EVALUATION OF ECONOMIC CONTRIBUTION OF MEAT GOAT PRODUCTION TO SMALL HOLDER LIVELIHOODS IN GWEMBE DISTRICT, ZAMBIA

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DECLARATION AND APPROVAL

Declaration

I declare that this is my original work and has not been presented in this or any other University for any other award.

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Approval

This work has been submitted with our approval as University supervisors

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DEDICATION

This work is dedicated to my beloved wife Mercy Mutumba Likando for her never ending support.

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ABSTRACT

Agriculture is a major development sector in Zambia and about 97.8% of the rural households are engaged in agriculture, and this equates to 45% of the total population. The agricultural sector contributes about 19.7% to gross domestic product, while the ruminant livestock sub-sector which consists of cattle, sheep and goat contributes 35% to the national agricultural output. In recent years, it has been observed that meat goat production is becoming increasingly important among smallholder livelihoods in Gwembe district. However, despite the recognized contributions of meat goats to smallholder livelihoods, such roles and contributions have not fully been studied and quantified. Since the enterprise is rapidly expanding taking the place of cattle, there is need to determine how much meat goat enterprises contribute to the economic well being of smallholder livelihoods. The main objective of this study was to investigate the contribution of meat goat production to the economic wellbeing of smallholder livelihoods in Gwembe district- Zambia. The specific objectives included: to determine the socio-economic characteristics of smallholder goat keepers; determination of the competitiveness of meat goat enterprise with regards to other enterprises among smallholder livelihoods; establishment of the role of meat goat production on socio-economic status of smallholder livelihoods and determination of participation of other service providers in goat production. To meet these objectives, descriptive statistics, gross margin analysis and multinomial logit models were employed. The population of interest comprised of smallholder farmers who were goat keepers within the sampled camps. A sample size of 150 households was selected among farmers who embrace goat production in their farming systems in Sinafala and Chipepo camps. The results showed that meat goat production was not restricted to any particular age group, but households heads above 21 years and women participation was low. The contribution per goat sold was about 1.3 percent towards the livelihoods of smallholder farmers per year. It was observed that goats mostly were kept for security reasons although other reasons included: income, home consumption and traditional beliefs. The results also showed that family size, education level, age, goats owned, association and sales period significantly influenced the role of meat goat production on smallholder livelihoods. The policy implication therefore, is to devise a mechanism that will create awareness among the rural poor that although cattle are traditionally preferred, goats are much more affordable to raise in marginal areas.

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LIST OF ACRONYMS AND ABBREVIATION

DAPH:	Department of Animal Production and Health
DFID:	Department of International Development
FANRPAN:	Food Agriculture and Natural Resources Policy Analysis Network
FAO:	Food and Agriculture Organization of the United Nations
GM:	Gross Margin
HPAI:	Highly Pathogenic Avian Influenza
IFAD:	International Food and Agricultural Development
MACO:	Ministry of Agriculture and Co-operative
PR:	Profitability Ratios
RRR:	Relative Risk Ratio
SADC:	Southern Africa Development Community
TVC:	Total Variable Costs
USA:	United States of America
USD:	United States Dollar
ZMK	Zambian Kwacha

CHAPTER ONE

INTRODUCTION

1.1 Background

Agriculture is a major development sector in Zambia and about 97.8% of the rural households are engaged in agriculture. This equates to 45% of the total population (Mucavele, 2009). The agricultural sector contributes about 19.7% to Gross Domestic Product (World fact book, 2011), while the ruminant livestock sub-sector which consists of cattle, sheep and goats contributes 35% to the national agricultural output (FAO, 2009).

The livestock sub-sector contributes significantly to the agricultural industry in Zambia through outputs such as: meat, milk, eggs, hides, skins, manure and draught power. It also generates employment opportunities and income among the rural people. Since the early 1990's the government has liberalized the agricultural markets for the products and inputs and emphasized the need for the private sector to take a lead in the development of the sector. However, it is recognized that the markets have not functioned efficiently (MACO, 2004).

In rural parts of the country, about 83% of the inhabitants are poor and 71% of them are extremely poor including Gwembe district (Oxford Policy Management, 2012). The main occupation in these rural areas is rain fed agriculture and with current climate change, the cycles of drought are becoming shorter and more severe. Whenever drought hits the country, it becomes apparent that most of the rural population is extremely vulnerable. The mode of agricultural production in Gwembe district is subsistence where major crops grown are maize, sorghum, sweet potatoes and groundnuts which could only be sold in years of surplus. Along with these, the livestock kept are cattle, goats, pigs and poultry. The only cash crop grown in small and scattered units is cotton.

The economy and the political environment are experiencing a period of significant transformation where the engagement of extension workers by the Ministry of Agriculture and Cooperatives as agents of technological transfer have been reduced resulting in a decline in extension services in the district. Since a substantial proportion of the population in the district live below the poverty line, there is declining life expectancy at about 38 years (IFAD, 2006). Poverty has been aggravated by the outbreak of cattle disease called foot and mouth disease (*theileriosis*). Before the devastating effect of the disease, cattle served as a

common source of farm livelihood for farmers in the region. This experience led to the realization that over reliance on cattle was not tenable and in order to enhance and diversify livestock production, small ruminants have been encouraged, with emphasis on goat production (Ministry of Agriculture and Cooperatives, 2004).

Goats have high productivity potential and are hardy. However, for goats, to provide lasting benefits to farmers, specific approaches must take into account the type of enterprise combination, ecosystem and production system. They must also factor in social, environment, and other considerations (Mamabolo and Webb, 2005). With economic considerations and efficient management, goat production is likely to lead to economic recovery in rural areas which previously relied on cattle.

In recent years, it has been observed that goat production is becoming increasingly important among smallholder livelihoods. Goat population increased by 71% between 2000 and 2006, distributed almost evenly as follows; 32% Southern, 24% Eastern, 17% Northern and other Provinces share 27% (that include Lusaka, Copperbelt, Central, Luapula, North-Western and Western Provinces) (Central Statistical Office, 2003). Therefore, since the enterprise is rapidly expanding taking the place of cattle, there is need to analysis the economic contribution of meat goat production to smallholder livelihoods.

1.2 Statement of the Problem

Cattle used to be one of the major enterprises on which the smallholder farmers depended on for their livelihoods. With the reduction in numbers of cattle heads per household due to foot and mouth disease, it has been observed that meat goat production is rapidly expanding and becoming increasingly important among smallholder households in Gwembe district, Zambia. However, despite the expansion and recognized contributions of meat goat to smallholder livelihoods, such contributions and roles have not fully been studied and quantified in Gwembe district. Hence, the study was to fill the gap in knowledge about the contribution of meat goat production in Zambia.

1.3 Objectives

1.3.1 General Objective

The general objective was to investigate the contribution of meat goat production to the economic wellbeing of smallholder livelihoods in Gwembe district, Zambia.

1.3.2 Specific Objectives

1. To determine the socio-economic characteristics of small holder farmers involved in meat goat production.
2. To determine the competitiveness of meat goat enterprise with regards to other enterprises among smallholder livelihoods.
3. To establish the role of meat goat production on socio-economic status of small holder livelihoods.
4. To establish the participation of other service providers in meat goat production.

1.4 Research Questions

1. What are the socio-economic characteristics of the smallholder farmers involved in meat goat production?

2. How competitive is meat goat production as compared to other enterprise among smallholder livelihoods?

3. What is the role of meat goat production on socio-economic status of small holder livelihoods?

4. Are there organizations/agents offering services to meat goat production?

1.5 Justification

There has being an increased assumption that in the livestock sector, cattle cannot be replaced by small ruminants (sheep and goat) even where they are endangered by diseases. Since goats exhibit high productivity potential they can easily help to improve the rural economy within a short time. Therefore, there is need to encourage the smallholder livelihoods to rear goats.

The knowledge of the profitability of meat goat enterprise will help in shaping the future of the livestock enterprise combinations involving goats through the policy makers who may have access to this report. The results of this study will be useful to stakeholders both within and outside the district.

Although a number of studies have been done on meat goat production, most of them concentrated on production and marketing. For instance, Chitambo (1995), studied the marketing chain for goats from the Zambezi valley and concluded that, the marketing costs were high because of the dispersed nature of the producers. This study was intended to fill the gap in knowledge about economic contribution of meat goat production in Zambia.

1.6 The Scope of the Study

This study was limited to Gwembe district in Southern Province of Zambia about 237 kilometers south of Lusaka the capital city. The district was purposively selected due to its comparative advantage for meat goat population. Gwembe district is a marginal area where average rainfall is less than 800 mm and characterized by poor grazing areas. It did not encompass all stakeholders in the district but its main group of interest was the smallholder farmers who keep goats as one of their enterprises as well as the service providers involved in meat goat production. The study involved two Agricultural camps in the district.

The major limitation of the study was the language barrier as the researcher speaks a different language from the one spoken by the respondents and this raised suspicion why the information was being collected from them. The obstacle was overcome by the use of local enumerators who were trained on how to administer the questionnaire in their own language.

1.7 Operational Definition of Terms

1. **Agricultural Camp** – It is an area with a defined boundary drawn to demarcate agricultural activities to which one agricultural assistant is assigned to co-ordinate agricultural activities.
2. **Competitiveness** – The ability to change a price above cost and be able to sell that product.
3. **Farm enterprise** – Smallest economic unit on a farm on which scarce farm resources are to be used.
4. **Food security** – Access of an individual at all times to enough food for an active healthy life
5. **Household** – People who comprise a family unit and who live together share the same eating arrangement and dwell together and headed by one individual.
6. **Kapenta** – Species of small fish which the local community around Lake Kariba catch and dries for sale or for home consumption
7. **Livelihoods** – Means of support to smallholders to adapt to their environment.
8. **Salaula** – Second hand clothes
9. **Smallholder** – family holdings characterized by low input and low output levels.

CHAPTER TWO

LITERATURE REVIEW

Reference has been made to previous research findings done by different authors to assess the contribution of meat goat production to the economic well being of smallholder livelihoods in different parts of the world. This chapter reviews meat goat production, marketing, ownership and distribution of small ruminants and profitability of goats.

2.1 Goat Industry

Most of the goats in the world are produced in Asian, followed by Africa (Sandra, 2007). The top three producers of goats are China, India and Pakistan, allocated in Asia (Sandra, 2007). According to the National Dairy Database – U.S.A (1992), the goat is one of the smallest domesticated ruminants that have served mankind earlier and longer than cattle and sheep. It is managed for the production of milk, meat and wool, particularly in arid, semi-tropical or mountainous countries. In temperate zones, goats are kept often rather as supplementary animals by smallholders, while commercially cows or buffaloes are kept for milk, cheese and meat, and sheep for wool and meat production. Nonetheless, there are more than 460 million goats worldwide presently producing more than 4.5 million tons of milk and 1.2 million tons of meat besides mohair, cashmere, leather and dung. More people consume milk and milk products from goats worldwide than from any other animal. Cheese production, from goat milk in France, Greece, Norway and Italy is of economic importance. Goat herds on the other hand are low producing though, are an expression of capital assets and wealth in Africa and Asia where they are found in large numbers.

