist thereby causing market disruption, fluctuations as prices become lower and marketing will be difficult for such diseased animals.

On contrary, llivestock products is expected to increase dramatically in developing countries as population size and income levels increase in what has been termed the *'Livestock Revolution'* (Delgado et al. 1999).

From this perspective, many of the diseases limit access to market for livestock products for the poor. This reduces their ability to reap full income value from their livestock activities by restricting them to informal markets and their lower prices (Perry et al. 2003).

4.4 Process and structures in the context.

After looking at the impacts of sheep and goats disease on the livelihood, it was considered to deal with factors which either exacerbate or lessen the impacts of these diseases.

Process and structures are organizations, policies, laws culture and institutions that could have positive and negative impacts on the livelihood outcomes.

All respondents stated that population growth was the challenge in their area. They reported of loss of key grazing areas, land annexation and shrinkage in relation to unplanned farm expansions.

4.4.1 Policy which prioritize sedentarization than pastoralism

One interview in the study revealed that the current state policy much favored farming than pastoralism with detrimental impact on pastoral livelihood. Little attention was given for the challenges like disease outbreaks and other livestock-based interventions which ignored pastoral communities. The growth of infrastructures and social services in the area also made the community to become more sedentary to take advantages of such services.

4.4.2 Growing population and urbanization

One of the costs of population pressure was that it makes the community less self-reliant. Food security is ultimately tied to human population density. In relation to this, crisis in pastoral context as a result of human over-population had been elucidated (Coppock, 1994).

Additionally, FGD participants showed their concern that increased population in the area has seriously undermined the food security situation as limited resources supposed to be shared among many. Furthermore, the participants expressed that most members of the community tend to migrate to urban and per-urban centers in search of casual labor and other income owing to poverty.

Interview with pastoral respondents revealed that they had faced a great challenge to keep their animals in relation to land shrinkage and uncontrolled farming in the area. They added that though farming was obvious to support the livelihood, it should be conducted in the areas where the land is productive and appropriate for it. However, the situation was that everyone was clearing the forest and farming even on the land which was only suitable for animal husbandry exacerbating land degradation and erosions. In that case, areas meant for animals might not produce the required grasses.

It is obvious that increased population with limited resource can also be translated to potential conflicts which further exacerbate food insecurity.

It follows from above that, urbanization coupled with population pressure has caused large areal expansion and construction of houses with negative consequences on the natural resources like forest, pasture and soil. The land that the pastoral communities relay on to keep their livestock has been degraded due to urbanization and uncontrolled farming to the extent that recovery will be costly.

4.4.3 Customary institution

These are social institutions which strongly related to the day-to-day life of the members of the community. In this respect, the community had customary institution (*Gada* elders) which organizes clan based self-helping mechanisms. The clans, thus, support the victimized member of their kin in the event of various shortfalls. The customary institution apparently strengthened the coping mechanism of the pastoral community. The elders led not only the self-helping mechanisms but also the management of resources (pasture and water points).

However, this system was weakened due to recurrent natural calamities in the area. Additionally, owing to the fact that people had left the system pursuing different religions, it was further undermined.

Pastoral systems are being known by loss of key grazing lands to cultivation, land annexation by government and private interest, drought, inappropriate development policies and population growth (Desta and Coppock, 2000).

The Ethiopia's policy statement on pastoral development emphasizes transformation strategies that are fundamentally linked to non-pastoral options with a long term goal of pastoralist sedentarisation (Berhanu et al. 2007). However, there has been little evidence that abandoning the pastoral way of life could improve the situation of the communities (Fratkin, 2006).

It follows that, policy and laws will have detrimental impact on the livelihood of pastoral communities which translated in to negative outcomes.

4.5 Households coping mechanisms to sheep and goat diseases.

Traditionally, the community has the social safety nets (self-helping mechanisms) locally called 'Busa *gonofa*' where by the victimized member of the community can be helped through his own clans provided that they have lost the livestock through uncontrolled circumstances. Currently, a vast majority of the community became equally vulnerable to various shocks which affect the system.

Almost all respondent and FGD participant stated that farming become an alternative livelihood in the area. Most rural communities and urban elites engaged on opportunistic farming in pocket areas. The current farming outcome was such that many people were attracted in to the business.

FGD participants suggested that there was new initiative like saving by few members of the community owing to awareness from the government. Those people used to put their money in the back for later investment on rent-house and hotel construction in the villages or urban centers.

The respondents also informed that the poor households used to sale wood and charcoal, engaged on casual labor as the coping strategies. However, sale of wood and charcoal was recognized as a destructive strategy to the forest and other tree species in the area such that the district passed a control mechanism on it.