Linda (2004) posits that goats can survive on bushes, trees, desert scrub and aromatic herbs when sheep and cattle would starve to death. Goat herders often have neglected a rational numerical balance between goat numbers and sparse vegetation. Over-grazing has destroyed many tree and woodland areas, which was blamed then on goats rather than man, and this has caused widespread ecological and political concerns, erosion, desertification and even ban on freely grazing goats in some area. On the other hand, goats are valued over cattle and sheep in the fight against bush encroachment on millions of acres of open rangeland.

Ajala *et al.*, (2008), noted that small ruminants play a vital role in the nutrition, social and economic wellbeing of the population in Nigeria. There is a great potential that exist for small ruminants in Northern Guinea savanna of Nigeria. Small ruminants in Nigeria are kept for a number of reasons not only to provide meat and as a source of regular cash income but also as security or assets only to be sold when extra cash is needed. They also play a pivotal role in social life that is during weddings and other festivals where they are presented as gifts or slaughtered as meat during the ceremonies. Findings showed that the motive to keep and to improve the productivity of small ruminants by farmers was economic: to increase cash income. However the study did not consider the economic contribution of small ruminants hence the strength of this study.

Verbeek *et al.*, (2009), investigated socio-economic factors influencing small ruminants breeding in Kenya. This research focused on activities and decision making, flock management, entries and exits of small ruminants, and reasons for culling. Socio-economic factors were seen as having a bearing on animal and farm management, decision making as well as general perception of breed and species of the farmers. It was concluded that these factors (social economic factors) will therefore affect the design and implementation of a breeding programme. Other factors like landownership, animal ownership and farm size did not have a direct bearing on animal breeding but on general household characteristics. No reference was made to the profitability of the unit as having influence on the breeding of small ruminants. Therefore, this research endeavours to investigate the contribution of goats to the profitability of the smallholder livelihoods.

Having similar cultural heritage in most parts of the world, women are usually socially marginalized hence their participation in asset ownership is limited, this does not exclude South Africa. Where women own goats their role in decision making with regards to how to utilize their animals in the absence of their husbands is limited, usually men have to sanction. Mamabolo and Webb, (2005) revealed that the various decision-making levels related to goats ownership in Mootse reflects a conspicuous gender imbalance which is a product of strong cultural background biased against women. The study did not show the role of goat production on socio-economic status of smallholder livelihoods, as it was focusing on fundamental aspects to model goat production systems in Southern Africa.

2.2 Goat Production

In 1990 the production and marketing of goats and goat meat was widely perceived by southern goat owners in United States of America and Extension Service personnel to be largely unorganized, unobserved and unrecorded. Accordingly, it was thought to be erratic over time and place as regards numbers, price, availability of retail product and consistency of quality. Consequently, equitable distribution of marketing margins across producers, middlemen, processors, and purveyors was also thought to be only imprecisely achieved (Pinkerton *et al.*, 1991).

According to Tchad (1989), the shift in ownership pattern of sheep to goat is the gradual change in emphasis from sheep to goat as the macro-management system moves from nomadic to sedentary and from pastoral to agricultural among the nomads of Kenya. This is reflected in the numbers of owners who either have preferences for goats over sheep or who, for other reasons, are forced to keep goats. Goats are, generally more prolific than sheep and are probably less trouble to manage for the agriculturalists and agro-pastoralists. This shows the increasing economic importance of goat production among the nomads of Kenya.

In Zambia Goats are important in the marginal areas but are widely distributed throughout the country, although over 60% are in river valley areas and semi-arid regions (Eroarome, 2006). These areas are characterized by poor crop *production*, and cattle do not thrive because of trypanosomiasis and feed scarcity (Department of Animal Production and Health, 1993). Goats' adaptability, prolificacy and modest nutrient requirements make them well adapted to poor marginal lands (Ahmadu *et al.*, 2000). Most smallholders keep local breeds.. Aside from the seasonal demand, religious rites and parties, goat meat is gaining general acceptance as a regular item in many homes and restaurants. While goats represent a critical resource for the provision of income and nutrition to the smallholders, they have not been fully appreciated by policy makers, non-governmental organizations and other development agents. Only limited research has been conducted on indigenous goats; their genetic potential has not been well documented and appreciated (Mwenya, 2001).

Zambian goats are believed to originate from the present day Zimbabwe (the Matebele and Shona kingdoms). The numbers in the national flock are not well known. There are many indigenous types (Mwenya, 2001), which are further described by the locality

within which they are found. In the Southern half of the country three different types have been identified (Chisanga and Mwenya, 1998): (i) The South East African Dwarf Goat, or Gwembe Valley goat, (ii) the Valley goat, a larger breed is found in most of the southern half of the country and the northern parts of the Zambezi escarpment and Luangwa valley, (iii) the plateau goat is an intermediate type found in the plateau areas and appears to be widely distributed in the country.

2.3 Ownership and Distribution of Small Ruminants

Rearing of small ruminants plays a very important role in the lives of small holder livelihoods in developing countries. Panin (2004), showed that in Botswana, the ownership of the small ruminants among the small livelihoods, goats were more widely owned than sheep. According to Jibowo (2000), despite women in the rural areas of Nigeria assisting their husbands in harvesting and carrying farm products from the fields they also raise small ruminants like sheep and goats.

2.4 Socio-economic Factors Influencing Breeding of Goats

According to Kosgey *et al.*, (2006) in Kenya, small ruminants are kept for both tangible (cash income from animal, milk and meat sales and for home consumption) and intangible benefits (.savings, insurance against emergencies, cultural and ceremonial purposes). Kosgey *et al.*, (2006b) ranked regular cash income as the most important purpose of small ruminants for both smallholders and pastoral/extensive farmers. Furthermore, the socio-economic factors, including farmers' reasons (both tangible and intangible) to keep animals, the particular traits they consider important and their farm management practices were quantified. However, a number of other socio-economic factors are still unclear. Therefore, it is necessary to study some of the other socio-economic factors that could possibly influence small holder farmers to keep goats. The aim of this study is to establish the role of meat goat production on socio-economic status of small holder livelihood

2.5 Goat Marketing

According to Gudahl (1987), on the demand side, exporters and strategic planners approaching the market in Africa face a number of questions. Which countries are supplying live goats to Africa? What is the dollar value of these imports? How much do the imports of

live goats vary from one country to another in Africa? Do exporters serving the market in Africa have similar market shares across the importing countries? On the supply side, Africa also sells to the international market of live goats. Which countries in Africa supply the most exports of live goats? Which countries are buying their exports? What is the value of these exports and which countries are the largest buyers? This report was created for strategic planners, international marketing executives and import/export managers who are concerned with the market for live goats in Africa. With the globalization of this market, managers can no longer be contented with a local view. Nor can managers be contented with out-of-date statistics that appear several years after the fact.

A marketing channel describes the movement of a product or commodity from the site of production to the place of consumption. It may include transportation, handling and storage, ownership transfers, processing, and distribution traditionally; principal players in goat marketing channels were entrepreneurs who carved out a portion of the trade through shrewdness, determination, and economic or political leverage. Because the industry is now rapidly developing, market channels are becoming discernible, points of origin are better defined, and new processing plants and marketing techniques designed to better meet consumer needs are increasingly evident (Gudahl, 1987).

South Africa has over 6 million goats that are owned by two distinct sectors, the commercial farmers and the small-scale, non-commercialized farmers. The commercial farmers keep Angora goats for mohair production with surplus stock being marketed in the goat meat sector and Boer goats specifically for meat production. Marketing of meat animals by commercial farmers is mostly through a well organized system with capital resources, infrastructure, institutions, legal frameworks and markets. Mainly the non-commercial farmers use an informal marketing system, which is characteristic of developing economies. The informal marketing channel is more often the route of necessity than the route of choice. Informal markets hold potentially many risks to both the producer and the consumer. Despite existing international niche markets and potential local niche markets that remain to be exploited, shifts in global consumer preferences and demand have opened up the possibility of the development of "exotic" (read indigenous) products of interest to the discerning consumer (Farias, 2001; Mahlase, 2001).

2.6 Profitability Analysis

The study carried out in Botswana showed that, on average, the small ruminant production enterprise earned a household a total net profit of P561.00. On a per animal basis, an appropriate measure for the profitability, the return per animal was P23.00 (Panin and Mahapibe, 1994). This suggested that a small ruminant production enterprise was profitable. However, profit per animal may not be the best measure of how efficiently the factors of production have been utilized. The study concluded that the best measure of efficiency is that which recognizes the returns per unit of input and capital, which was identified as one of the constraints to increased agricultural production in Botswana (Panin and Mahapibe, 1994). The return per pula of capital tied up in the small ruminant enterprise was calculated.

According to Mucuthi (1992), the high mean income from small ruminant production for respondents without off-farm income indicates the significant contribution of small ruminants to net farm income. Indeed, small-scale farmers in the arid and semi-arid (ASALs) lands considered small ruminant production and off-farm income as the most important sources of household income for development as well as daily expenses. Small ruminant production contributed 50% and 54% to income used for daily and development expenses, respectively.

2.7 Theoretical Framework

Utility theory provides a methodological framework for the analysis of alternative choices made by individual smallholder farmers on the role of meat goat production to their livelihoods. Utility refers to the satisfaction that each choice provides to the decision maker (Keeney and Raiffa, 1993). Thus, utility theory assumes that any decision is made on the basis of the utility maximization principle, according to which the best choice is the one that provides the highest utility (satisfaction) to the decision maker (Aleskerov and Monjardet, 2002). Utility theory is used to explain the behavior of individual smallholder farmers. In this case the smallholder farmer plays the role of the decision maker that must decide on the roles of goat production so as to secure the highest possible level of total utility subject to his/her available resources. Utility maximization approaches encompass the dual character of peasant households as both families and enterprises and thereby take account of the consumption side of peasant decision making (Mendola , 2007).

The utility that the decision maker gets from selecting a specific choice is measured by a utility function U, which is a mathematical representation of the decision maker's system of preferences such that: $U(x) > U(y)$, where choice x is preferred over choice y or $U(x) = U(y)$, where choice x is indifferent from choice y (Aleskerov and Monjardet, 2002).

The selection of the role of goat production can be modeled within a framework that explains individual choice behavior. The decision to select the role of goat production is a behavioural response arising from a set of alternatives and resource constraints facing the individual farmer as it was shown by Leagans (1979). Selection of an enterprise phenomenon necessitates a different analysis (Ben-Akiva and Lerman, 1985). As a result of their work, discrete choice models were developed to analyse the selection of enterprise on the farm by smallholder farmers. Multinomial logit regression is one of the models in discrete choice analysis used when more than two alternatives are in a choice set. It is derived from utility-maximizing theory that states that consumer chooses the alternative which maximizes his utility (Ben-Akiva and Lerman, 1985).

2.8 Conceptual Framework

The livelihood concept is based on the premise that a rural household has access to a minimum amount of resource base which can be utilized to fashion out a set of livelihood strategies such as crop farming, livestock rearing, off farm employment to improve household welfare (Chambers and Conway, 1992).

This research focused specifically on those smallholder farmers who embraced goat production, either as one of the several livelihoods strategies or as their main livelihood strategy. Therefore, adoption of the Sustainable Livelihood Framework by DFID required re-definition of the assets that were available to the smallholder farmers. These assets were operationalized as follows;

Natural capital included; land, water, soil, natural grazing pastures, Physical capital included; livestock, crops, farm equipment, technologies and infrastructure, Social capital included; social networks, social relations, associations, Human capital; Number of household members, their gender and age compositions, skills, education level, household size, marital status, Financial capital; cash, creditors, debtors and savings. To foster sustainable development in goat production external support through other service providers which include the public and the private sectors must recognize the dynamic nature of

livelihood strategies, respond flexibly to changes in people's situation, and develop longer term commitments.