It follows from the above that, the current coping mechanisms that left for most members of the community in the study area as per the view of the respondents were treatment and vaccination of animals (for those who afford to do), petty trade, opportunistic farming, selling of animals and saving the money in the bank for subsequent investment on construction of rent-houses in the village and urban centers.

All respondents have confirmed that some of the above coping mechanisms were successful while the others were unsuccessful. The treatment and vaccination of sheep and goats in relation to infectious diseases were reported to be unsuccessful owing to both low coverage and limitation in confirmatory diagnosis.

Moreover, the researcher also observed that most members of the pastoral and agro-pastoral households (especially women) were engaged in various income generating schemes.

Increasing sheep and goat disease, new emerging diseases and shortfall in responses make treatment and vaccination of herds insufficient institutionally.

However, investing on the cash generated from sale of sheep and goats and the petty trade initiatives in the areas could complement the pastoral income and could pave the way for alterative livelihood diversification strategies in the area (Table: 6).

Table 6: Interview result of pastoral and agro-pastoral respondents.

Respondent	Sex	Pastoralist
1	M	• Never bought sheep and goats but inherited all of them from his father. • Livelihood is dependent on livestock (cattle, sheep and goats). • Practise livestock keeping in marginal area where crop production is minimal. • Reported of keeping sheep and goats as food supply, sources of cash, security (to buy additional food or slaughtered for consumption) and milk from goat is used as child nutrition. • The availability of food in the household depends on the number of animals that the household owns. • Has 0.25 hectares of land where he grows maize, which is the staple crop. • Lost 15 goats of 80 due to coenurosis last year with income loss he estimated to be about 9,000 ETB (around € 358; at the time: € 1 = 25.2 ETB). • He stated that livestock death means food for children (milk) will no longer be there and loss of individual animal cause multifaceted challenges for the household. • He stated that: *"...we relied on sheep and goats due to their short gestation period, good prices, drought resistance ability and survival on less feeds. However, disease was creating unexpected challenge such that we were wondering what to do afterwards..."* • The recurrent and rampant sheep and goat disease in the area meant that survival on them became more challenging.

		• Stated that attempt to compensate the impact of sheep and goat disease was dependent on opportunistic farming on small plot of land and clan-support (indigenous social safety nets) and stated that social safety net has been difficult to have in these days.
Respondent	Sex	Pastoralist
2	F	• Inherited most of the animals from her fore-fathers. • Livelihood is largely dependent on livestock (cattle, sheep and goats) and also engaged in purchase of sheep and goats to pursue small business. • Practise livestock keeping in peripheral area where crop production is virtually impossible. • Reported of keeping sheep and goats as food supply, sources of cash such as to buy additional food or slaughtered them for consumption; and milk from goat was increasingly used as child nutrition. • She stated that the availability of food, most notably: food security in the household depends on the number of animals that the household owns. • Reported that sheep and goat diseases caused huge challenge in the livelihood. Since goats were the common species of animals to be sold, recurrent death resulted in loss of asset. • Due to increased diseases in the area, the milk meant for children was much reduced. • Participate in petty trade (selling of sugar, tea leaves and other consumables) and sell milk of cattle and camel as whole milk or its products. • The impact of disease was compensated with petty trade and opportunistic farming.
Respondent	Sex	Agro-Pastoralist
1	M	• Livelihood is dependent on livestock keeping as well as farming. • Income from livestock is almost equivalent to income from crops and small trades. • Has 1 hectare of land where he grows maize and haricot beans due to the fact that crop production is challenging in particular area. • He stated that sheep and goats nicely add to the income from large ruminant, farming and small business. • He used to buy sheep and goats to sell them back adding value and/or substitute them for other type of livestock.

		• He reported of losing 10 sheep and 2 goats of diarrhoea and coenurosis respectively in last year. • He stated that *"... I got good harvest from my field of maize this year. I will not sale the animals to the market..."* • Impact of disease was compensated through farming, purchase of medicine and vaccination, timely selling them, petty trade and replacing them with other species.
Respondent 2	Sex	Agro-pastoralist
	M	• Livelihood is dependent on livestock keeping and farming only. • Has livestock (has cattle, sheep and goats as well as donkey) which he keeps for food supply and sources of cash. • Has 1 hectare of land where he grows maize and haricot beans. • He usually purchases sheep and goats for reproduction purposes as well as to sell them back for cash meant for: human health, purchase of cloths and food items. • Impact of disease was compensated through farming, purchase of medicine and vaccination, as well as indigenous social safety nets.