According to the conceptual framework below, smallholder access to assets is influenced by their vulnerability context which takes account of trends and shocks. Access to assets such as the goat asset base is also influenced by the presences of other service providers, which affects the ways in which people combine and use their resources to achieve their goals. These are their livelihood strategies. These livelihood strategies have implications for smallholder behavior and finally on the smallholder livelihood outcome.

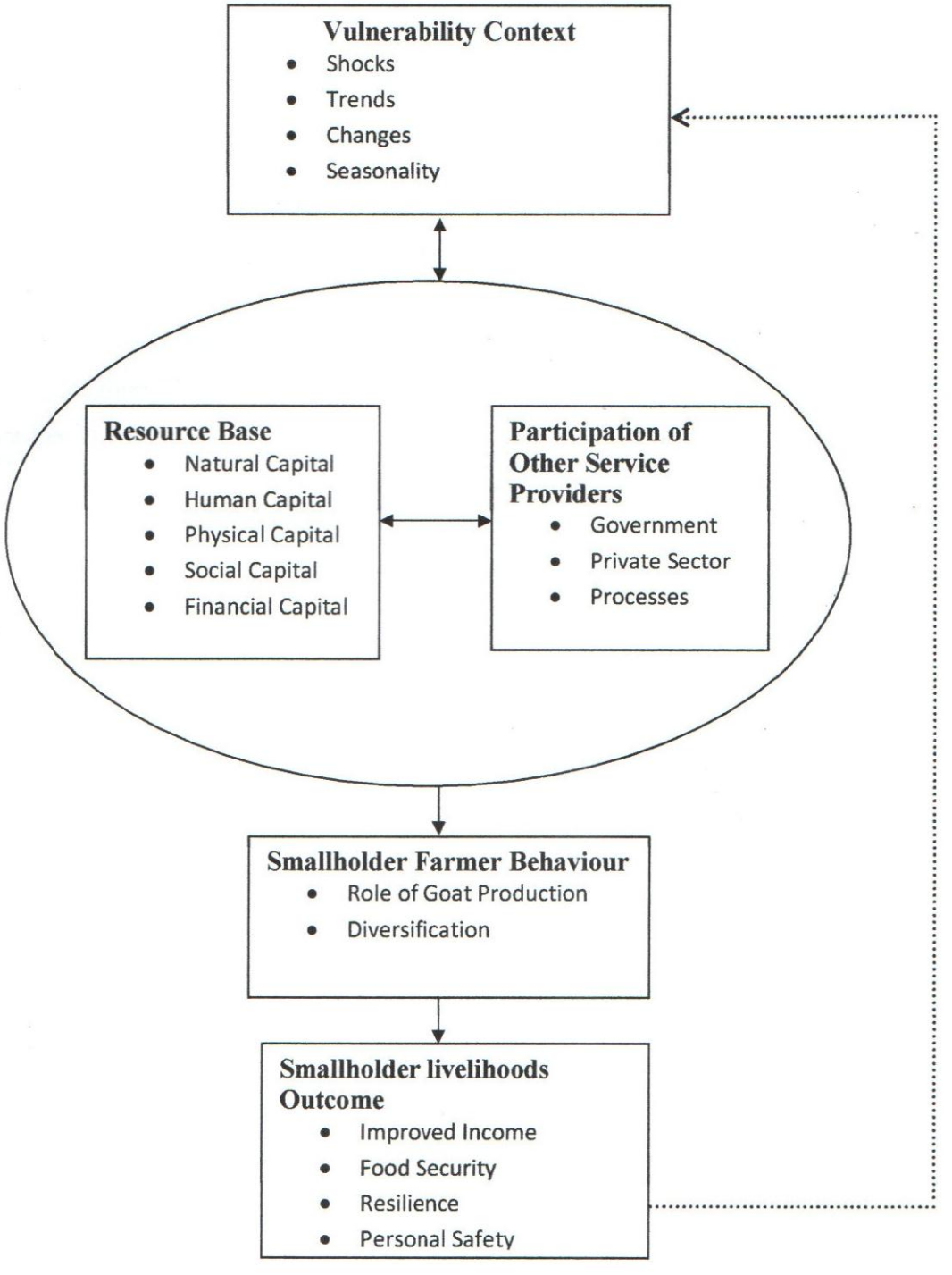

Figure 1: Conceptual Framework
Source: Own Conceptualization

CHAPTER THREE
METHODOLOGY

3.1 Study Area

The study was conducted in Gwembe district which is 237 kilometers South of Lusaka. It is located between latitudes 16° and 18°S and longitudes 26° and 29°E in the Southern Province of Zambia. Zambia is divided into three agro-ecological zones according to annual rainfall which are; agro-ecological zone I with average annual rainfall of less than 800mm, agro-ecological zone II with average annual rainfall of 800 mm -1000 mm and agro-ecological zone III with average annual rainfall of above1, 000 mm (Jain, 2006). The study area lies in agro-ecological zone I with average annual rainfall of less than 800 mm and is generally considered being one of the driest and most prone to drought occurrences (Jain, 2006). The district is dominated by subsistence crop production of small grains such as sorghum and pearl millet with cotton being grown as a cash crop. This district has three agricultural blocks each being managed by one Agricultural Block Supervisor. The Gwembe district was chosen primarily because it's a district with the highest number of goat population in the province being kept at smallholder level. Small scale farmers around the district practice mixed farming that is the venture into crop as well as livestock farming.

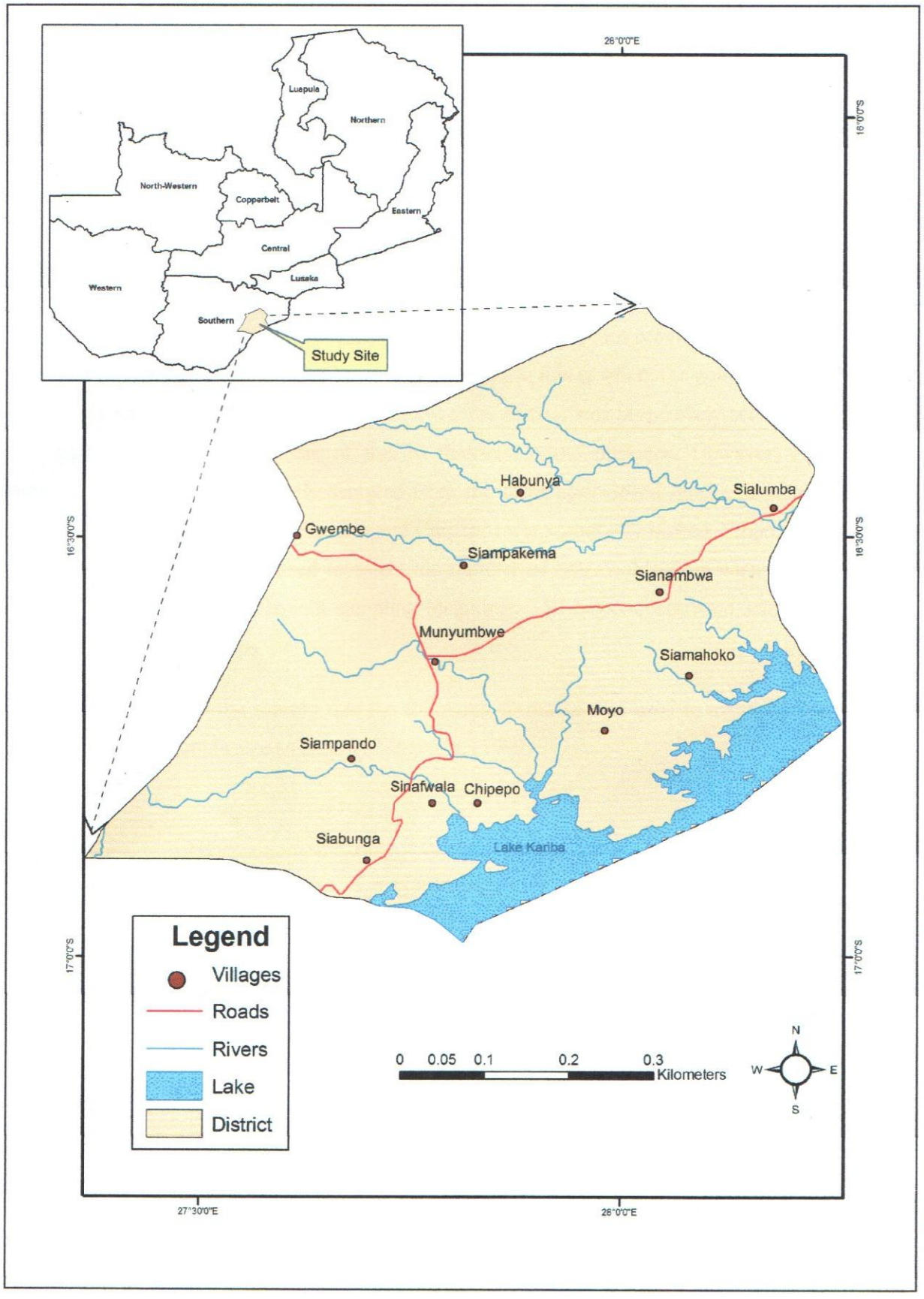

Figure 2: Map of Gwembe district showing the study area

3.2 Study Population

The population of interest comprised of the entire smallholder farmer who were meat goat keepers within the specified camps (Chipepo and Sinafala), while the sampling unit was constituted by the smallholder households.

3.3 Sampling Procedure

The study used a Multi-stage sampling technique. Southern province was selected out of the nine provinces of the Republic of Zambia because this is where the population of goats is highest among small holder livelihoods. Gwembe district was purposively selected basing on high concentration of goats of the 10 districts in the province. However, Chipepo agricultural block was randomly sampled from the three agricultural blocks in the district. Within the block, two camps (Sinafala and Chipepo) were randomly picked. Proportionate to size of the population was used to select the number of households from each of the two camps. Using systematic random sampling technique, 150 respondents were selected from the two agricultural camps.

To determine the sample size the following formulae was used to avoid biasness in determining the sample size as used by Mugenda, (1999)

$$N = \frac{Z^2 p(1-p)}{F^2} \quad \text{.....(1)}$$

Where; N = required sample size, Z = confidence level at 95% (standard value of 1.96), p = estimated proportion of an attribute, which was estimated at 90% due to the fact that about 90% of the rural population in Gwembe keep goats (MAFF, 2004) and F= margin of error at 5% (standard value of 0.05). Therefore, using Equation (2), N was determined.
The sample size was adequate and reliable, therefore valid generalization will be made.

3.4 Methods of Data Collection

Primary data was collected through the administration of semi-structured questionnaires from the 150 respondents in the study area. The questionnaires were administered to the farmers by a team of enumerators who were trained for three days.