Pastoral livelihood system adapt over time in a variety of ways when crisis are protracted.
In recent times, pastoralist communities, especially in the medium-potential areas, have been changing from purely keeping livestock towards agro-pastoral system (Kosgey et al. 2008).

In pastoral areas mixed herding is a local strategy which allows risk management and flexible financial management (CAADP, 2006).

Driven by external shocks and trends in the system, the Borana household livelihood diversification is generally characterized by a growing shift of surplus labor to arable farming and other petty activities that place a heavy pressure on the natural resource base of the pastoral system (Berhanu, 2007).
Otte et al. (2004), stated that the burden from livestock disease will be reduced if the farm economy is relatively diversified and other income opportunities exist which was in agreement to the interview with respondents (Table: 6).

Filed observation have revealed that few members of the community tend to have smaller and less viable herds which was analogous to Barret and McPeak (2001), who suggested engagement of poorer pastoralists in to non-farm activities like unskilled wage labor and petty trade due to herd losses.

4.6 The livelihood outcome of pastoral households during the study period

4.6.1 The condition of the households

According to the witness of the key informant and field observation, it is noticed that this year the food security situation in the district is relatively better vis-à-vis the trends in the past years.

The FGD participants elucidated that regardless of the income from farming, livestock and livestock products: milk, eggs, and honey, the communities have been generating additional income and improved their livelihood using petty trades and natural resources available in the area.

Interview with key informant suggested that the community have been diversifying its income sources. Petty trades, beekeeping, gum and incense, gold and sand mining were among the other income sources that the women and youth in the area were engaged in.
The researcher observed that women and youth were more benefited from petty trade and available natural resources in the area.

The Guji pastoral area of Southern Ethiopia received normal to above normal total rain fall from March to May, 2013. This has helped browse, pasture, and water sources to generate and improved animal body conditions and productivity.

However, the following data from FEWS NET assumes the likelihood of events that could potentially change the scenario (Table: 7).

It could be assumed that due to high prevalence of livestock disease in pastoral areas, outbreaks could potentially affect the food security situation of the pastoral communities in the areas. The probable condition may affect poor pastoral and agro-pastoral households.

Table 7: Possible events that could change the most-likely scenario of the country.

Area	**Event**	**Impact on food security outcomes**
Pastoral areas	Livestock disease outbreak	The improvement in animal body condition and their productivity would be affected. Reduced milk from lactating animals and reduced income from livestock sales would likely follow.
Nation wide	Delays in humanitarian assistance	An increase in the rate of malnutrition.
SNNPR	Further decline in International coffee prices	A further decline in international coffee prices could lead to lower wages for workers in coffee in Sidama and Gedio Zones in SNNPR

Source: Ethiopia Food Security Outlook, FEWS NET (2013).

4.6.2 Water availability

The availability of water, as per the respondents and observation was found to be better as compared to pas years except the damage to some key water points, notably ponds and traditional wells due to the intensity of rainfall.

4.6.3 Sheep and goat body condition and productivity.

As per the result participant observation, the overall livestock body conditions including that of sheep and goats were better (Annex: 5).

Field observations further elucidated that breeding situations and milk production is on good situation. Milk availability is not uncommon in almost all major PAs and pastoral women were seen carrying the excess milk to the nearby markets.

Moreover, participant observation revealed that there are some disease and/or symptoms of diseases especially abortion in goats in some PAs of the district which will have negative impact on these animals. The presence of this disease could mean that milk availability as well as pastoral food security will be affected provided that timely action will not be taken.

4.6.4 Market conditions

It was noted that brokers tend to collect the animals to transfer them for traders coming down to Negelle borana often visiting the area on behalf of exporters. One pastoralist highlighted that *"...Brokers tend to collect the animals with 23 ETB/kg/animals in the village and sell them with 31 ETB/ kg/animal...."*

When it comes to the terms of trade, as described earlier, the price of one quintal of maize and one head of small male goat is almost comparable.

According to the district pastoral development office pre-harvest assessment report, the market condition is stable and the supply was on good situation. During this research, the researcher has observed that at one village market (Annex: 5), about 30 sheep and goats entered the market for sell in the morning. The sell price of sheep and goats was 23 ETB/ /kg /animal using hanging balance whilst it was about 1100 ETB for adult male animal sold without hanging balance.

However, the price of livestock kept on decreasing as a result of few numbers of traders and increased supply of animals to the market.

4.6.5 Nutrition and human health

During the field work there was no epidemic cases identified in the community in general and the households in particular. However, reference to the district's pre-harvest assessment report showed that due to climate change and shortage of clean portable water, diarrhoea, malaria, measles and tonsils were reported on mothers and children in some PAs (LDPDO, 2013).

Furthermore, according to the assessment conducted by Liben district Health team, it was noticed that 1,389 children and 978 mothers and total 2,367 mothers and children are under malnutrition (LDHO, 2013).

CHAPTER 5: CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Livestock ranked being the main sources of livelihood for rural communities of Liben district. Sheep and goats played the major role in pastoral income, especially being an income source thereby filing the gap of food shortages during critical times of the year. However, opportunistic farming and petty trades are also complementing the livelihood of the community. The major crops grown in the area were: maize, haricot beans, wheat, barley and teff. It was found that sheep and goats became an important food sources for poor pastoral and agro-pastoral households due their small gestation period, productivity, drought resistance and ability to survive in low-nutritious feeds and ease to fill the food deficit of such households during emergencies.

The study established that diseases are the main and major constraints of sheep and goats production in the area; the important infectious diseases of sheep and goats in the area being PPR, CCPP and Anthrax while disease like coenuruses appears to be equally devastating.

It was also found out that disease reduce productivity of the animal by reducing milk yield that the pastoral and agro-pastoral children survive on during critical times. They also affect lambing/ kidding rates through abortion and reduce stock replacement and construct death of individual animal there by creating critical food deficit and limit access at the household level.

Sheep and goat diseases, as a result, affect the quality of the animal to be marketed through excess loss of animal conditions. As the market demand good quality animals, disease tend to either block or limit the income the pastoralist could get from sell of the animal there by reducing the food purchasing power of the pastoralists, especially during critical times. Thus, it establishes it relationship to food availability and access to pastoral households.

The diseases tend to affect the food purchasing power of the households through death of individual animals thereby creating absence of the animals to be sold. It also affects the price of the animals as the community tends to bring large number of animals during outbreaks. Given the fact that crop price was higher that could not be compensated through sell of few animals in particular point in time, it further affect the pastoral terms of trade.

The study also found out that the community pursued different coping strategies to withstand the negative impacts of sheep and goat disease to the food security. The most important once were petty trading, selling sheep and goats and putting the money in the bank for future investment on rent-house constructions in urban centers; while the others being opportunistic farming and investment on animal treatment and vaccination. The results of investment on treatment and vaccination of the animals were overshadowed by low coverage of both treatment and vaccination services due to weak institutional support in animal health sector.

The food security of the pastoral households during the study period shows promising condition owing to good main rains which provide good animal production environment. Since livestock disease outbreaks are common in pastoral areas, the food security assumed will be affected provided that diseases are occurred in the area. The sown crops are in good conditions and the availability of milk is not uncommon almost in all major pastoralist associations during the study period.

5.2 Recommendation

The following were recommended based on the outcome of this research.

- **Household and community**

A. Participate and carry on the income generating ventures, diversify their economies from sole livestock keeping into farming and other income generation activities.
B. Encourage saving the money in the bank after sale of animals to invest on rent-house and hotel constructions in urban centers.
C. The community should mobilize themselves during vaccination and be willing to vaccinate their animals on time.

- **District government**

A. The vaccination should be sufficient such that the vaccination should consider the demand at grass root level.
B. Capacity building for animal health experts, especially of extensions staffs at grass root levels.
C. Endorse and capitalize on petty trades considering the interest and self-initiation of the community.
D. Support to opportunistic farming already practiced by the community as livelihood options.

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Annex 1: Total population and households in Liben district.

No	Name of PA	HHs	Total population
1	Mugayo	944	4155
2	Alge	953	4195
3	Buradhera	827	3638
4	Daka kala	823	3622
5	Lagagula	1238	5445
6	Ardot	685	3016
7	Siminto	1249	5497
8	Miessa	1489	6551
9	Ardabururi	1874	8247
10	Kobadi	1184	5208
11	Karsamalle	1568	6898
12	Gobicha	1785	7854
13	Boba	961	4228
14	Bulbul	1082	4539
15	Hadhessa	3804	3539
16	Korati	1023	4499
17	Malkaguba	581	2557
Total		**19,020**	**83,688**

Source: Liben district health office, 2006.

Annex 2: Checklist for focus group discussions.