3.5 Methods of Data Analysis

A number of statistical tools were employed to address the stated objectives of this study. The analytical tools which were used included: descriptive statistics, gross margins and multinomial logistic regression analysis. The softwares used for the analysis were: Statistical Package for Social Sciences (SPSS) for descriptive statistics, Excel for graphs and pie charts while Stata was used for multinomial logistic regression analysis.

3.6 Model Specifications

Both descriptive and quantitative statistics were used in the analysis of the data. Enterprise returns were determined using gross margin analysis to measure the competitiveness of goat production as compared to other enterprise among smallholder farmers. Multinomial Logit model was used to analyze the socio-economic factors that influence the role of goat production on socio-economic status of small holder livelihoods.

Objective 1

To determine the socio-economic characteristics of small holder livelihoods involved in meat goat production descriptive statistic was used in the analysis.

Table 1: Descriptive of variables and expected signs used in objective 1

Variable Code	Variable	Description and Units	Expected Sign
AGE	Age of household head	Number of years	+
GEN	Gender of household head	Male/female	+
MART	Marital status	Discrete variable	+
Hhsize	Household size	Number	±
INCOME	Source of income	Continuous	±
LSIZE	Size of cultivated land	Hectares	+
EDU	Education level	Years of schooling	±
EXPER	Experience in goats	Years of keeping goats	±
Gsize	Goat herd size	Number	±

Source: Author

Objective 2

To establish the competiveness of meat goat enterprise with regards to other units among smallholder livelihoods gross margin analysis was used. Gross margin analysis is often used in determining the performance/or comparing enterprises on the farm or between farms. This model was used to determine the performance of goat enterprise among small holder farmers and also for comparison between enterprises on the same farm in Gwembe district. Major livestock and crop enterprises were selected for comparisons to be made.

A number of studies have been carried out to determine the performance of enterprises and comparison of similar enterprises among farmers within the same group farming ability using gross margin models (Abbot and Makeham 1990). Gross margin (GM) is used for comparative analysis of activities on one farm and between farms that are in similar environment. This model was used by Ekunwe and Soniregun, (2007) to determine the performance and returns of small ruminants (sheep and goat). Gross margin is the difference between the Total Revenue (TR) and the Total variable cost (TVC) per unit of a fixed input required to produce the crop or a particular livestock product. This can be presented as follows;

$$GM = TR - TVC \quad \text{.........................(2)}$$

Where:

GM= Gross Margin

TR= Total Revenue

TVC= Total Variable Cost

Total Revenue = Total Quantity of Output X Price per Unit Output

Total Variable Cost= Total Physical Input X Price per input unit.

Gross margin per unit of output is calculated using the formulae:

$$GM / Unit = \frac{GM}{TPP}, \quad \text{.........................(3)}$$

Where;

GM/Unit= Gross Margin per Unit output in Kwacha

GM= Gross Margin

TPP= Total Physical Product (number of goats produced)

Table 2: Description of variables used in gross margin model

Variable Code	Variable	Description and Units	Expected Sign
GM	Gross margin	Kwacha	$\pm$
TOR	Total Revenue	Kwacha	+
INPUTs	Quantity of inputs	Kilograms	+
OUTPUT	Quantity of output	Kilograms	+
PRICES	Prices of input/output	Kwacha	+

Source: Author

Objective 3

To establish the role of meat goat production on socio-economic status of small holder livelihoods in Gwembe district descriptive statistics were used. While multinomial logit model was used to determine the socio-economic factors that influence the role of meat goat production on smallholder livelihoods. Multinomial logit model was used to analyze crop (Kurukulasuriya and Mendelsohn, 2008; Hassan and Nhemachena, 2008) and livestock (Seo and Mendelsohn, 2008) choices as methods to adapt to the negative impacts of climate change. The advantage of the Multinomial logit model is that it permits the analysis of decisions across more than two categories, allowing the determination of choice probabilities for different categories (Madalla, 1983; Wooldridge, 2002) and it is also computationally simple (Tse, 1987).

It is an extension of the binary logit model having more than two values for the dependent variables. Multinomial logistic regression involves nominal response variables for more than two categories. A response variable with K categories will generate $K-1$ equations. Each of these $K-1$ equations is a binary logistic regression comparing a group with the reference group. Multinomial logistic regression simultaneously estimates the $K-1$ logits. Further, it is also the case, that the model tests all possible combinations among the K groups although it only displays coefficients for the $K-1$ comparisons. The model has been chosen because the dependent variable Y has more than two values. $Y_i = j$, $j = 0,1,2....K$ respectively.

In this application, the values of Y represents four type of reasons (dependent variables). Let $(p_0,p_1,.....,p_K)$ be the probability of $K-1$ alternatives of selection The model is

specified as;

$$P(Y=j)=\frac{\exp^{x_i\beta_j}}{1+\sum_{j=1}^{m}\exp^{x_i\beta_j}} \quad \ldots\ldots(4)$$

Using identification normalization with an arbitrary restriction by setting $\beta = 0$, the probabilities are going to be given by:

$$P(Y=0)=\frac{1}{1+e^{\beta_1 x_i}+e^{\beta_2 x_i}+\ldots+e^{\beta_m x_i}} \quad \ldots\ldots(5)$$

$$P(Y=j)=\frac{e^{\beta_j x_i}}{1+e^{\beta_1 x_i}+e^{\beta_2 x_i}+\ldots e^{\beta_m xi}} \quad \ldots\ldots(6)$$

Where β is $K\text{-}1$, $j=1\ldots.m$

To describe this model let y denote a random variable taking on the values (1,2,..*j)* for j is a positive integer. Let x_i denote a set of explanatory variables

In the model, Y denotes role of goats among smallholder livelihoods (dependent variables), which are:

1. Prestige
2. Consumption
3. Security
4. Tradition
5. Income

The explanatory variables (independent variables) are specified as a function of socio-economic and institutional factors denoted by X_i.

GENDER- gender of the household head who is responsible for making decisions

AGE- the age of the household head at the time of the survey

MART- marital status of the household head

Hhsize - the number of individuals staying in the same house

EDU - the highest education level attained by the household head

EXPER- Length of time the Household have been keeping goats

TYPELAND - the type of farm he has whether its private or communal

GOATSOWNED - number of goats owned

ASSOCIATION - organizations of farmers with the area of the study

SALESPERIOD - the period of sales of goats during the year

The parameter estimates of the Multinomial Logit model provide only the direction of the effect of the independent variables on the dependent (response) variable, but estimates do not represent either the actual magnitude of change or probabilities (Temesgen, 2010). Therefore, odds ratios (relative risk ratio) have been preferred.

The ratio of the probability of choosing one outcome category over the probability of choosing the baseline category is often referred to as relative risk (and it is also sometimes referred to as odds). Relative risk ratio is equivalent to the exponentiated coefficients from the multinomial logistic model, yielding regression coefficients that are relative risk ratios for a unit change in the predictor variable.

Let

$$P(y_i = j) = P_{ij} \quad \ldots\ldots(7)$$

$$\frac{P_{ij}}{P_{io}} = \exp\left(X_i \beta_j\right) \text{ risk ratio} \quad \ldots\ldots(8)$$

The relative risk ratio (odds) tells how the probability of choosing j relative to 0 changes if X is increased by one unit.

$$\frac{P_{ij}}{P_{io}} = \exp\left[(X_i + 1)\beta_j\right] \quad \ldots\ldots(9)$$

Such that

$$\exp(\beta_j) = \frac{P_{ij'}}{P_{io'}} \Big/ \frac{P_{ij}}{P_{io}} \quad \ldots\ldots(10)$$

is the relative risk ratio (RRR)

The **RRR** option for **mlogit** command to display the regression results in terms of relative risk ratios is used.

Therefore, since the parameter estimates are relative to the referent group, the standard interpretation of the multinomial logit is that for a unit change in the predictor variable, the logit of outcome *m* relative to the referent group is expected to change by its respective parameter estimate given the variables in the model are held constant (Alexander, 2007). That is variable x increases (decreases) the probability that alternative j is chosen instead of the baseline alternative if relative risk ratio (RRR) > (<) 1.

Table 3: Description of variables and the expected signs used in multinomial logit model

Variable Code	Variable	Description and Units	Expected Sign
Dependant Variables			
REAS	Reasons for keeping goats	Discrete variables	±
Independent Variables			
GEN	Gender of household head	male/female	+
AGE	Age of household head	Number of years	+
MART	Marital status	Discrete variables	+
Hhsize	Household size	Number	±
EDU	Education level	Years of Schooling	±
EXPER	Experience of keeping goats	Years	±
Fsize	Farm size	Hectares	±
FTYPE	Farm type	Private/Communal	±
LOC	Location	Area	±

Source: Author

Objective 4

To establish the involvement/participation of other service providers in meat goat production descriptive statistics was used in the analysis

Table 4: Description of variables and the expected signs used in objective 4

Variable Code	Variable	Description and Units	Expected Sign
Dependant Variables			
IPART	Involvement of Other service Providers	Continues	±
Independent Variables			
PRESEN	Presence of Service Providers	Dummy	±
ROLE	Role played	Discrete Variables	±
SERV	Service Provided	Discrete Variables	±
IMPACT	Impact of Service Providers	Discrete Variables	±
ASSIST	Assistance rendered	Discrete Variable	±

Source: Author

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents the results of the qualitative and quantitatively analyzed data for the study. The discussion of the findings is presented under the following subsections drawn from the objectives of the study.

- Socio-economic characteristics of sample household.
- Competitiveness of meat goat production with regards to other enterprises among smallholder livelihoods.
- Role of meat goat production on socio-economic status of small holder livelihoods.
- The participation of other service providers in meat goat production

4.1 Socio-economic Characteristics of Sample Household

Socio-economic characteristics that were important were; gender, age, marital status, level of education, land ownership, occupation, sources of income, family size, associations and time of sale of goats.

4.1.1 Age of Household Head

Table 5 shows the ages of the household heads involved in meat goat production. The ages were categorized into 5 groups, that is, less or equal to 20 years, 21-30 years, 31-40 years, 41-50 years and 51 or above so as to make it easier to determine which age group is highly involved in goat rearing.

Table 5: Percent distribution of age of household head involved in meat goat production

Age in years	Number of farmers	Percentages
Less or equal to 20	2	1.3
21-30	43	28.7
31-40	42	28.0
41-50	38	25.3
51 or above	25	16.7
Total	150	100
Mean age 38.86 years		
Minimum age 19		
Maximum age 66		
std. deviation 11.18		

Source: Field survey data May, 2012

The mean age of the household head involved in goat production was 38.86 years. Goat production was not restricted to any particular age group, but all household heads above 21 years were involved in almost equal proportions, but those above 51 exhibited lower proportions (Table 5) probably because of the restive nature of goats which older people cannot cope. However, Otchere (2009), reported a contrary finding that the older persons were the ones most involved in small ruminant production in Southeast, Nigeria.

4.1.2 Gender of the Household and Average Household Size

According to the results 65.3% of the households were male headed while 34.7% were female headed (Table 6), meaning that more males were involved in meat goat production as compared to females. Although the percentage of women involvement was low, it is an indicator that there was participation by them in the industry. The difference in numbers between female and male headed households is probably attributed to the cultural belief that males are responsible for livestock production. This confirms Jibowo (2000), who posited that women in rural areas not only assist their husbands in harvesting and carrying farm products from the farm, but are allowed to raise small ruminants like sheep, goats and local birds. Majority of households (86%) were married as compared to single 6%, widowed 6.7% and 1.3% divorced. While the average family size was 6 persons per household.

Table 6: Demographic characteristics of households involved in meat goat production

Characteristic	Number of Observation	Percent
Agricultural camps		
Chipepo	94	62.7
Sinafala	56	37.3
Total	**150**	**100**
Gender		
Male	98	65.3
Female	52	34.7
Total	**150**	**100**
Marital status		
Single	9	6.0
Married	129	86.0
Divorced	2	1.3
Widowed	10	6.7
Total	**150**	**100**
Family size		
1-5	59	39.3
6-10	76	50.7
11-15	14	9.3
16-20	1	0.7
Total	**150**	**100**
Minimum family size 1		
Maximum family size 19		
Mean family size 6.2	Std deviation 3.02	

Source: Field survey data May, 2012

4.1.3. Occupation of Household Head

The primary occupations of household heads involved in meat goat production were as shown in Figure 3. The largest proportion (98%) was involved in farming, while 1.3% was in formal employment. The remaining 0.7% was engaged in business. Farming is almost the absolute occupation and underscores the need to study the enterprise.

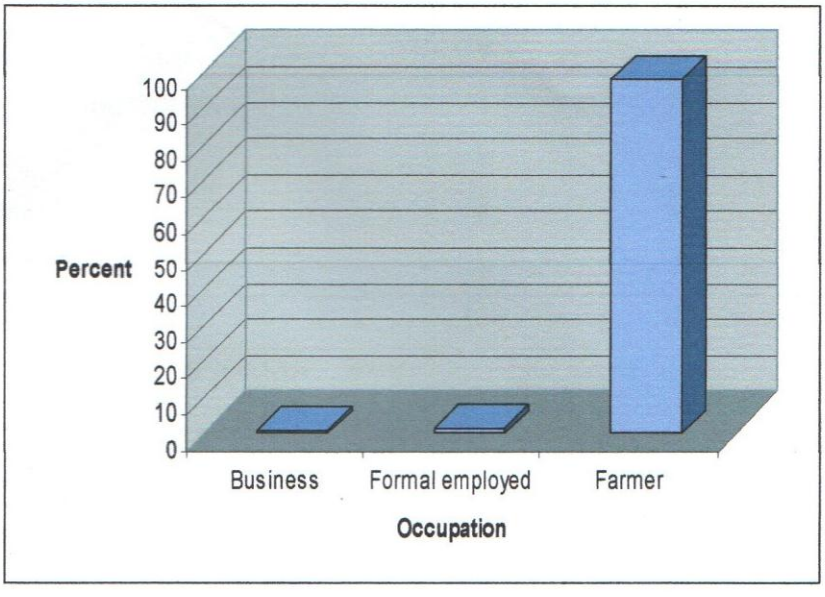

Figure 3: Primary occupation of the households

Source: Computed from Field Survey data May, 2012

4.1.4 Source of Income

The sources of income can be grouped into three: livestock, crops and off-farm (including the sale of "*kapenta*", charcoal, "*salaula*" and employment). According to results in Table 7, most of the households (51.3%) derived their income from the sale of both livestock and crops. Households involved in all the three sources were 26.7%, while crops and off-farm was 6%, and livestock and off-farm was 2.7%. For crops alone it was 6%, livestock 5.3%. Households which neither generated income from livestock nor crop enterprises but from off-farm activities were 2% and were keepers of goats.

Table 7: Percent distribution of sources of income

	Number of Observations	Percent
Crops, Livestock and Off-farm	40	26.7
Crops and Livestock	77	51.3
Crops and Off-farm	9	6
Livestock and Off-farm	4	2.7
Crops	9	6
Livestock	8	5.3
Off-farm	3	2
Total	**150**	**100**

Source: Field Survey data May, 2012

4.1.5 Size of Cultivated Land

On average the area cultivated per household in Sinafala and Chipepo camps was 3.6 hectares (Table 8). Main crops grown were maize, cotton, sorghum, sweet potatoes, groundnuts and millet. Since the system of land ownership in those areas is communal for every household, the land not put into crop production is used to graze livestock. Other than goats the other livestock kept included cattle, poultry and pigs.

Table 8: Percent distribution of cultivated land, 2010/2011 season

Hectares	Number of observations	Percentage
0-3	82	54.7
4-8	58	38.7
9-12	9	6.0
13-16	1	0.6
Total	150	100
Minimum number cultivated 0.75 hectares		
Maximum number cultivated 13.0 hectares		
Mean number cultivated 3.634 hectares		
Std deviation 13.432		

Source: Field Survey data May, 2012.

4.1.6 Education Status

Table 9 presents the level of education of households who were involved in goat production. Most farmers had low levels of education where 51.3% attended primary education and 26.7% basic school education level. Musaba (2008), reported similar results on education background of livestock keepers in northern Namibia among communal farmers. Farmers who have attained primary and basic school level of education are assumed to read and write therefore, more likely to appreciate new information. Those who never went to school accounted only for 18%, while those who reached high school and tertiary education were 3.3% and 0.7% respectively.

The fewer numbers with high school and tertiary education would imply that as individuals get more educated, the chances of them being involved in some agricultural activities like goat rearing reduce. This is because they may have a number of alternatives especially off farm. Interestingly, households with primary and basic education participate in goat rearing more than those with no education. Their level of education enables them to make decisions involving taking risks in new enterprises like meat goat rearing.

Table 9: Percent distribution of education level of farmers

	Number of Households	Percentage
None	27	18
Primary	77	51.3
Basic School	40	26.7
High School	5	3.3
Tertiary	1	0.7
Total	150	100

Source: Field Survey data May, 2012

4.1.7 Experience in Goat Production

Figure 4 presents the length of experience in meat goat production by households. The majority of the households (60%) had experience of more than 5 years, 7% had 4-5 years, 11% between 3-4 years, 15% had 2-3 years of experience while 7% were less or equal to 1 year of experience. The length of experience indicates that meat goat production is a fairly new enterprise in the region probably necessitated by the inability to sustain cattle due to disease.

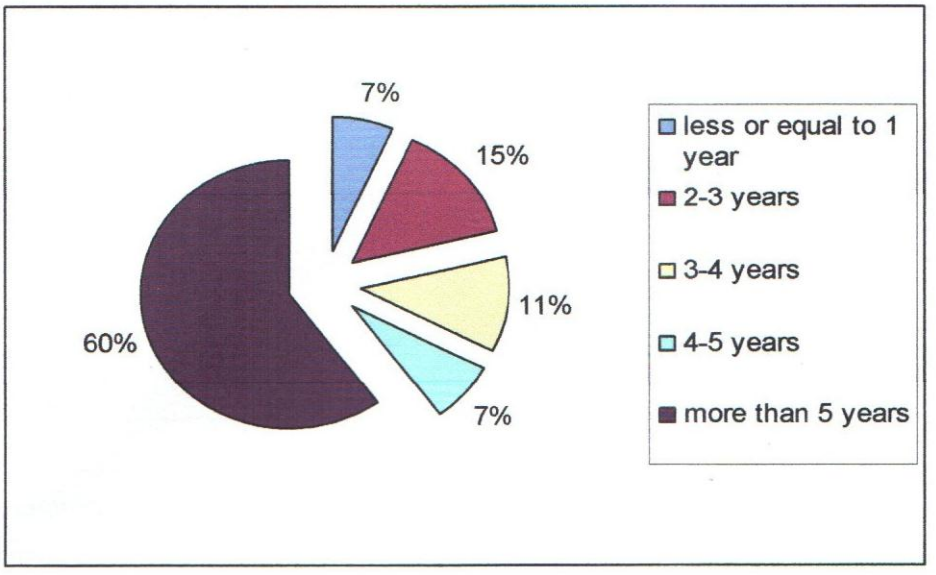

Figure 4: Experience of smallholder farmers by percent

Source: Field Survey data May, 2012

4.1.8 Number of Goats kept

The minimum number of goats owned by a household was 2, maximum 59 and mean was 20. This varied greatly between the households as it is reflected by the standard deviation of 13.432 shown in Table 10

The highest proportion of the households (30%) owned less than 10 goats, followed by those who had between the ranges of 11 to 20 (about 29%) and the lowest group was for those who owned more than 50 goats. The bigger the size of the goat herd the fewer the households who own such herd sizes. Otchere (2009) reported that majority of small ruminants is owned by individuals or families in rural areas and the numbers per group is small. The few numbers of goats kept are disappointing in an area like Gwembe where other livestock like cattle cannot thrive. It is apparent there is still little appreciation of the commercial value of meat goats which needs to be brought to the fore.

Table 10: Number of meat goats kept

Goat Population	Number of Households	Percentages
Less or equal to 10 goats	45	30
11-20 goats	44	29.3
21-30 goats	25	16.7
31-40 goats	20	13.3
41-50 goats	13	8.7
51 and above	3	2.0
Total	**150**	**100**
Minimum number owned 2		
maximum number owned 59		
Mean number owned 19.92		
Std deviation 13.432		

Source: Field Survey data May, 2012

4.2 Competitiveness of Goat Production with Regards to other Enterprises among Smallholder Livelihoods

Competitiveness refers to the ability to charge a price above cost and be able to sell the goats in a competitive market. Therefore, to determine the competitiveness of goat production, Gross Margin analysis was used.

4.2.1 Income Contribution of Goat Enterprise

Among the goat keepers 82.7% sold goats during 2010/2011 season, while the remaining 17.3% did not sell (Table 11). The mean number of goats sold was 3. For the same season (2010/2011 season) the minimum price offered was ZMK40, 000.00, while the maximum was ZMK80, 000.00 per animal and mean price was ZMK55, 000.00 equivalent to about 11.00 US dollars.

Table 11: Goat sales during 2010/2011 season

Detail	Number of Household	Percent
Sold	124	82.7
Did not sell	26	17.3
Total	**150**	**100**
Minimum number sold	0	
Maximum number sold	13	
Mean	3.33	
Std deviation	2.63	

Source: Field Survey data May, 2012

To determine the profitability of the goat enterprise, gross margin per animal was used as presented in Table 12. The variable inputs identified were; dip, drugs and family labour. The opportunity cost of family labour was estimated to be ZMK30, 000.00 per animal per year.

To measure the actual contribution of meat goat enterprise to the livelihoods of smallholder farmers, the gross margins per unit of other identified farm enterprises were calculated. The calculations are based on the following: crops 1 hectare, goats 1 mature animal, cattle 1 mature animal, piggery 1 mature pig and poultry per bird. The figures in Table 12 were based on average costs for each item, calculated from the entire sample.