1. Sources of income for your households? (Proportional pilling; Income expenditure).
2. Reasons for rearing sheep and goats.
3. The category of community (rich, medium, poor and destitute) mostly tends to rear sheep and goats; what do you think so?
4. Sources of income other than Livestock.
5. The important sheep and goat diseases in the village. List according to descending order of importance. (Ranking &Scoring).
6. Which once are more fatal; which one reduces productivity.
7. Comparing the magnitude of the above (# 6).
8. The major impacts of this disease on the livelihood. The challenges the diseases caused on marketing of sheep and goats.
9. The expenditures of you income.
10. Effect of disease.
11. Effect of disease on expenditures.
12. The existing coping strategies to the diseases.
13. Any support/compensation mechanism to losses related to diseases.
14. For which bodies the support indicated in #13 (NGOs, Government, community).

Annex 3: Checklist for individual interviews

Identification _____ Date _____

Name _____

District _____ Village/group _____

General

- How long did you stay here?

1. What is your Livelihood?
2. What classes of livestock do you live on? Indicate the number of each species?
3. Purpose of sheep and goat production?
4. Do you buy sheep and goat? If yes; why?
5. Sale of sheep and goat? If yes; why?

6. Household income sources? (Use PRA tools: scoring and proportional pilling)

7. Types of crops grown?

8. Household Expense?

9. Constraints sheep and goat production?

10. Major sheep and goats diseases (Local names or symptoms of diseases)?

11. Do you think that sheep and goat infectious diseases are increasing or decreasing? Why?

12. Are there any problem related to sheep and goat production? List down according to importance.

13. What do you think about the sheep and goat holding of the household? Increased /decreased. Why?

14. What is your experience on the food available in your household for consumption in relation to above diseases?

15. What is the trend and status of milk production from sheep and goats for the last 10 years?

16. What are the Constraints for issue in # 15?

17. What are the market problems related to sheep and goat diseases?

18. What are the current price of sheep and goats in relation to food grains?

19. What factors affect the price?

20. What is the economic importance of sheep and goat diseases? Is it a problem for you? Why?

21. Are sheep and goat disease affect your purchasing capacitates of food grains?

22. If yes, how?
23. The coping measures to sheep and goat diseases.
24. Are these measures sufficient to cope with impact of diseases?
25. For # 24; If not, why not; if yes, how?
26. Any support/compensation mechanism to losses related to diseases?
27. For which bodies the support indicated in #26 (NGOs, Government, community).
28. What do you suggest/recommend for your PA/other bodies as a way out to the impacts of these diseases?

Annex 4: Checklists for Participant Observation

1. Observations of sheep and goats body conditions, diseases at the field level.
2. The various income sources of the study HHs.
3. Farm observation and sown crops.
4. Sheep and goat market at the village level and at the primary market.
5. The various coping strategies employed to deal with various natural calamities.
6. Observation of what women do in the HH in relation to sheep and goat husbandry.
7. Observation of various food security indicators: crop conditions, water conditions, Livestock conditions and production, human health, etc.
8. Various income generating schemes.

Annex 5: Photo Gallery

Photo 1: Focus group discussion with community (left); a pastoral boy in the study area while herding sheep and goats (right).

Photo 2: Social mapping process with FGD participants (left); produced map which transferred on to paper after sketch on the ground (right).

Photo 3: Interview with DA (left); interview with animal health expert in the Liben district (right).


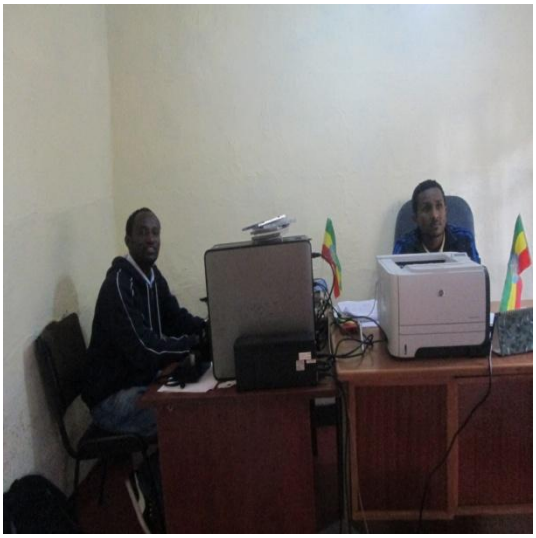

Photo 4: Interview with Key informant (left); Interview with vice- head, Food security desk in Liben district (right).


Photo 5: Interview of respondent with Agro-pastoral livelihood strategy (left); Interview with respondent with pastoral livelihood strategy (right).


Photo 6: Focus group discussion with women (left); A pastoral woman who participated in the study (right).


Photo 7: Sheep and goat market at village level (left); Primary sheep and goat market at Negelle Borana (right).

Photo 8: Sheep and Goat population in the study area.