Table 12: Gross margins per unit of enterprise in Zambian Kwacha (ZMK)

Details	Enterprises							Total
	Goat	Cattle	Poultry	Piggery	Maize	Cotton	Off-farm	
Variable Costs	ZMK	ZMK	ZMK	ZMK	ZMK	ZMK	ZMK	ZMK
Dip	1,237	120,500	-	-	-	-	-	121,737
Vaccines	-	73,000	500.00	-	-	-	-	73,500
Drugs	922	46,000	500.00	15,000.	-			62,422
Feeds	-	-	1,000.	10,000.	-	-	-	11,000
Family labour	30,000	30,000	-	30,000.	70,000	100,000		260,000
Basal Dressing	-	-	-	-	167,000	167,000	-	334,000
Top dressing	-	-	-	-	165,000	165,000	-	330,000
Weed killer	-	-	-	-	45,000	80,000	-	125,000
Pesticides	-	-	-	-	-	75,000	-	75,000
Seed	-	-	-	-	120,000	70,000	-	190,000
Ploughing	-	-	-	-	50,000	50,000	-	100,000
Weeding	-	-	-	-	45,000	50,000	-	95,000
Purchased material	-	-	-	-	-	-	365,000	365,000
Packaging	-	-	-	-	30,000	25,000	80,000	135,000
Transportation	-	-	-	-	10,000	30,000	50,000	90,000
Other expenses	514	5000	2000	10,000	5,000	3,500	80,000	106,014
TVC	**32,673**	**274,500**	**4,000**	**65,000**	**707,000**	**815,500**	**575,000**	**2,473,673**
Income								
Sales	**55,000**	**990,000**	**11,650**	**100,000**	**975,000**	**1,250,000**	**837,580**	**4,219,230**
Gross Margin	**22,327**	**715,500**	**7,650**	**35,000**	**268,000**	**434,500**	**262,580**	**1,745,557**
GM/TVC	**0.68**	**2.61**	**1.91**	**0.54**	**0.38**	**0.53**	**0.46**	

Source: Calculated from Field Survey data May, 2012

GM = Gross Margin, TVC = Total Variable Costs, ZMK = Zambian Kwacha, Exchange rate $1 to ZMK4800.00 as on 30th Sept. 2012.

Gross margin is a useful tool in measuring the performance of individual enterprises on a farm. They can be used in deciding the combination of enterprises on a farm with regards to the most limiting factor and their profitability. Abbot and Makeham (1990) used gross margins per unit of the most common limiting factor to decide on the combination of enterprises on the farm.

The results indicated that the gross margin contributed to livelihoods per mature goat was ZMK 22,327.00 equivalent to 4.47 US dollars, meaning that for an average of 3 goats sold per household per year the total gross margin realized was ZMK 66,981.00 equivalent to 13.40 US dollars. Basing on gross margins, goat enterprise ranked fifth after cattle, cotton, maize and piggery, with respective gross margins as ZMK715, 500.00, ZMK434,500.00, ZMK268,000.00 and ZMK35, 000.00. Off-farm earnings were about ZMK262, 580.00.

Apart from gross margins, profitability ratios can shed light on the ranking of enterprises. Profitability Ratio (PR) is calculated by dividing gross margin with total variable cost. Based on these ratios, goat enterprise was the third most profitable with a value of 0.68, cattle and poultry enterprise with values of 2.61 and 1.91 respectively.

Despite cattle and poultry enterprises showing superior profitability, Gwembe valley is a marginal area, where cattle do not thrive because of trypanosomiasis and feed scarcity (DAPH, 1993; Ahmadu *et al.*, 2000), conditions are similarly unfavourable for poultry if they must depend on scavenging. Poultry can only be sustainable when commercial feeds are used. On the other hand, goats' adaptability, prolificacy and modest nutrient requirements make them well adapted to poor marginal lands (Ahmadu *et.al.*, 2000).

To further understand the contribution of meat goat enterprise, the gross margin per goat was expressed as a percentage of the total gross margin per household. It was obtained that the contribution from every goat sold, towards the livelihoods of smallholder farmers per year was 1.3%. Therefore, the more goats one sells, the more contribution they make towards the livelihoods of households. Shirima (2005) found that goats' additional income accrued from the sale of goats and their products to average 0.22 USD per person per day a study which was carried out in Kondoa eroded area, Tanzania.

4.3 Role of Meat Goat Production on Small holder Livelihoods

Meat goat rearing is one of the enterprises embraced as an agricultural activity. A number of households were involved in goat rearing for a number of reasons. There were four major roles goat production played among the households: home consumption, security, tradition and income. Interestingly no respondent chose prestige therefore, it was left out of the discussions which followed and even in the model. Table 13 presents the role of goat production on small holder livelihoods. Results showed that most of the households (42.7%) went into goat production for security reasons against any emergencies needing money or

livestock. This could be plausible because being a dry area, some unanticipated events may arise. Ayele and Peacock, (2003) reported that during the severe drought of 1999- 2000 in Ethopia, households who sold livestock were able to buy grain and survive the drought without resorting to food aid handouts.

One would have thought income to be the driving force behind keeping goats but it was interesting to realize that the households who kept goats for income was 39.3%, which was less than that for security. The other reasons such as home consumption (14%) and traditional (4%) were not prominent. These findings are similar to those of Mahanjana and Cronje, (2000) who reported that goats in Mgwalana community, South Africa were kept for traditional ceremonies, cash sales, home meat consumption and store wealth as a hedge against emergencies (security). Schoeman *et al.*, (2010), reported that at the rural community level, goats play a significant role in the food chain and overall livelihoods of the poor rural households where they were also largely the property of resource poor women and their children.

Table 13: Description of the role of meat goat production on households

Role	Number of Household	Percentage
Home consumption	21	14
Security	64	42.7
Tradition	6	4
Income	59	39.3
Total	**150**	**100**

Source: Field Survey data May, 2012

4.3.1 Socio-economic Factors Influencing Role of Meat Goat Production

The roles played by goats (home consumption, security, tradition, and income) are influenced by socio-economic factors including occupation, education, income, marital status, age, family size, place of residence and religion/associations.

The multinomial logit model was used to estimate the influence of socio-economic factors on the role of goat production on smallholder livelihoods. The dependent variables in the empirical estimation were the role of goat production on smallholder livelihoods as described in Table 13. The estimation of the multinomial logit model in STATA automatically chooses the most frequent category to be the default reference group or the base category. Therefore, security became the reference group, for comparison with the other dependent variables which were home consumption, tradition and income. Prestige was left

out off the model because it was insignificant (not chosen by any of the respondents). The independent variables in the model were specified as a function of socio-economic and institutional specific attributes such as; gender, age, education, marital status association, experience, sales period, family size and goats owned.

The results of multinomial logit model showing the influence of individual socio-economic and institutional attributes on the role of goat production on small holder livelihoods are presented in Table 14.

Table 14: Marginal log probabilities of factors influencing role of meat goat production

Factors influencing Role	RRR	Std. Err.	Z	P>z	[95% Conf.	Interval]
Home consumption						
Gender	0.711	0.503	-0.48	0.629	0.177	2.846
Age	1.011	0.038	0.3	0.763	0.940	1.088
Marital	0.986	0.485	-0.03	0.977	0.376	2.586
Family size	0.790	0.088	-2.12	0.034**	0.635	0.982
Education	0.204	0.130	-2.49	0.013**	0.058	0.711
Typeland	2.602	10.119	0.25	0.806	0.001	5308.389
Goatsowned	0.966	0.026	-1.29	0.199	0.916	1.018
Experience	0.626	0.195	-1.5	0.133	0.340	1.152
Association	0.141	0.111	-2.49	0.013**	0.030	0.661
Salesperiod	0.086	0.094	-2.25	0.024**	0.010	0.727
Tradition						
Gender	4.442	6.379	1.04	0.299	0.266	74.105
Age	1.131	0.078	1.77	0.077*	0.987	1.295
Marital	0.831	0.650	-0.24	0.813	0.179	3.849
Familysize	0.492	0.172	-2.02	0.043**	0.248	0.978
Education	1.024	0.978	0.03	0.980	0.158	6.650
Typeland	5.501	53.545	0.18	0.861	2.851	1.061
Goatsowned	0.898	0.057	-1.7	0.090*	0.793	1.017
Experience	0.971	0.568	-0.05	0.960	0.308	3.059
Association	0.373	0.592	-0.62	0.535	0.016	8.407
Salesperiod	0.718	1.191	-0.2	0.842	0.028	18.529
Income						
Gender	1.334	0.699	0.55	0.583	0.477	3.727
Age	0.860	0.035	-3.71	0.000***	0.794	0.931
Marital	0.562	0.363	-0.89	0.373	0.158	1.994
Familysize	0.994	0.090	-0.06	0.950	0.833	1.187
Education	2.403	0.995	2.12	0.034**	1.067	5.410
Typeland	5.843	6.867	1.5	0.133	0.584	58.490
Goatsowned	1.024	0.023	1.08	0.278	0.981	1.070
Experience	1.202	0.281	0.79	0.431	0.761	1.900
Association	0.907	0.563	-0.16	0.875	0.269	3.061
Salesperiod	2.191	1.217	1.41	0.158	0.738	6.507

Source: Generated from Field Survey data May, 2012

Reference group	Security
Dependent variables	Roles
Number of observations	150
Log likelihood with no restriction	-108.03829
Chi-squared	119.33
Significance level	0.00000

The asterix *, **, and *** represents significance at 10%, 5% and 1% respectively

There were four variables significant for home consumption role. According to the results in Table 14 family size, education, belonging to an association and sales period all had negative implication to keeping goats for home consumption and all significant at 0.05 level. The negative relationships imply that home consumption is not a priority for households whether with large family size, high levels of education or belonging to farmer associations. Households may be more interested in other roles of goats than home consumption. This concurs with earlier descriptive results where the home consumption variable was not prominent.

An increase in family size reduces the probability of keeping goats for home consumption by 0.79 times. Since the number of goats per household are not large, the larger the family size, the more goats become useful for other purposes rather than home consumption.

As an individual attains higher levels of education, the probability of keeping goats for home consumption is decreased by 0.20 times. This suggests that as individuals get educated they tend to make more rational decisions on the utilization of goats rather than home consumption. Better education promotes good understanding, use of better methods and encourages more efficient farm management practices (Mbam and Edeh, 2011).

Belonging to associations dealing in goat production results in a decrease in probability of an individual keeping goats for home consumption by 0.14 times. This could be because as individuals interact with each other they learn more about the possible options of using goats and make the appropriate decisions. Muhikambele *et al.*, (2001) reported that with the help of farmer associations households were able to collectively tackle problems relating to livestock production, set prices acceptable to all, seek and communicate with markets for their livestock in Mgeta and Gairo, Tanzania.

As time for selling of animal changes from harvest period through dry period to rain season the probability of keeping goats for home consumption decreases by 0.09 times. It implies that in some parts of the year goats contribute to household food security and can easily be converted into cash instead of being kept for home consumption. Goats are highly mobile capital good and can easily be liquidated during period of crisis for the family (Jarvis, 1993). Imana, (2008) reported that mostly income for poor livestock – keepers is highly seasonal.

The variables significant for traditional role for keeping goats were: age, family size and goats owned. Age was positive and significant at 0.1 level because as an individual gets older the probability of keeping goats for traditional reasons increases by 1.13 times. This could be because older persons in rural areas tend to maintain livestock including goats as a sign of prestige.

The effect of family size on keeping goats as a result of traditional reasons was negative and significant at 0.05 level. If the family size was to be increased by one unit the probability of keeping goats because of traditional roles reduced by 0.49 or otherwise. This relationship implies that as the family size increases the household realizes that keeping goats should not be for traditional reasons. They act as a source of security for any unforeseen circumstances such as raising money for school fees, hospital and also in case of agricultural production failures. Fakoya (2009), reported variables such as age, years of rearing experience and education having direct impact on small ruminant production which includes goats.

The number of goats owned was negative and significant at 0.1 level. An increase in the number of goats owned reduced the probability of keeping goats for tradition reasons by 0.9 times. The findings suggests that an individual could have been keeping goats as a result of traditional reasons but once the number increases the individual may realize that actually goats can perform a number of roles one of them being security reasons.

The significant variables at 0.05 level relating to income roles were age and education. Education positively and significantly influenced keeping goats for income. As an individual attains high levels of education, the probability of such an individual keeping goats for income increases by 2.4 times. This implies that education creates awareness that a unit like goat enterprise should be run as a business and it should generate income for the household. But at the same time, as an individual gets older the probability of such an individual to keep goats for income reduces by 0.86 times. This reinforces the fact that as goat owners get older, they tend to keep goats for security and not other reasons.

From the foregoing results of the multinomial logistic model, the results confirm the findings of Ajala *et al.*, (2008), that goats do not only provide meat and as a source of regular cash income but also as security or asset only to be sold when extra cash is needed. It is also clear that different socio-economic and institutional characteristics have influence on the role

of goat production on smallholder livelihoods.

4.4 The Participation of Other Service Providers in Meat Goat Production

4.4.1 Presence of Other Service Providers in the Industry

In both Chipepo and Sinafala 93% of the households indicated that there were some other institutions (government, private businessmen and non-governmental organizations) involved in goat production, while 7% did not acknowledge the participation of other service providers, as presented in Figure 5.

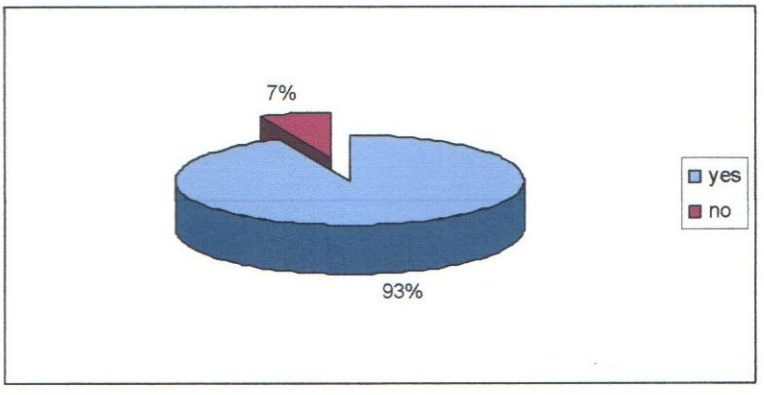

Figure 5: Percent distribution of participation of other service providers

Source: Calculated from Field Survey data May, 2012

The presence of service providers relating to goat production was recognized by the community. The proportions of households recognizing participation of government extension workers were 90.7%, and 24.7 and 0.7% for nongovernmental organizations and private business men respectively as presented in Table 15.

The roles played by these service providers differed significantly and ranged from advisory services, breeding stock, provision of inputs and market for the goats. The assistance offered by the government extension workers was purely advisory on technical lines in terms of goat production. While the assistance given by non-governmental organizations was in form of inputs, mainly breeding stock and drugs (to mostly associations). The private businessmen distributed inputs according to requests from individual farmers as well as providing the market of goats.

Table 15: Participation of other service providers in the goat industry

	Number of Observations	Percent
Government Extension workers		
Yes	136	90.7
No	14	9.3
Total	150	100
Non-governmental Org.		
Yes	37	24.7
No	113	75.3
Total	150	100
Private business men		
Yes	1	0.7
No	149	149.3
Total	150	100

Source: Field Survey data May, 2012

4.4.2 Involvement of Smallholder Farmers as a result of Other Service Providers

When the smallholder farmers were investigated as to whether or not their involvement in goat rearing was due to the influence of these organizations operating in the area. Most of the households, (92%) were not influenced by other service providers, suggesting that with or without the organizations' presence in the area they would still be involved in goat production. It was only 8% of the households which agreed their involvement was due to the participation of these service providers in goat production within the area. This has been summarized in figure 6.

The general implication is that, although the majority of the households were acknowledging the presence of other institutions being involved in the goat industry, the inclusion of goats as one of the enterprises on their farm was not because of these organizations.

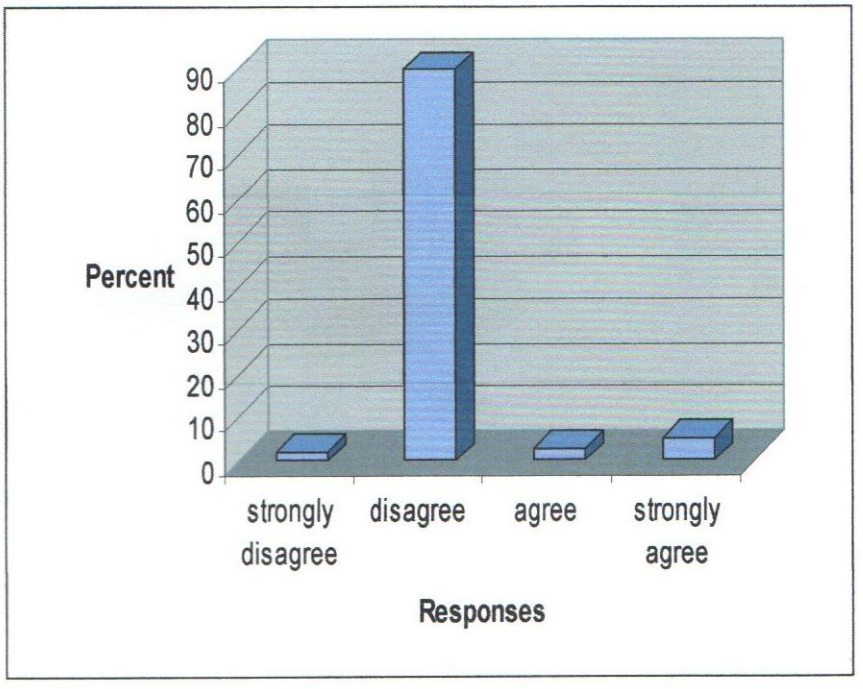

Figure 6: Involvement in goat production due to service providers

Source: Field Survey data May, 2012

4.4.3 Influence of Other Service Providers on Non-goat Keepers

The perception of households on other service providers regarding the introduction of goat keeping to households who are currently non-goat keepers in the near future is summarized in Figure 7.

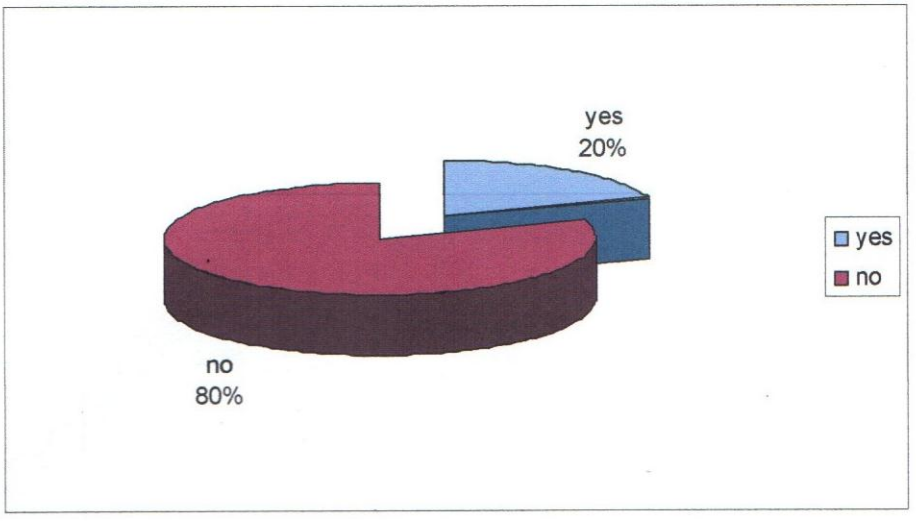

Figure 7: Recruitment of more smallholder farmers into goat production by service providers

Source: Field Survey data May, 2012

The decision by farmers to engage in goat production in the near future due to the presence of service providers was extremely low (20%). On the other hand, 80% of the households did not foresee more of the non-goat keepers going into goat production as a result of the activities of these organizations. This implies that the involvement of smallholder non-goat keepers in goat production in future may not depend on external forces or activities of such service providers operating in the area. It is likely to result from other informal social networks involving farmers.

4.4.4 Impact of Service Providers on Smallholder Livelihoods

Small ruminants and more specifically goats are of economic importance to farmers and especially smallholder farmers in marginal areas (Tchad, 1989). The impact of other service providers on the livelihoods of smallholder farmers is summarized in Figure 8. Although 93.3% acknowledged the participation of other service providers in the goat industry, their impact on the livelihoods of the smallholder farmers was viewed differently. About 43% of the respondents agreed having improved their understanding of goat production due to the services rendered by these organizations and 25% accepted having improved their food security. Any change in their lives to have been brought by the activities of these organizations through goat production was refuted by 23%. Interestingly, only 9% of

the households attributed increase in their income being as a result of these organizations helping in goat production.

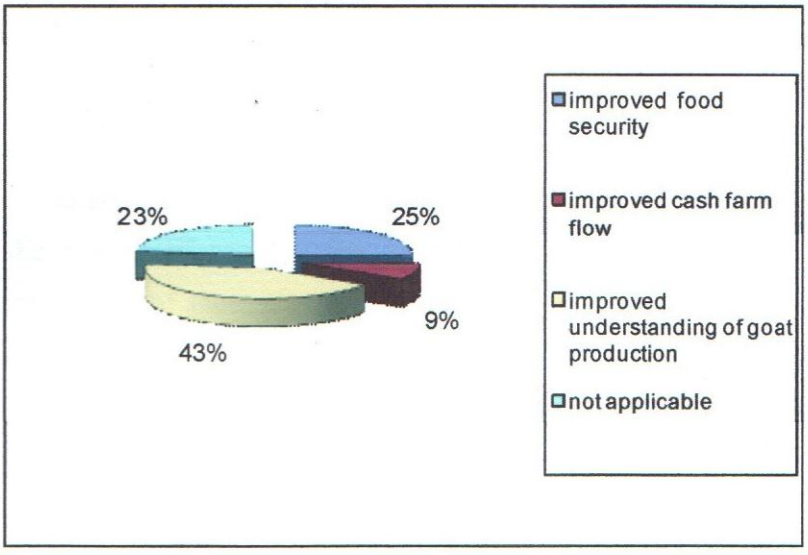

Figure 8: Impact of Service Providers on Smallholder livelihoods

Source: Field Survey data May, 2012

Generally, despite the 23% of the respondents not appreciating the presence and contribution of these service providers, 77% acknowledged their efforts. They cited improvement in their livelihoods through; food security, cash farm flow and understanding of goat production, hence contributing to the economic well being of the small holder farmers who are in goat production.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

The success of meat goat production for economic well-being of smallholder livelihoods must ultimately be measured by their economic contribution towards the socio-economic status of small holder livelihoods. Therefore, the role of goat production in the rural household structure and socio-economic status within Zambia's subsistence economy is defined by the reasons of having goats in their production systems. To understand the economic contribution of meat goat production to smallholder livelihoods in Zambia the study discussed the social economic characteristics of the sampled household, income contribution of goat enterprise, the role of goat production on socio-economic status of small holder livelihoods and the involvement of other service providers in the industry.

5.1 Conclusion

Meat goat production was not restricted to any particular age group, but all household heads above 21 years were involved in almost equal proportions, though women participation was low. The average gross margin per goat sold was 22,327.00 (ZMK) equivalent to 4.47 US dollars and contributes about 1.3% towards the livelihoods of smallholder farmers.

The key reason why farmers entered into meat goat production was mainly as security against unforeseen events though income, home consumption and traditional beliefs were some of the reasons. The socio-economic factors that influenced the role of goat production on smallholder livelihoods were: age, family size, education level, belonging to an association and period of sale.

Although other service providers participated in promoting goat production, they did not have influence on smallholder goat keepers' involvement in meat goat production. But their impact on the livelihoods of the Smallholder goat keepers' was through improvement in: cash farm flow, food security, and understanding of meat goat production.

With optimal combination of assets at the disposal of the households, meat goat production therefore, can be one of the livelihood strategies that can easily be converted into positive livelihood outcomes in times of stress and shocks.

5.2 Recommendations

Government policies and investment strategies that support the provision of and access to education and extension services on small ruminants are necessary to better equip the small holder farmers in Gwembe district.

The policy implication therefore, is to devise mechanism that will create awareness among rural poor that actually, although cattle are traditionally preferred, goats are also a right and much more affordable species to raise at relatively low cost and be able to generate enough income.

Policy interventions that encourage informal social networks and formation of formal farmer associations can promote group discussions and better information flows on how best the enterprise can be incorporated in their farming systems, can it be financially or materially.

Further investigations should be carried out which should include other parameters like net margins which were not included in this research when determining the contribution of meat goat production to the smallholder livelihoods.

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APPENDICES

Appendix 1: Questionnaire

Title: Evaluation of Economic Contribution of Goat Production to Small Holder Livelihoods in Gwembe District, Zambia

Department of Agriculture Economics & Agribusiness Management

Egerton University,

Introduction

This survey is being conducted by a Postgraduate student at Egerton University – Kenya in Partial fulfillment for a Masters degree in Agricultural and Applied Economics. Therefore, the purpose of this research/exercise is purely academic. You are kindly requested to provide information through the answering of the questions in the questionnaire.

N.B. Information given will be treated as confidential and shall only be used for this study.

Questionnaire No;.....

(Where the box is provided tick where it is appropriate to you)

SECTION A; PERSONAL DETAILS

1. Date of interview;...../...../2012
2. First Name;..... Surname;.....
3. Village:..... Agric Camp:.....
   Block:.....
4. Location of village
   1=Urban, 2=Per-urban, 3=Rural, 4=others (specify)
5. Sex;
   1=Male, 2=Female
6. What is your age in years?.....
7. Marital status
   1=Single, 2=Married, 3=divorced, 4=Widowed, 5=Separated
8. What is your family size;.....
9. Level of education attained
   1= None, 2=Primary, 3=Basic school, 4=High school, 5= Tertiary

10. What is the primary occupation of the household decision maker?

    1= Business, 2= Employed, 3= Farmer, 5= Others (specify).....

11. Major sources of income

    1= Livestock sale 2= Crop sales, 3= Off-farm trading, 4=Other.

12. What type of land do you have

    0=Private, 1=Communal

13. What is the size of land you cultivated last season (2010/2011 season)

    .....(in hectares)

SECTION B: GOAT ENTERPRISE

14. What is the size of your goat herd?.....

15. What is the composition of your goat herd?

Class	**Number of Animals**
Bucks	
She-goats	
Female weaners	
Male weaners	
Kids	
Total	

16. Choose only one reason why you went into goats production.

1=Prestige, 2=Home consumption, 3=Security, 4=Tradition, 5=Income

17. For how long have you been involved in goat production

    (1) Less than 1 year { }

    (2) 2-3 years { }

    (3) 3-4 years { }

    (4) 4-5 years { }

    (5) more than 5 years { }

18. Do you sell your goats?

    1=Yes, 2=No

19. If no give reasons why not:

    .....

    .....

20. If yes, indicate the prices at which you sold, according to each class - 2010/11 season

Class	**No. Sold**	**Price per Kilogram**	**Amount Received**
Bucks			
She-goats			
Female weaners			
Male weaners			
Kids			
Total			

21. How many did you sell during the identified years?

Year	Number sold, identify class		Unit Price	Total Sold	Total Amount
	Alive	Cold dressed weight			
2011					
2010					
2009					

22. What were the major inputs used during 2010/11 agricultural season.

No.	INPUT	QUANTITY	COST/UNIT	Total Amount
1	Dip			
2	Drugs			
3	Labour			
4	Supplementation			
5	Other			
6				
7				
8				
9				

23. What other products from this enterprise did you sell during 2010/2011 season

    1) Milk
    2) Hide
    3) Manure
    4) Others (specify);.....
    5) Non

24. Indicate the quantities of products from the goat enterprise consumed at home and sold during 2010/2011 season

ITEM	**Quantitysold in units**	**Quantity consumed in Units**	**Value in kwacha**
Goat meat			
Milk			
Manure			
Other Products (Specify)			

25. Is the goat enterprise enough to sustain your livelihoods? 1= Yes, 2 = No

26. If the answer to question 25 is no, why?

    .....

    .....

    .....

    .....

27. Are you **currently** a member of any farmers' group or local association in this village dealing in goat production?

    1=Yes, 2=No

28. If yes, give the name.....

29. Fill in the details

Name of group or association (include local institution)	Please rank the Primary objectives of association: rank them 1=savings 2=agriculture 3= marketing 4=welfare 5=other	Your position in the group 1=committee member 2=ordinary member	How long have you been a member of this group?	Does your wife or husband belong to the same group with you 1=Yes, 0=No	Was your participation different before 2010/2011 season? 0=No 1= yes	If different, please indicate the differences

SECTION C: OTHER LIVESTOCK ENTERPRISES

30. Are you keeping other livestock other than goats?

    1=Yes, 2=No

31. If the answer is yes for question 30, which are they?

    i) Cattle { }

    ii) Poultry { }

    iii) Pigs { }

    iv) Sheep { }

    v) Others (Specify).....

32. How many of each type were sold during 2010/2011 season

No.	Type of animal	Number owned	Number sold	Number consumed	Unit Price	Amount in Kwacha
1	Cattle					
2	Poultry					
3	Pigs					
4	Sheep					
5	Others					
6						

33. What are they major variable inputs used according to each type of livestock for the season 2010/2011

ITEM	QUANTITY	UNITS	PRICE/UNIT	TOTAL AMOUNT
CATTLE				
Dip				
Vaccinations				
Drugs				
Drugs				
Drugs				
Feeds				
Labor				
Others				
POULTRY				
Vaccinations				
Feeds- starter				
Feeds- finisher				
Drugs				
Drugs				
Labor				
Other				
PIGS				
Feeds				
Drugs				
Labor				
Other				
SHEEP				
Feeds				
Drugs				
Labor				
Others				

34. Total variable costs incurred for the season 2010/2011

.....

SECTION D: LEVEL OF PARTICIPATION

35. Is there any service provider participating in goat production in your area (government workers, NGO, private individuals)?

    1=Yes, 2=No

36. If yes who are they

    1=Government Extension workers, 2=NGOs, 3= Private firms, 4=Others

37. Do you believe that they played a role in you being involved in goat production

    1=Strongly disagree, 2=Disagree, 3=No opinion, 4=Agree, 5=Strongly agree

38. What type of assistance do they provide?

    1= Advisory, 2=Breeding stock, 3=Inputs, 4=Financial, 5=Marketing, 6=No

39. Is it because of this type of assistance that you are involved in meat goat production?

    1=Yes, 2=No

40. Do you see other farmers going into goat production because of these organizations?

    1=Yes, 2=No

41. How has the mentioned service providers impacted on your life?

    i) Improved your food security { }

    ii) Improved your cash farm flow { }

    iii) Improved your understanding of goat rearing { }

    iv) Just established your goat herd { }

    v) No impact { }

42. If no impact, give reasons why?

.....

.....

SECTION E: CROP ENTERPRISES

43. What major crops did you grow for 2010/11 season:

.....

.....

.....

.....

44. How many hectares did you allocate for each?

.....

.....

.....

.....

.....

45. How did you use the output produced for the season 2010/2011(in Kgs)

Type of crop	Total Yield	Consumed on the Farm	Sold	Re-used on the Farm	Given as gifts

45. How much was realized from the sale of crops

Crop	Quantity	Unit Price	Amount K N

46. What inputs were used in the production of the crops identified above

Inputs	Quantity	Unit Price	Amount K N
Crop A			
Fertilizers Basal			
Fertilizer Top			
Weed killer			
Insectcides			
Seeds			
Ploughing			
Weedings			
Packaging Material			
Transportation			
Others specify			
Total			
Crop B			
Fertilizer basal			
Fertilizer top			
Seed			
Weedings			
Others specify			
Total			
Crop C			
Fertilizers Basal			
Fertilizers top			
Seed			
Weedings			
Others specify			
Total			

47. What other economic activities (Off-farm economic Units) are you engage in

Type of Economic activity	Amount Invested	Amount realized season 2010/2011

48. What was the total amount of direct expenses spent on off-farm enterprises?

.....

49. Indicate the sources of household income.

	Current Income 2010/2011 season		Was income more same or less compared to 2009/2010? =less 1=same 2=more
Type of earning or income	**Amount**	**Frequency**	
Employment income			
Income from business			
Income from farm produce sales (milk, crop produce)			
Income from sale of livestock and other assets e.g. land, vehicle			
Transfer earnings from relatives, sons, daughters etc			
Borrowing from friends, neighbors			
Loans from credit inst. /associations			
Value of gifts			
Land rented out income			
Buildings rented out income			
Other structures rented out income			
Motor/bike/cycle rented out income			
Other income			

SECTION F; MARKETING

50. When do you sale your animals?

i. Rain season [ ]

ii. Dry season [ ]

iii. Throughout the year [ ]

51. Who are the buyers of your goats?

i. Middlemen [ ]

ii. Retailers [ ]

iii. Local community [ ]

52. Where do you sale your goats?

i. Farm gate [ ]

ii. Market place [ ]

iii. Where ever it is convenient? [ ]

iv. Do not sale [ ]

53. What are the major marketing problems you face

i. Pricing [ ]

ii. Marketing costs [ ]

iii. Transportation [ ]

iv. Competition from other farmers [ ]

v. Lack of information [ ]

54. Assets owned by the household

	2011				Before 2011
	No. of assets	Value, (Kwacha)	Ownership 1 Husband 2 wife 3 joint ownership	Who has access to these assets? 1=husband; 2=wife; 3=children; 4=all family members; 5=other spec.	When was asset acquired?
Non-Agricultural Assets					
Bicycles					
Motor cycle					
Personal car					
Radios					
Chairs/sofas					
Mobile phone					
Commercial Vehicle					
Others					
Agricultural Assets					
Oxen					
Wheel barrows					
Spraying pump					
Cattle					
Donkeys					
Goats					
Sheep					
Pigs					
tractor					
Cribs					
Granaries with food					
spade, hoe					
Machetes/slasher					
Plough					
Others, specify					

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Interviewed by:

Date:

Time:

Observations:

Checked by:

Date:

Time: