



## Value Chain Analysis of Goats in Zambia: Challenges and Opportunities of Linking Smallholders to Markets

by

*Namonje-Kapembwa, Harrison Chiwawa, and Nicholas Sitko*

Working Paper 117

December 2016

Indaba Agricultural Policy Research Institute (IAPRI)

Lusaka, Zambia

Downloadable at: <http://www.iapri.org.zm> and

<http://www.aec.msu.edu/agecon/fs2/zambia/index.htm>

# **Value Chain Analysis of Goats in Zambia: Challenges and Opportunities of Linking Smallholders to Markets**

by

**Thelma Namonje-Kapembwa, Harrison Chiwawa, and Nicholas Sitko**

**Working Paper No. 117**

**December 2016**

**Indaba Agricultural Policy Research Institute (IAPRI)  
26a Middleway, Kabulonga,  
Lusaka, Zambia**

Namonje-Kapembwa is a Research Associate with Indaba Agricultural Policy Research Institute; Chiwawa is District Fisheries and Livestock Coordinator in the Ministry of Fisheries and Livestock; Sitko is Professor of International Development in the Department of Agricultural, Food, and Resource Economics, Michigan State University.

## ACKNOWLEDGMENTS

The Indaba Agricultural Policy Research Institute is a non-profit company limited by guarantee and collaboratively works with public and private stakeholders. IAPRI exists to carry out agricultural policy research and outreach, serving the agricultural sector in Zambia so as to contribute to sustainable pro-poor agricultural development.

We wish to acknowledge the financial and substantive support of the Swedish International Development Agency and the United States Agency for International Development (USAID) in Lusaka. We further would like to acknowledge the technical and capacity building support from Michigan State University and its Researchers, and Patricia Johannes for formatting and editorial assistance.

Any views expressed or remaining errors are solely the responsibility of the authors.

Comments and questions should be directed to:

The Executive Director  
Indaba Agricultural Policy Research Institute,  
26A Middleway, Kabulonga,  
Lusaka.  
Telephone +260 211 261194;  
Telefax +260 211 261199;  
Email: [chance.kabaghe@iapri.org.zm](mailto:chance.kabaghe@iapri.org.zm)

**INDABA AGRICULTURAL POLICY RESEARCH INSTITUTE  
TEAM MEMBERS**

The Zambia-based Indaba Agricultural Policy Research Institute research team is comprised of Antony Chapoto, Clifford Dlamini, Brian Chisanga, Munguzwe Hichaambwa, Chance Kabaghe, Stephen Kabwe, Auckland Kuteya, Olipa Zulu-Mbata, Thelma Namonje-Kapembwa, Rhoda Mofya-Mukuka, Paul Samboko, and Henry Machina. Michigan State University-based researchers associated with IAPRI are Eric Crawford, Steven Haggblade, T.S. Jayne, Nicole Mason, Nicholas Sitko, Chewe Nkonde, Melinda Smale, and David Tschirley.

## EXECUTIVE SUMMARY

Zambia's livestock sector plays a pivotal role in the socio-economic development of both the rural and urban population. Smallholder farmers, for the most part, dominate the sector, and at the household level, its role goes beyond the provision of food and nutrition in people's diets, to act as a risk buffer by providing an alternative source of income in case of crop failure. Though the small animals perform a wide range of economic and social functions, low productivity among the smallholder livestock farmers is still of concern in Zambia's livestock sector. Goats are the second most popular owned livestock by most smallholder farmers in Zambia. Their ability to utilize a broad range of feed resources and adapt to marginal conditions presents an opportunity for income generation among the poor rural households. Further, with the prevailing farm structures and increasing land constraints in Zambia, opportunities for income generation from field crops is limited. Small livestock rearing is, therefore, suited for the rural farm households to invest in and take advantage of the rapid increase in income and population growth. However, despite these opportunities, the small livestock sector is still underdeveloped and lacks a clear government policy to guide it. Further, the small livestock sector is characterized by the limited supply of both goat meat in the formal markets such as well-established supermarkets and butcheries. The study is motivated by the desire to address the following research questions:

- i) What factors influence producers' choice on whether to use the formal or informal marketing channels for goats and what factors influence their marketing behavior?
- ii) What socio-economic characteristics affect the herd size of goats among smallholder farmers and how can they improve it?

To address these questions, we used a value chain analysis approach to gain an understanding of the factors surrounding the marketing of small livestock. Using primary qualitative data from eight selected districts in Southern, Western, Central, Eastern, and Lusaka provinces in Zambia and supplemented by nationally representative household survey data, this study analyzed the value chains of goats and highlights the factors surrounding the production and marketing of small livestock. The small livestock sector is faced with some challenges ranging from cultural related issues, management issues, and access to the necessary services.

The following are the main findings from this study.

1. The analysis of the gross margin suggests that commercialization of goats yields positive net income, however, the magnitude of the margins accrued to the producer is lower than other actors in the value chains.
2. Small livestock are assets easy to sell for cash and as such, many of the sales are triggered by the need to support family expenses rather than as a business initiative. It was observed that a majority of the households that participate in the marketing of goats are those with a bigger flock. Since small livestock are productive assets that generate future income, livestock marketing by smallholder households respond mainly to demands for cash needs rather than short-term profit making. Building and maintaining the herd size is, therefore, of great importance to the smallholder farmers and affects their marketing decisions.
3. Production of goats is affected by high disease incidences and mortality rates. This has adverse effects on the herd sizes and limits the farmer's ability to participate in livestock markets. Analysis of the factors that influence herd size shows that off-farm income, landholding size, the age of the household head, and good management practices have a positive bearing on the size of the flock.
4. Management of small livestock is often under the semi-intensive system with little to no supplementary feeding. Regarding management, most farmers put more emphasis

on cattle compared to the small livestock. This is because there is a general perception that small animals requires minimal management and cattle are significantly more valuable both culturally and economically. The limited knowledge of management practices by smallholder farmers is primarily attributable to no access to extension services from the veterinary officers. Therefore, knowledge dissemination through extension and training must be promoted to improve small livestock production.

5. The marketing channel for goats is over 80% informal; this affects the prices that farmers receive. Further, the results from the probit regression analysis show that the choice of which marketing channel to use is influenced by the herd size of the animals, and the gender of the decision maker as well as the geographical location. It was observed that households with big herd sizes were more likely to sell to traders as opposed to selling to individual households. The choice of the marketing channel used by the farmer has a bearing on the price received and the gross margins. Farmers complained about the low prices that are offered by small-scale traders, and this discourages some of the farmers from selling their animals. There is no standardized pricing—in most cases the size of the goat determines the prices. These factors, therefore, limit the farmers' ability to invest and expand their livestock production.

To address some of the challenges in the small livestock production and marketing, the study recommends the following actions:

- i) To address the problem of disease incidences, the government should introduce sanitary mandates. Sanitary mandates entail contractual arrangements where the state contracts the private sector to implement certain animal health services that are carried out in the national interest, usually at the cost to the state. This can be revised to mean assistance from other stakeholders in the development of the livestock value chain. These mandates could establish an income base enabling the establishment of private practicing in the areas of extensive husbandry systems, which would not normally support such an enterprise.
- ii) Extension and community participation; most smallholder farmers cling to the old paternalistic approach to veterinary services whereby the state made most disease control decisions and implemented them at no cost to the beneficiary. However, this approach can no longer be sustained. Therefore, communities need to take on these responsibilities themselves. There is a need for communities to appreciate their responsibilities in disease control. This could include the necessity of locally enforceable legislation through the local authorities and traditional leadership. Accordingly, extensive publicity/extension campaigns need to be undertaken to inform and explain to the communities of the need for their involvement in the preparation of alternate provision of animal health services
- iii) One of the factors that have been highlighted in literature, which affects the choice of the marketing channel, is the issue of high transactional costs. One way of minimizing transaction costs is for smallholder farmers to form livestock marketing groups. By pooling resources together, it has the potential for small livestock producers to increase their participation in formal markets and increase access to information.
- iv) To encourage entrepreneurs to pursue value addition activities such as processing, pasture production, and others, the government, through related agencies, must partner with private firms/institutions in the facilitation of the development of facilities currently deemed expensive and unattractive to the entrepreneur in remote areas to lure individuals to participate in the markets. Using the Chibolya market model, the government would initially own the facilities but lease out operations to individuals or groups of individuals who shall run the facility at

competitive market rates. These must be established in selected districts with production potential.

- v) Government and the private sector should establish more abattoirs and slaughter slabs in selected districts especially those with a high population of livestock. The abattoirs should not be product specific but be able to handle all types of livestock that are owned by farmers. These should be regularly be inspected by the veterinary department and health inspectors, as these facilities can be a source of health concerns if sanitary conditions are not adhered to by producers and traders.
- vi) There is need to establish more breeding centers for small livestock to help increase herd sizes and encourage farmers to participate in the marketing of goats. Grants must be made available to selected individuals or institutions to create and manage breeding centers and programs on behalf of the people or government.

## TABLE OF CONTENTS

ACKNOWLEDGMENTS .....	iii
INDABA AGRICULTURAL POLICY RESEARCH INSTITUTE TEAM MEMBERS .....	iv
EXECUTIVE SUMMARY .....	v
TABLE OF CONTENTS.....	viii
LIST OF TABLES.....	ix
LIST OF FIGURES .....	ix
LIST OF ACRONYMS .....	x
1. INTRODUCTION.....	1
2. DATA AND METHODS.....	4
3. VALUE CHAIN MAPPING FOR GOATS IN ZAMBIA.....	5
3.1. Input Suppliers and Service Providers .....	6
3.1.1. Veterinary Services .....	8
3.2. Goat Production by Smallholder Farmers .....	9
3.3. Rationale for Rearing Goats .....	10
3.3.1. Factors Influencing Herd Size .....	12
3.4. Goat Marketing and Processing .....	14
3.4.1 Factors Affecting Choice of Market Channel for Goats by Smallholder Farmers .....	17
3.5. Gross Margin Analysis for Goats.....	19
4. LIVESTOCK POLICY ENVIRONMENT .....	22
5. CONCLUSION AND RECOMMENDATIONS .....	23
REFERENCES .....	27

## LIST OF TABLES

<b>TABLE</b>	<b>PAGE</b>
1. Pair-wise Ranking of Perceived Challenges in Goat Production.....	7
2. Changes in Goat Production over Time.....	9
3. Characteristics of Households Owning Goats by Herd Size .....	12
4. OLS Results on Factors Influencing Herd Size .....	13
5. Number of Goats Transported to Kasumbalesa .....	15
6. Probit Results Factors Affecting Choice of Market.....	17
7. Smallholder Producer to Trader Gross Margins for Goats .....	20
8. Smallholder Producer to Abattoir (Butchery) Gross Margins for Goats .....	20
9. Traders Gross Margins for Goats (Trader to Retailer/Consumer).....	21

## LIST OF FIGURES

<b>FIGURE</b>	<b>PAGE</b>
1. Market Channels for Goats .....	2
2. Value Chain Map for Goats Source: Author's field notes. ....	5
3. Goats Grazing Areas by Season.....	6
4. Disease Control Methods in Goats .....	8
5. Geographical Distribution of Households Owning Goats .....	11
6. Goat Prices from Various Locations.....	15
7. Monthly Price Trend for Live Goats by Selected Provinces .....	16

## LIST OF ACRONYMS

CLAs	Community Livestock Auxiliaries
DRC	Democratic Republic of Congo
FGD	Focus Group Discussion
FSRP	Food Security Research Project
GART	Golden Valley Agricultural Research Trust
GDP	Gross Domestic Product
Ha	Hectares
IAPRI	Indaba Agricultural Policy Research Institute
Kg	Kilogram
MAL	Ministry of Agriculture and Livestock
NCD	Newcastle Disease
PHS	Post-Harvest Survey
RALS	Rural Agricultural Livelihood Survey
SS	Supplemental Survey
SSA	Sub-Saharan Africa
ZMW	Zambian Kwacha
ZNFU	Zambia National Farmers Union

## 1. INTRODUCTION

The livestock sub-sector is one of the fastest growing in the agricultural sector in most developing countries and has been undergoing what has been termed as a *Livestock Revolution* (Swanepoel, Stroebel, and Moyo 2010). The rapid population growth and urbanization coupled with emerging evidence of income growth in developing countries especially in Africa have resulted in a rapid increase in demand for livestock products, and this is expected to continue in the future. According to Bennett's law, people tend to move away from consumption of starchy foods towards animal proteins as the income increases. These broad demographic and economic trends are creating new and expanding market opportunities for smallholder livestock producers to invest in. Therefore, tapping into these opportunities in ways that are beneficial to rural producers is a critical policy and developmental challenge. However, inappropriate policies and misallocation of investment resources could skew the distribution of the benefits and opportunities away from the smallholders who would potentially gain the most from these market opportunities (Holloway and Ehui 2002).

Similarly, in Zambia the livestock sub-sector plays a pivotal role in the socio-economic development of both the rural and urban population. The Zambia's livestock sector is largely dominated by the smallholder farmers who account for 80% of the total livestock population. At the household level, livestock serves as a valuable wealth asset accounting for 20% of the productive assets (Lubungu and Mofya-Mukuka 2012). The smallholder livestock production contributes to income generation and features prominently in cultural transactions such as dowry payments, and settlement of disputes, as well as payment of school fees and other necessities. Beyond the important role that livestock play in providing food and nutrition in people's diet, it also acts as a risk buffer by providing a means of reducing the risks associated with crop failure and a diversification strategy for resource-poor farmers (Swanepoel, Stroebel, and Moyo 2010). However, despite the significant roles that livestock play and its potential to contribute to poverty alleviation and job creation, the Zambia's livestock sector is still underdeveloped and over the past decade has received less funding compared to crop production (Kuteya et al. 2016). The limited investments made in the livestock sector is mostly directed to cattle production. The sector is characterized by poor husbandry methods, limited disease control, and high mortality rates and low productivity coupled with a serious knowledge gap.

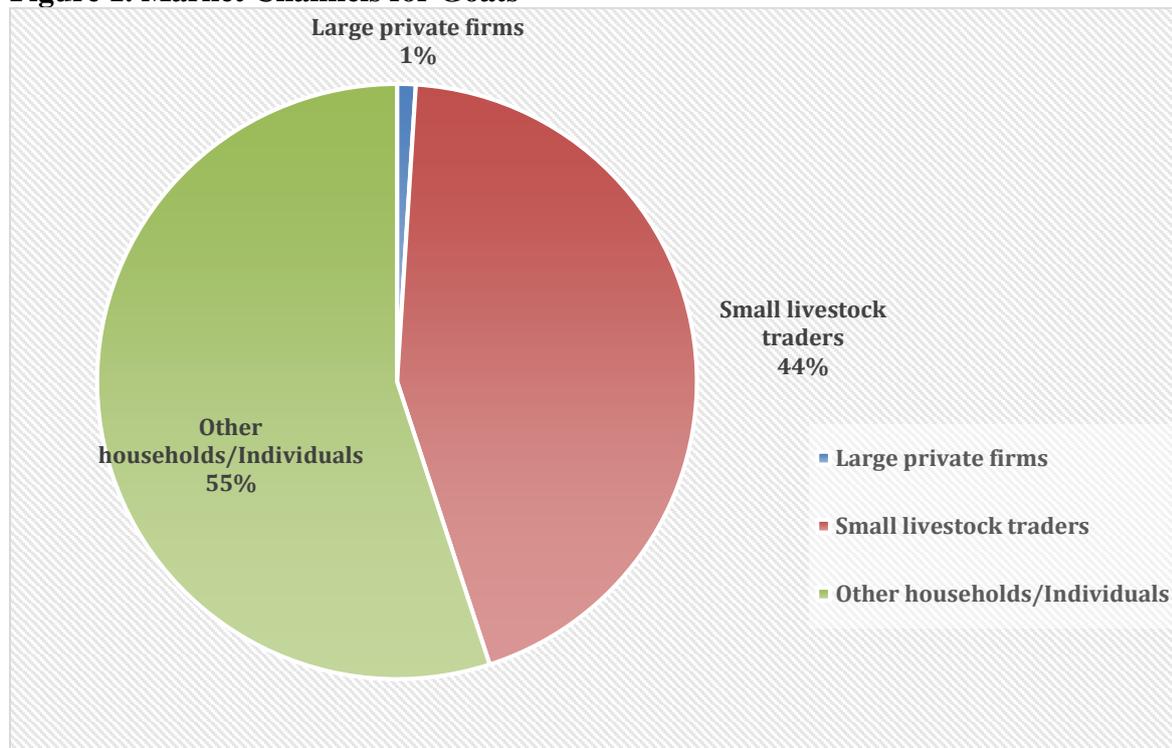
There is a dearth of information on small livestock production such as goats particularly focusing on the key opportunities and challenges in linking smallholder livestock producers to markets. Given the high percentage of rural households who own goats, the small livestock sub-sector provides a useful case study for assessing the challenges and opportunities of utilizing livestock market to link smallholder farmers to markets. Zambia's Gross Domestic Product (GDP)<sup>1</sup> per capita has significantly increased from \$377 per annum in 2001 to around \$1,725 per annum by 2014 (World Bank 2015). This increased income levels coupled with rapid urbanization in Zambia and changes in consumption patterns has contributed directly to the growing demand for livestock related products (Hichaambwa 2012). Further, the current farm structure in Zambia is characterized by the predominance of very small farms and increasing land constraints. The study by Hichaambwa and Jayne (2012) has shown that 64% of the rural farm households own less than 2 hectares of land. Under these conditions, opportunities for income generation from traditional field crops are limited and declining. Small livestock rearing may be well suited for very small farms. Therefore, finding

---

<sup>1</sup> <http://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=ZM>

ways to support farmers to be able to leverage their existing investments in livestock to take advantage of emerging opportunities is a potentially valuable development approach. Besides the emerging market opportunities for livestock, the ability of goats to utilize a broad range of feed resources and adapt to marginal conditions further presents an opportunity for resource-poor rural households to engage in goat production. However, despite the high production of goats among the smallholder farmers, marketing is highly concentrated in the informal markets, and the percentage of households that are selling goats has remained low. Studies have shown that the majority of the world’s rural poor keep and use livestock in a variety of ways that extend far beyond income generation. Livestock act as a store of wealth, a risk management tool and as such, income needs rather than price changes drive the marketing (Rich et al. 2011). Therefore, understanding among other things, the producers’ ownership patterns, and marketing behavior is critical in establishing interventions that are necessary for improving the small livestock sector. For instance, as shown in Figure 1 below, only 1% of the households sell goats to large private firms<sup>2</sup> while the majority sells to individuals or households. Some major concerns that arise with the use of informal channels are a lack of a standardized pricing system and issues of health concerns as animals are rarely cleared by the veterinary department to be free of diseases. Formalized market systems are expected to increase transparency and thereby leading to a price discovery system that rewards both the buyers and sellers. The use of formal markets also helps to minimize health risks associated with consuming animals that are infected with diseases.

**Figure 1. Market Channels for Goats**



Source: CSO/MAL/IAPRI 2015.

<sup>2</sup> Private abattoirs and butcheries, Zambeef, etc.

Using a value chain analysis approach, this study looks at the value chain for goats in Zambia assessing the opportunities and challenges in linking smallholder livestock producers to markets. The study will investigate the factors that influence the marketing behavior of small livestock producers and gain an understanding of the factors restricting them to use formal marketing channels to market their goats. This study will, therefore, address the following research questions:

- i) What factors influence producers' choice on whether to use the formal or informal marketing channels for goats and what factors influence their marketing behavior?
- ii) What socio-economic characteristics affect the herd size of small livestock among smallholder farmers and how can they improve it?

The rest of the paper is organized as follows; Section 2 describes the data and methods used in this study, in section 3 we describe the value chain map for goats and the different actors along the value chain. While section 4 brings out the policy issues related to livestock production, and lastly section 5 presents the conclusion as well as the recommendations for policy interventions.

## 2. DATA AND METHODS

The study utilized qualitative data that was supplemented with quantitative data from the household surveys for various years. The qualitative data was drawn from the focus group discussions (FDGs) which were conducted in eight districts. These districts include; Mongu, Senanga, Kalomo, Choma, Mumbwa, Chipata, Petauke and Siavonga. The choice of the districts was based on the number of goats that are produced in a particular area. Most of the selected districts have high production of goats while Mongu and Senanga are among the least goat producing districts. The selected districts will also help us gain an understanding of why some areas are low producing when goats are believed to thrive in any condition. The focus group discussions were held with mostly producers (smallholder farmers), and each group had approximately 5 to 15 participants comprising of both male and female farmers. A total of 112 farmers participated in the discussions from all the eight districts. Key informant interviews were also conducted with provincial veterinary officers, district veterinary officers, veterinary assistants, traders, processors as well as input suppliers. The criteria for selecting the participants were based on households that owned or raised goats. Through the discussions with the farmers and key informants, we were able to identify some input suppliers and local butcheries as well as processors.

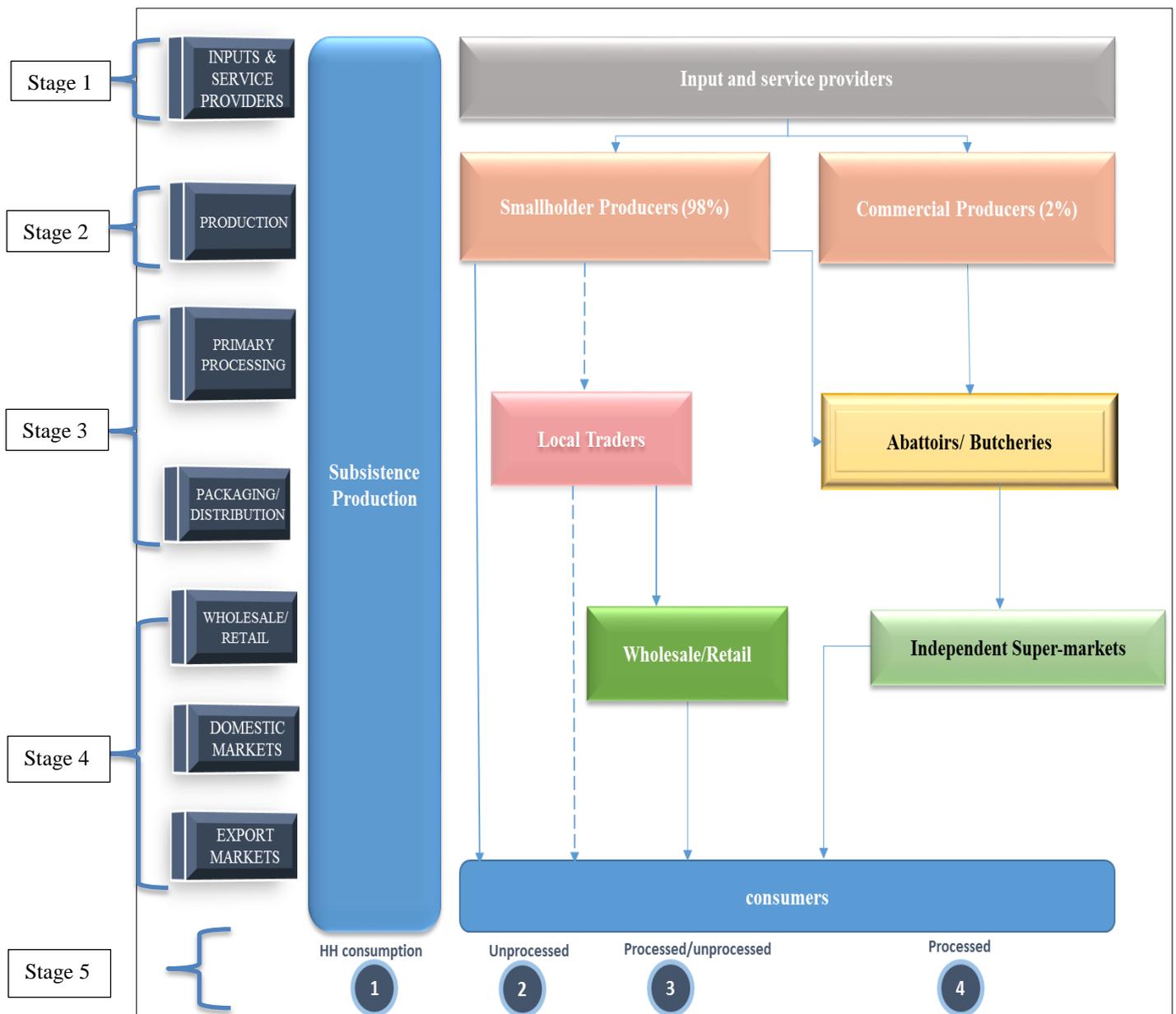
For the quantitative data, the study used data from the Rural Agricultural Livelihoods Survey (RALS) and Supplemental Survey (SS) for 2004, 2008, 2012, and 2015 as well as the Post-Harvest Survey data (PHS) for 2013/14. RALS and SS were conducted by Indaba Agricultural Policy Research Institute (IAPRI) and Food Security Research Project (FSRP) in collaboration with Central Statistics Office and the Ministry of Agriculture respectively. While the PHS was conducted by the Ministry of Agriculture and Central Statistics Office. All the data sets used are nationally representations of rural farm households cultivating less than 20 hectares of land for farming and livestock production purposes.

The study used descriptive analysis and econometric methods such as linear regression model and probit model to analyze the factors influencing herd size and the choice of marketing channel. The use of both qualitative and quantitative methods of data analysis gives a comprehensive picture of the small livestock production based on the nationally representative survey results and field visits.

### 3. VALUE CHAIN MAPPING FOR GOATS IN ZAMBIA

This section describes the value chain map for goats in Zambia. The value chain map provides an understanding of the different actors involved in each segment and the processes involved in moving goats from the producer to the final consumers. Analyzing the role that each actor plays along the goat value chain helps us to identify both the challenges and opportunities in linking smallholder farmers to markets. Figure 2 below shows the various stages in the goat value chain. Based on Figure 2, five critical stages have been identified in the value chain that is input/service supply, production, marketing/processing/retailing and consumption. The five stages are discussed in-depth in the proceeding sub-sections.

**Figure 2. Value Chain Map for Goats**



Source: Author's field notes.

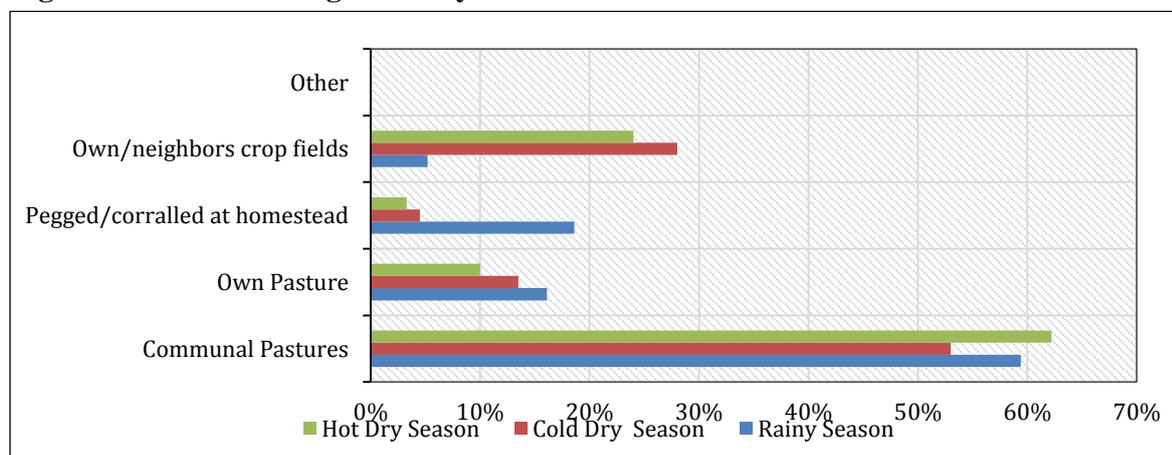
### 3.1. Input Suppliers and Service Providers

Following the value chain map highlighted in Figure 2 for goat production, this section describes the primary inputs for small livestock production, which include feed, water, and health services (veterinary services). The section addresses the main sources of these inputs as well as the challenges faced by smallholder farmers in accessing them.

*Feed:* Goat rearing in Zambia by the smallholder farmers is mostly done under the semi-intensive system where animals are confined in night shelters and during the day the goats are left to graze freely in and around the farmland or at a nearby communal land. Small ruminants in the smallholder livestock sector are largely dependent on natural pastures and crop residues for most of the year and rarely receive supplements. As such, nutrition has been documented as one of the limiting factors in the traditional livestock production (Simbaya 2002). Further, Simbaya (2002), highlights that during the rainy season young grasses have a very high concentration of essential nutrients that are capable of supporting animal growth but as the rainy season advances, the protein, and other nutrients tend to reduce due to a rapid increase in fiber. The situation worsens in the dry season as the levels of nutrients drastically reduces, thus limiting the nutritional quality of feed available for the animals to meet their protein, energy, and mineral requirements. Nutrition has been found to have a greater effect on the estrous cycle, and Ungerfeld and Bielli (2012) indicates that changes in food availability can influence the seasonal breeding patterns in animals. This, therefore, can lead to declining frequency of estrous and increased period between birth and first estrous. For instance, Alexandre and Mandonnet (2005) indicate that poor and fluctuating nutritional levels can cause reproductive inefficiencies in goats. Moreover, according to Bosman, Moll, and Udo (1997), changes in nutrition and management are the primary factors determining the productivity of goats and the survivability and growth of kids. Nutrition, therefore, tends to affect total lifetime productivity by influencing the overall growth and mature size, leading to lower herd replacement rates and increased period to reach marketable size.

However, despite these known facts, results from the nationally representative household survey on grazing patterns for goats as shown in Figure 3 remain the same throughout the year. Communal pastures are the most commonly used source of pasture for goats among the smallholder livestock farmers. For example, more than 60% of the household used common pastures for grazing in the hot, dry season while own or neighbor's crop field is the second most common grazing area for goats during the hot and cold, dry seasons.

**Figure 3. Goats Grazing Areas by Season**



Source: CSO/MAL/IAPRI 2015.

On the other hand, enclosed feeding (pegged/corralled at home) is mostly used in rain season this is to prevent crop damage from animals. This system, however, is only used by less than 5% of the households in the hot and cold, dry seasons. These results are in line with what was obtained from the focus discussions with the farmers. The general perception among smallholder farmers is that goats are self-managed and are more tolerant to many diseases compared to other livestock. This has resulted in very low adoption of sustainable pasture management techniques that can enable them to supply the necessary feed required for their animals, especially in the dry season when the nutrient levels are very low. However, some smallholder farmers have adopted the cut and carry system and supplement grains and other crop by-products as concentrate feed. In some countries, the smallholder farmers use fodder trees as a traditional supplement to overcome nutritional deficiencies in the dry season (Legese et al. 2014; Heifer International 2012). This, however, is rarely practiced in Zambia. The main supplement given is maize bran and other crop residues during and after harvest when people are processing maize meal and other cereals. Furthermore, overstocking of animals on pastures resulting in overgrazing is a huge challenge since the demand by far exceeds the pasture's carrying capacity.

Goats are particularly destructive in this respect, leaving the land devoid of vegetation. This pattern of grazing is similar among smallholder livestock producers that keep small ruminants both under the semi-intensive as well as extensive system (Heifer International 2012; Legese et al. 2014). This type of feeding system has implications on the productivity of goats, especially in the dry season.

*Water:* Water provision is a crucial input for livestock productivity and goats have unique characteristics that enable them to withstand heat stress and prolonged water deprivation compared to other ruminant animals. However, goat production is often constrained by water and feed shortages (Al-Khaza'leh et al. 2015). Further, a study in Saudi Arabia on the effect of water restriction in lactating goats during the dry season showed that feed intake (dry matter) decreased and milk production reduced from 20 to 18% when water restriction was at 50 and 25% respectively (Araújo et al. 2010).

Information gathered from the focus group discussions indicates that during the rain season animals often fend for their water needs as there is a lot of water collection in small water streams, ponds and shallow well around homesteads. However, during the hot, dry season, when water streams and ponds dry up, they have to travel long distances to rivers to access water. Lack of water was ranked as the number one challenge that smallholder goat producers are facing. The fact that they have to travel long distances to access water for their animals, some farmers indicated that they had lost their animals along the way.

**Table 1. Pair-wise Ranking of Perceived Challenges in Goat Production**

Challenge	Score	Rank
Lack of Knowledge	2	3 <sup>rd</sup>
Disease prevalence	4	2 <sup>nd</sup>
Lack of Feed and Water	5	1 <sup>st</sup>
Lack of Improved Breeds	1	5 <sup>th</sup>
Distance to the nearest drug store is far	3	4 <sup>th</sup>

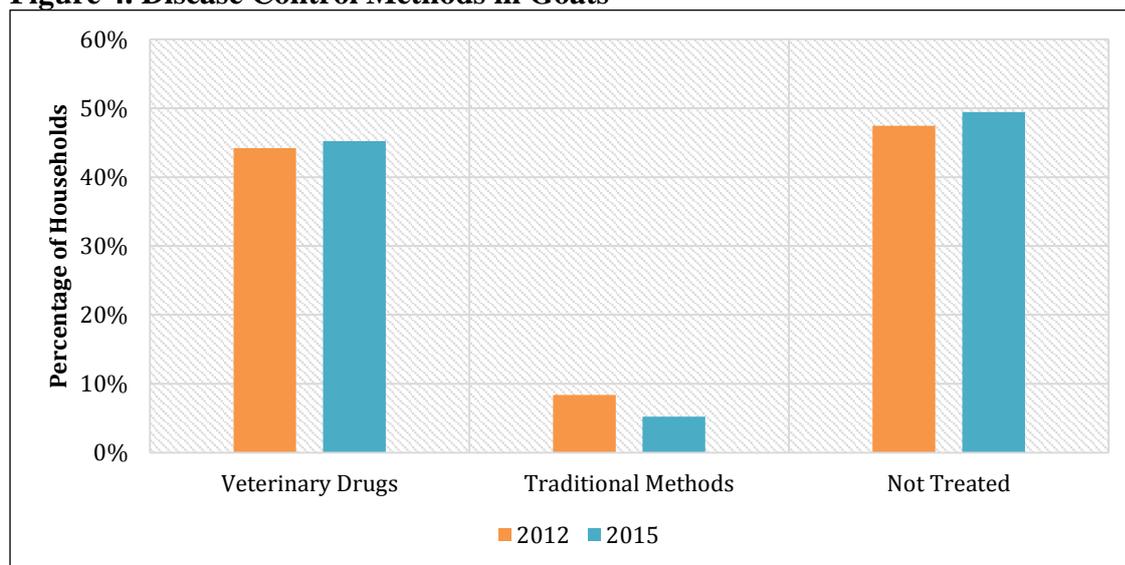
Source: Author's field notes.

Others, however, stated that they normally fetch water for their animals, particularly during the dry season. However, usually these households owned very few goats or owned oxen that would be used to transport water in drums for their animals as this activity adds more workload for the household members. Farmers during the focus group discussions were asked to highlight some of the challenges they faced in goat production and ranked them in the order of most challenging to least challenging factors. Table 1 shows the list of challenges that farmers face in goat production where the first rank (1<sup>st</sup>) represents the most challenging factors and fifth (5<sup>th</sup>) represents the least challenging factors.

### 3.1.1. Veterinary Services

Goats are known to adapt well to local environments and are more resistant to diseases compared to other animals. However, despite their desirable characteristics, goats also suffer from disease outbreaks such as mange, diarrhea, heart-water, and contagious ecthyma<sup>3</sup> (orf) which are among the major constraints to goat keeping. Figure 4 below shows the methods of disease control that smallholder livestock farmers used based on the household survey data collected in 2012 and 2015. The figure reveals that nearly 50% of the households that reported disease incidences in goats did not treat their animals. Similarly, over 40% of the households used veterinary drugs to treat disease in their animals. There has been a slight increase in the percentage of households treating animals with veterinary drugs as well as those that are not treating their animals between 2012 and 2015. Traditional methods are the techniques that are least used by smallholder households with less than 10% of the households indicating having used this method. The results further show a decrease in the percentage of households that are using traditional methods. The results presented in Figure 4 align with the general perception among smallholder farmers in the rural areas that goats do not require any vaccines for preventing diseases or drugs to treat the diseases, as they are self-treated.

**Figure 4. Disease Control Methods in Goats**



Source: CSO/MAL/IAPRI 2012 and 2015 Survey Data.

<sup>3</sup> A viral infectious skin disease of goats and sheep affecting the lips especially of young animals.

Public extension system through the veterinary department is the primary source of agricultural information and knowledge for the smallholder farmers. However, the delivery of extension services by the Ministry of Fisheries and Livestock is still weak and in most cases absent. Moreover, farmers during the field visits attributed their lack of knowledge about goat management and disease control to lack of extension and veterinary services for livestock producers. Some farmers also stated that they mainly seek veterinary services for large ruminants (cattle) and were unaware of veterinary services available for goats. The lack of knowledge in disease managed in goats is reflected in the high percentage of households that are not utilizing veterinary drugs. However, even for large ruminants, there is limited access to extension services from the veterinary department as shown by Lubungu, Sitko, and Hichaambwa (2015). The rural agricultural livelihood survey results further show that only about 19% and 11% of the smallholder farmers vaccinated and dewormed their goats respectively (Chapoto and Zulu-Mbata 2015). The vaccination campaigns that are carried out by the veterinary department are mainly to control cattle diseases. However, during the field visits, smallholder farmers did not show the willingness to pay for vaccines to immunize goats from diseases that affect them. The farmers indicated that goats must be covered by the same disease control policy as applied to cattle. To this end, lack of farmer training in small livestock husbandry methods is the result of the limited extension and veterinary services in most rural areas due to low staffing levels. Further, inadequate extension infrastructure and equipment that consequently affect producer knowledge of methods of disease prevention were cited as the primary constraints to livestock production.

### 3.2. Goat Production by Smallholder Farmers

Goats are produced in almost all the parts of the country, and currently, about 35.1% of the smallholder farmers in Zambia own goats (Chapoto and Zulu-Mbata 2015). Though goats are found in all parts of the country, a huge population of goats is located in Southern Province, which has over 50% of households raising goats. Table 2 shows the changes that have occurred between 2001 and 2015 in goat population and the proportion of households that own and sell goats. The national population of goats has doubled over the years, but the average household herd size has had a minimal increase over the same period. The increased population of goats over the years has been mostly due to increased number of households owning goats as opposed to increases in the herd size. The percentage of households owning goats increased by over 100%. However, this increase has not translated into a significant increase in the percentage of households that are participating in markets. Similarly, there is a reduction in the average number of goats that are sold by the households participating in livestock markets.

**Table 2. Changes in Goat Production over Time**

Variable	2001	2012	2015	Percentage Change (2001 to 2015)
National herd size of Goats	1,098,453	2,151,890	2,908,466	165%
Average herd size	6	7	7	17%
% of Households Owning	15.12	30.68	35.1	132%
% of Households selling goats	33.67	38.42	34.26	2%
Average number of goats sold	3	4	2	-33.33%

Source: Author's field notes.

The study by Negassa and Jabbar (2008) shows that many smallholder farmers do not participate in the livestock market and for those who participate, the size of the transaction (sale or purchase of cattle, sheep or goats) has been found to be very small. They further indicate that for both cattle and small ruminants, birth is more important than purchase from the market in building and maintain the herd size and flocks. Therefore, despite the reasonably high share of cash income coming from livestock as a source of smallholder livelihood, the production system is not adequately market-oriented. McPeak (2004) also observes that, though livestock sales may increase current cash income and thus consumption, sales come at the cost of decreased future income and consumption and as such, farmers try to maximize herd size and limit marketed animals to raise cash to meet the immediate expenditure requirements. Herd size and dependence on livestock have an influence on household livestock marketing behavior. Barrett, Bellemare, and Osterloh (2006) highlight that most households participate in the livestock marketing more actively as sellers rather than buyers when prompted by environmental stress. They also noted that low livestock market participation was prevalent among households with an alternative source of livelihoods and those with low herd sizes.

### **3.3. Rationale for Rearing Goats**

Goat production has many positive attributes that make them favorable for smallholder farmers as a means of survival such as their prolific nature, the need for low inputs for a moderate level of production, ability to reach maturity early and of course their profitability. In situations where land is of poor quality and constrained by environmental factors such as inadequate rainfall, very high temperatures, crop cultivation becomes difficult. Goats, however, would make a significant contribution to poor farmers and the stability of small farm systems under such situations. They also contribute towards rural household food and nutritional security. Also, during the focus group discussions farmers indicated the following as some of the reasons why they rear goats:

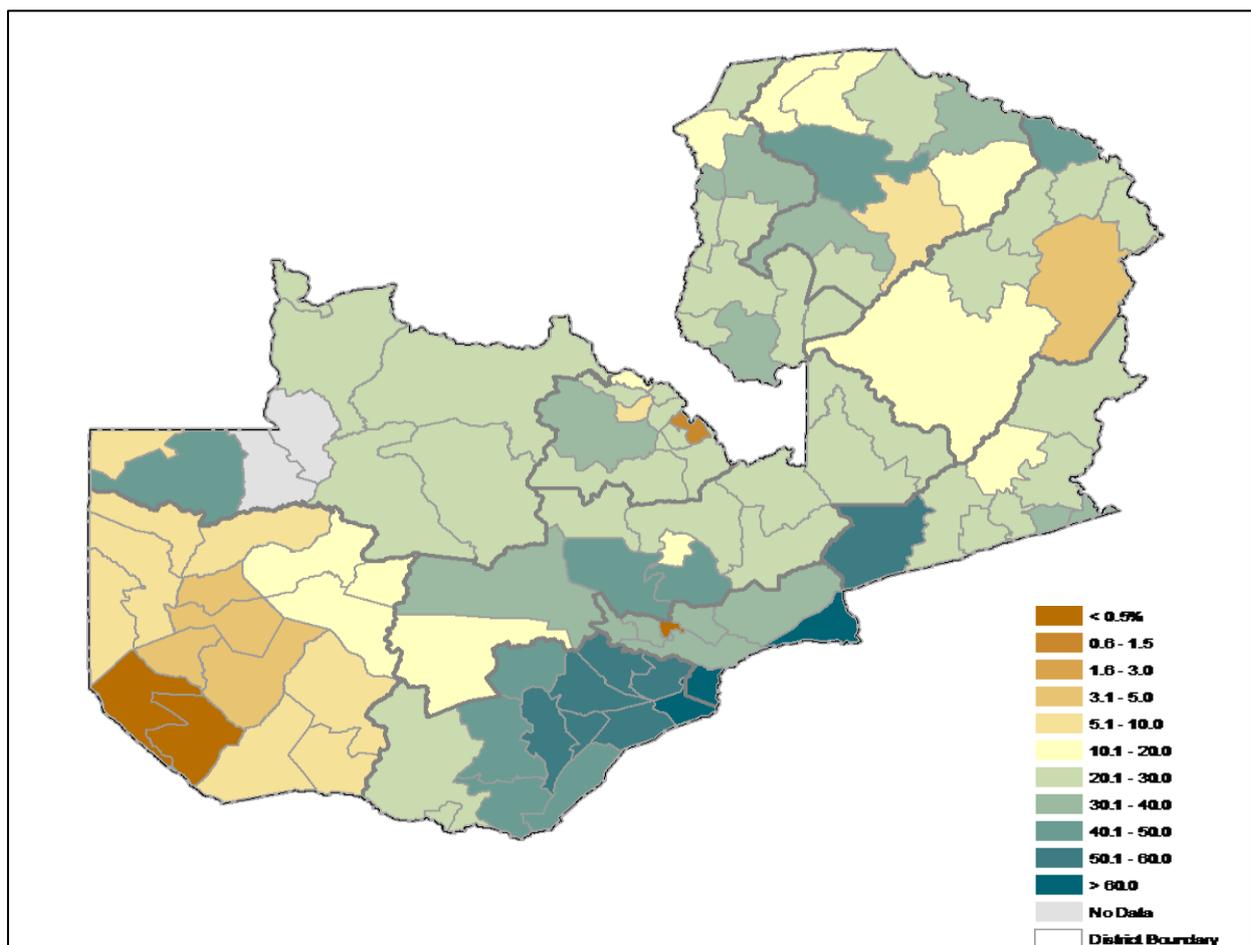
- It is a source of income and helps families to cover expenses such as payment of school fees for children, medical bills, and other household expenses. This, therefore, suggests that goat market is quite liquid, like the maize market with lots of buyers and easy to sell to cover family expenses. Further, in the absence of formal financial and insurance institutions in the rural areas, small ruminants are *easy to cash* assets and an important diversification strategy that can help reduce market and climatic risks (Dossa et al. 2008).
- At a wider scale, goats are used for social events such as weddings and traditional ceremonies, payment of dowry, at funerals and settlement of disputes.
- They also keep goats for prestige and as an inheritance asset for children if the owner dies. This, however, is not the case for all the ethnic groups in Zambia. For example, in Western Province, some Lozi's consider keeping goats as a sign of poverty.
- They also stated that goat droppings are used as manure that is suitable for gardens. It is also used as relish though they rarely slaughter goats, however, goat milk is mostly fed to children to prevent malnutrition. This however is not common in most parts of the country it was cited in Eastern Province during the FGDS.

The consensus from the farmers was that goats are an asset that can easily be converted into cash to solve family expenses such as payment of school fees and buying of inputs. Since livestock are a productive asset that generates future incomes, livestock marketing by smallholder households will respond mainly to demands for cash needs rather than short-term profit making (Barrett, Bellemare, and Osterloh 2006; McPeak 2004). As a result, households

sell their animals in large part to meet their immediate needs for cash such as purchasing food or medicine or paying for school fees. However, wealthier households with greater herd sizes have been found to use livestock markets more frequently to cash out animals because they have greater cash needs and higher expenditure rates (Barrett and McPeak 2003).

The above highlighted reasons for keeping goats have also been cited by Jaitner et al. (2001) where the farmers ranked savings, insurance against crop failure and source of income as the primary reasons for keeping small ruminants. Furthermore, results in Figure 5 show that for most parts of the country over 20% of the households own goats, but there is a drastic difference in Western Province with some districts owning less than 1%. Goats can thrive in most parts of the country, and as such, it can be argued that ownership of the certain type of livestock is influenced by cultural factors including ethnicity and motivations rather than geographical conditions. For instance, during the field visits in Western Province, the farmers indicated that there had been a general perception among residents that goat rearing is for the poor impoverished people and goats were seen to be an inferior species to cattle. Until recently, the demand for goats and goat related products in Western Province have been very low, but producers are now beginning to appreciate that goat rearing can be very lucrative.

**Figure 5. Geographical Distribution of Households Owning Goats**



Source: CSO/MACO 2013/14.

**Table 3. Characteristics of Households Owning Goats by Herd Size**

Variables	Mean All HH	Mean Goat Owners	Number of Goats						
			1-4	5-9	10-14	15-19	20-24	25-30	>30
% of HH owning	35.10		40	34	12	7	3	2	3
Age of HH head	48	50	48	50	51	51	55	52	54
Education of HH head	5	6	6	6	6	7	6	7	8
Household size	6	7	6.5	6.8	7.5	7.9	8.4	8.3	8.5
Maximum education of adults	8	9	8	9	9	9	9	10	11
Female headed HH (%)	21.2	14.29	44.61	35.63	8.38	4.49	3.29	1.80	1.80
Landholding size (ha)	4.66	6.14	4.76	6.18	7.96	7.06	11.65	8.79	7.48
Area cultivated (ha)	2.47	3.28	2.56	3.23	4.03	4.63	4.58	5.30	4.92
Off farm income (ZMW)	8,090	8,368	4,932	9,077	8,720	10,843	8,850	20,555	30,274
value of livestock sales(ZMW)	2,799	2,294	458.75	829.19	1,605	1,819	2,448	2,550	4,071

Source: CSO/MAL/IAPRI 2015.

\*HH = Household

### 3.3.1. Factors Influencing Herd Size

Table 3 shows the general characteristics of households owning goats by herd size. The results indicate that about 35.1% of households owned goats in 2015 and regarding the number owned, the majority owned one to four goats followed by those owning five to nine goats. Similarly, we see a positive correlation between off-farm income and the herd size. Households that have more income from off-farm activities have big herd sizes compared to those with relatively small incomes. Table 3 also shows that households with big herd sizes have members who have high levels of education compared to households with small herd sizes. As highlighted earlier, the income generated from goat sales helps farm households to pay school fees for their children. It is also likely that households with better-educated individuals may earn more income from other sources thereby investing in livestock assets such as goats. Further, goat owners are older, and cultivate and own larger landholding sizes compared to average farmers.

In addition to the results presented in Table 3, we run a regression analysis to ascertain the household characteristics that influence the herd size of goats. Since the flock size can be affected by numerous factors that were not included in our regression analysis, we limit the discussion of our results as correlation rather than causality.

The results in Table 4 show that some household characteristics are positively correlated with the flock size of goats, and these include the age of the household head, household size, and landholding size as well as off-farm income. The positive and significant relationship between age of the household head and herd size implies that older household heads are more likely to have a big herd size compared to younger household heads. Results in Table 3 shows that the average age of the farmers keeping goats is 48 years. Since asset accumulation takes time, so it is likely that older farmers that have been keeping livestock for a long time will have big herd sizes.

**Table 4. OLS Results on Factors Influencing Herd Size**

Variables	Coefficients
Female household head (=1)	-0.1798 (0.5288)
Age of household (yrs.)	0.0455*** (0.0125)
Education of household head (yrs.)	0.0784 (0.0624)
Household Size (number)	0.5526*** (0.1064)
Landholding Size (Ha)	0.0278* (0.0156)
Off-farm Income ('000 ZMW)	0.0363** (0.0142)
Received Goats (lobola, damage, gift etc.)	0.7864*** (0.1917)
Dewormed (=1)	1.4505 (1.1239)
Vaccinated (=1)	3.8975*** (0.7661)
Household Sells Goats (=1)	0.9541* (0.5192)
Distance to Veterinary Services (Km)	-0.0013 (0.0069)
Theft (=1)	-0.9022 (0.7649)
Constant	-1.2566 (1.0340)
Observations	2,301
R-squared	0.1826

Data Source: CSO/MAL/IAPRI 2015.

Standard errors in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Younger farm household heads are more likely to migrate in search for non-agricultural wage jobs and other off-farm activities compared to the older household heads hence young people may be less interested in goat rearing (Dossa et al. 2008; Umunna, Olafadehan, and Arowona 2014). Further, older farmers are more likely to keep small ruminants as a strategy of farm diversification and managing risks associated with crop failure.

Here we use landholding size as a proxy for income status for households and the hypothesis is that households with big landholding sizes are more likely to invest in livestock production because with more income, they can participate in livestock markets by buying to increase the herd size, and can invest in management practices that improve their livestock production. The variable landholding size shows a positive and significant relationship with herd size implying that households with big landholding size are more likely to own big herd sizes of goats. In addition, off-farm income can facilitate the acquisition of more goats by the smallholder farmers hence the positive correlation between the herd size and the value of off-farm income. Barrett, Bellemare, and Osterloh (2006) further highlights that households with an alternative source of livelihoods away from livestock are less likely to participate in markets as sellers thereby maintaining the herd sizes of their animals.

Management practices such as vaccination and deworming also have a positive influence on the herd size in the sense that they affect productivity levels of goats. In our results, though deworming has a positive sign on the coefficient, it is not statistically significant. Disease incidences were cited as one of the challenges that farmers face in keeping goats and therefore, management practices such as deworming and vaccinations play a critical role in reducing mortality rates thereby maintaining the herd sizes Jaitner et al. (2001). Further, households that participate in goat markets own more goats compared to non-participant. Market participation is likely to facilitate the restocking of new animals as income generated from the sales can be used to purchase more animals with better breeds. Theft and distance to the livestock services negatively affect the herd size of goats. Farmers cited these two factors as some of the constraints that goat farmers face in the local communities. These variables, however, are not statistically significant. Results also show that female headedness is not associated with herd size. This result is surprising because other studies have shown that women are more likely to own small livestock such as goats compared to cattle. However, since female-headed households are faced with more financial constraints than their male counterparts, they are likely to sell their goats more often to meet family expenses, hence reducing the herd size.

### **3.4. Goat Marketing and Processing**

Unlike the beef marketing channels, goat marketing is mostly informal and dominated by small-scale farmers and traders. This section discusses the various marketing channels for goat by smallholder farmers. There are three channels where goat meat from the farmers can reach the consumers. The first channel is where farmers (producers) sell their (live/slaughtered) goats directly to consumers (individuals and other households) within the communities and open markets—this appears to be the most commonly used channel by smallholder farmer (See Figure 1). The second channel comprises of small-scale traders who buy goats at the farm gate prices and resell to other traders, processors, and consumers. The third channel involves farmers selling their goats to the local butcheries and abattoirs, which are later sell them to consumers at retail prices.

*Selling to Households/Individuals:* For the first and second channel, the majority of the farmers sell live goats as opposed to already slaughtered and according to CSO/MAL/IAPRI (2015) of all the households selling goats only about 9% sell already slaughtered animals. Farmers usually take their goats to the nearest markets using bicycles while some farmers slaughter the animal, which is later sold for cash or bartered with other households within the communities. Since the goat markets are very informal, no standard pricing system has been set. During the field visits, farmers indicated that they only sell goats when the need arises and as such, there is a wide variation in prices based on the geographic location and markets plus the urgency of the problem to be solved. The selling prices are often determined by the size and physical appearance of the goats. For instance in Kalomo district, goat prices range from ZMW120 to ZMW200 while the price ranges from ZMW150 to ZMW400 in Siavonga. Goat prices are very low across the country, and this is because the local breeds that most smallholder farmers own are very small in size and the average carcass weight is about 15kgs. For a few farmers that own boar goats, they can sell a live goat at ZMW600. Farmers expressed concerns about the low price offers they get from private traders and due to desperation to meet the family needs they end up selling their goats at very low prices. However, despite this downside of the marketing, some farmers in Choma expressed happiness with institutions such as Golden Valley Agricultural Research Trust and the Netherlands Development Project who purchase goats at higher prices compared to what is offered by the private traders.

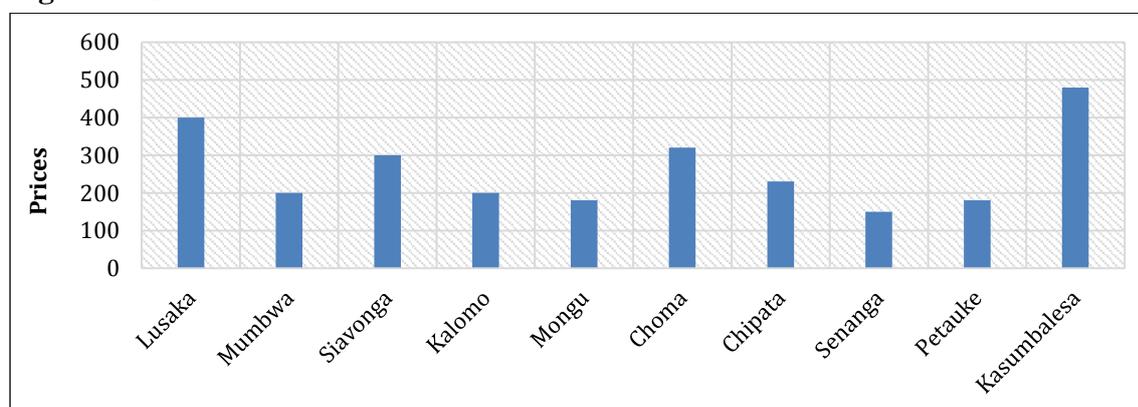
**Table 5. Number of Goats Transported to Kasumbalesa**

Location	Number of Goats	Number of Permits	Frequency
Lusaka	1,280	64	Monthly
Kalomo	1,920	96	Monthly
Choma	1,280	64	Monthly

Source: Small Livestock Association of Zambia (2016)

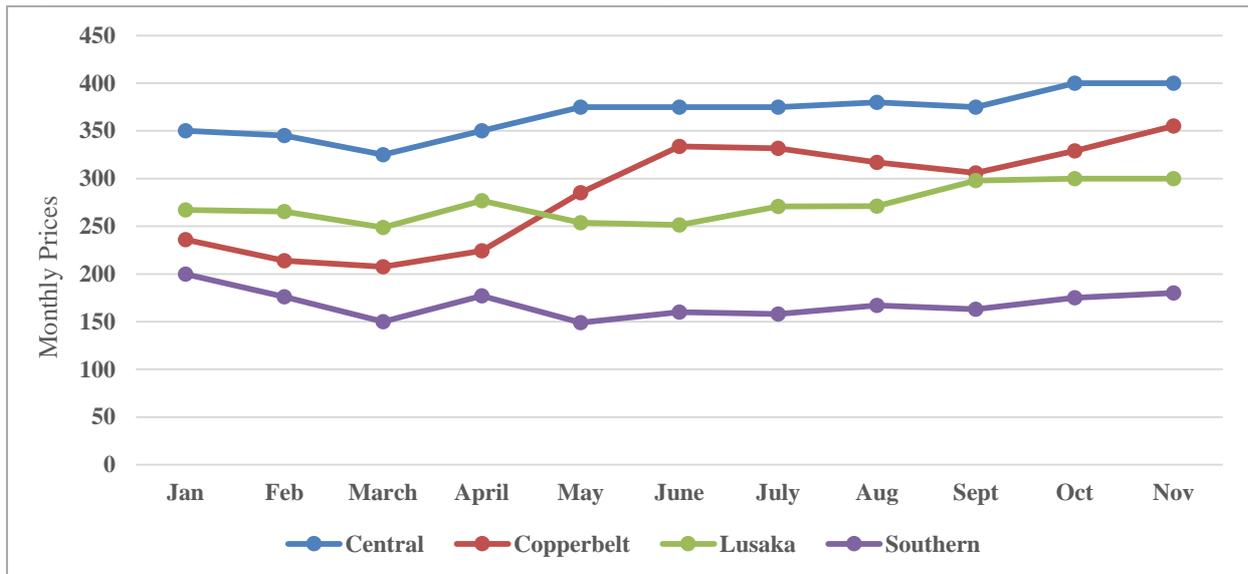
*Selling to Traders:* The second channel involves the small-scale traders, who are the main buyers of goats from the smallholder farmers in this channel. The traders are mostly from Lusaka and Copperbelt; they often go around different villages buying goats from the farmers. Once they have reached the targeted number, goats are then transported and sold to consumers in Chibolya market in Lusaka while others are sold at Kasumbalesa border on the Copperbelt. The choice of the market for the traders is largely influenced by the selling price, the demand, and availability of transport. The goat prices in Lusaka’s Chibolya market range from ZMW200-ZMW450 per live goat while at Kasumbalesa border on the Zambian side, prices range from K300- K600 per live goat though these rates are much higher on the Democratic Republic of Congo (DRC) side compared to the Zambian side. Table 5 shows the number of goats that are traded to Kasumbalesa border on a monthly basis from Lusaka, Kalomo, and Choma. On average 4,480 goats are transported to Kasumbalesa every month. These numbers however only include the officially reported figures from traders that obtain permits to transport their animals. The high volume that is traded on a monthly basis signals the high demand for goat meat from our neighboring country DRC. The cross-border trade between Zambia and DRC provides an alternative goat market for smallholder farmers, however, due to the informal nature of goat markets the actual volumes of the animals been traded to DRC are not recorded, and as such, the reported contribution of livestock to GDP is likely to be undervalued.

Some traders, on the other hand, buy goats and sell processed meats along the roadside. For instance, along the Lusaka-Livingstone road, some traders sell roasted goat meat, and they indicated that on average they sell between two and four goats in a day. Further, some traders sell goat meat by part, for instance, consumers either buy a front or rear leg, while offals are sold as a set. Figure 6 shows the average prices for goats from various locations in Zambia. As earlier indicated, the highest rates are at Kasumbalesa border on the Copperbelt due to the cross-border trade with DRC and the high demand for goat meat.

**Figure 6. Goat Prices from Various Locations**

Source: Authors field notes (2016).

**Figure 7. Monthly Price Trend for Live Goats by Selected Provinces**



Source: IAPRI market price data 2016. <http://www.iapri.org.zm/application/page/application>.

Further, in Figure 7 we present the monthly prices for goats from the various provinces. It should be pointed out that overall, the average prices in Southern Province are lower compared to other provinces. The low prices can be a result of the high supply of goats in the Southern Province compared to other provinces, and as a result, traders can easily negotiate for lower prices. Figure 7 also shows that goat prices are lower at the beginning of the year<sup>4</sup> but tend to increase as the year progresses.

*Selling to Processors:* For the third channel, it should be noted that very few farmers are selling their goats to abattoirs or butcheries (approximately 1% according to figure 1). From the districts that were visited NASLA Halaal Butchery in Senanga, Zambeef abattoir in Mumbwa and IZE food mart in Kalomo districts they indicated that they buy goats from the local farmers though the majority of the goats processed are from their farms as local suppliers cannot meet the demand. They further indicated that demand for goat meat is high, but the supply from the farmers is not constant. On the other hand, farmers stated that they preferred selling live goats as opposed to selling to abattoirs (or butcheries) because, at the abattoirs or butcheries, goats are sold by the weight of the carcass. The average price for the goat carcass is ZMW20/kg. This, therefore, disadvantages the farmers who in most cases own local breeds, which are small with low carcass weight. Selling to abattoirs or butcheries poses uncertainty to the farmer who in most cases are unaware of the actual carcass weight until the animal is slaughtered. If the weight is below the average carcass weight, they are likely to lose out on the profits. The other reason why farmers prefer selling through the open channel such as to the traders or other households is to avoid the inconvenience of going through the veterinary department for animal clearance and inspection, police, and council for just one or two goats. This process is suitable for traders since they deal with large numbers of goats, hence, they have to get clearance from the veterinary and the police departments to transport goats from one district to another. At the village level, the headmen, chief or local authorities dispense this duty of clearing the livestock more as a way of proving ownership to control theft.

<sup>4</sup> Most farmers sell goats at the beginning of the year when schools re-open hence the lower prices.

### 3.4.1. Factors Affecting Choice of Market Channel for Goats by Smallholder Farmers

To understand the factors affecting the choice of the market channel to use for goats, we turn to the results from the econometrics analysis in Table 6. The results indicate that herd size, the gender of the household head, and gender<sup>5</sup> of the decision maker affect the choice of the market channel to use. For instance, households with big herd sizes are more likely to sell to traders as opposed to selling to individual households. Since traders typically buy quite a large quantity of goats in each transaction, farmers with a large flock of goats will prefer selling to the traders compared to selling one or two goats to individual households.

**Table 6. Probit Results Factors Affecting Choice of Market**

Variables	Selling to Small scale Traders	Selling to Individual Households
Herd Size of Goats	0.0028* (0.0017)	-0.0033* (0.0017)
Female head (=1)	0.1430* (0.0764)	-0.1257* (0.0762)
Female Decision Maker <sup>6</sup> (=1)	-0.1946*** (0.0634)	0.1863*** (0.0632)
Age of Decision Maker	-0.0002 (0.0014)	-0.0001 (0.0014)
Education level	0.0020 (0.0053)	-0.0019 (0.0053)
Household Size	0.0033 (0.0063)	-0.0027 (0.0063)
Distance to the District Town Center	-0.0000 (0.0007)	0.0001 (0.0007)
Distance to the Markets	-0.0009 (0.0007)	0.0010 (0.0007)
HH access to price information (=1)	0.057 (0.0456)	-0.0604 (0.0455)
Disease incidence (=1)	-0.0254 (0.0425)	0.0293 (0.0426)
Animals Vaccinated (=1)	0.0729 (0.0477)	-0.0672 (0.0478)
<i>Some Provincial Dummies</i>		
Copperbelt	0.2160*** (0.0726)	-0.2336*** (0.0724)
Eastern	0.0966 (0.0647)	-0.0788 (0.0648)
Lusaka	-0.1206 (0.0733)	0.1373* (0.0734)
Muchinga	-0.1877** (0.0865)	0.2026** (0.0865)
Southern	0.1077* (0.0606)	-0.1059* (0.0606)
Observations	726	726

Data Source: CSO/MAL/IAPRI 2015.

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

<sup>5</sup> The correlation between gender of the household head and decision maker is 0.72 hence the two variables are not highly correlated.

<sup>6</sup> Decision to sell or not sell

The study by Bruyn et al. (2001) also shows that herd sizes of the animals had an influence on the marketing channel that was used by the farmers. However, it was observed that with increased herd size, transportation cost also increased which is another factor that influences the choice of the marketing channel.

Results also show that female-headed households are more likely to sell their goats to traders compared to their male counterparts. However, when we control for the gender of the decision maker, females are more likely to sell to other households as opposed to selling to small-scale traders. One of concerns that farmers raised during the FGDs was the issue of feeling exploited by the small traders. Small traders always want to buy at very low prices; hence, female farmers may therefore, prefer to sell to individual households rather than to traders to avoid low prices. Other variables such as distance to the markets, disease incidences, and age of the decision maker show a negative relationship with selling to small-scale traders. However, these variables are not statistically significant. Other studies have found that marketing costs such as transport costs, council fees, and animal health certification do significantly affect household market behavior. In particular, high transaction costs discourages market participation and also affects the choice of marketing channel (Bellemare and Barrett 2006; Musemwa et al. 2016). Further, the study by Shiimi, Taljaard, and Jordaan (2010) on factors influencing the decision to market cattle via the formal or informal markets shows that access to market-related information and improved productivity significantly affects the farmer's decision of whether or not to sell through the formal markets.

Our results show that households who had access to commodity price information were more likely to sell to traders than to individual households though in both cases the variable is not statistically significant. Disease prevalence also limits farmers from accessing the formal market channels as the perceived standards of the formal markets may disadvantage most farmers (Togarepi, Benisiu, and Margareta 2016). Further, after controlling for provincial dummies, results indicate that farmers in Southern, Copperbelt and Eastern provinces are more likely to sell to small-scale traders as opposed to selling to individual households. These results are as expected, since herd size affects the decision to sell and which market channel to use. Recall that Southern and Eastern Provinces have the highest population of goats in Zambia whereas for Copperbelt Province, the demand for goats is high at Kasumbalesa border and consequently farmers are more likely to sell their animals to small-scale traders than to individual households.

The consensus from the field visits and what has been highlighted in past studies is that households sell their small livestock largely to meet their immediate needs for cash. The livestock marketing behavior of smallholder farmers is driven more by income needs rather than demand or price movements (Shiimi, Taljaard, and Jordaan 2010; Barrett, Bellemare, and Osterloh 2006). This, therefore, implies that goat marketing is very liquid with a lot of buyers and sellers. Furthermore, in the absence of formal financial markets for rural households, keeping livestock represents a means of finance and self-insurance and small ruminants being a liquid asset that can easily be converted into cash is, therefore, a risk-coping strategy of rural households (Barrett, Reardon, and Webb 2001; Dercon 1998).

However, under the current conditions, formalization of the goat market is difficult because the herd size of goats for the majority of the farmers is still very small. Thus, linking most producers to the markets may require horizontal arrangements such as selling as a group which is difficult to achieve when most farmers use their livestock to sort out cash needs. Therefore, in order to move towards a formal system, firstly, it would require farmers to increase their overall herd sizes so that individual farmers are more capable of selling directly

to processors. This will require adopting management practices that reduce diseases incidence and mortality rate. Secondly, there is a need to have a group of farmers that can supply to the processors who have a less chance of defaulting on the supply arrangements with the processors. Musemwa et al. (2016) also highlight that formation of small farmer groups and the association has the potential to increase the participation of small-scale livestock farmers in formal markets. Marketing groups can help lower transaction costs, increase access to information and farmers can achieve greater economies of scale.

### **3.5. Gross Margin Analysis for Goats**

Using the pricing and cost information obtained from the field visit, we estimate the financial profitability of goats for the smallholder farmers and traders. We make the following assumptions: that goats are kept under the semi-intensive rearing system; supplementary feeding is only done in dry season; and goats are sold when they are nine months old. Based on the findings from the field visits, goats like other livestock are affected by various diseases, and hence, we assume that under the semi-intensive system they are given some dewormer, vaccines, and antibiotics and get dipped at least once in a year. To estimate the gross margins, we use the average prices of a live goat and the average price of goat carcass when sold to abattoirs or butcheries.

Table 7 shows the gross margins estimates if the farmer sells a live goat to a trader. The average price for a medium sized goat is about ZMW250, and the cost estimates are associated with feed, drugs, and labor. Under the semi-intensive system, we assume that goats are taken for grazing in common pastures as shown in Figure 3 and therefore we account for the labor cost associated with herding the animals. The estimated gross margin is ZMW 119.67, which is approximately 92% of the total costs that the farmer incurs if goats are managed under the semi-intensive system. The estimated margin does not include other benefits that accrue to the households such as the manure that is obtained from goat's droppings that can be used in gardens. The positive value of the gross margins shows that the production and marketing of goats are very profitable.

In Table 8, we present a different scenario where the farmer sells the goat to an abattoir or butchery. Based on the information collected from the field, abattoirs/butcheries buy dressed goats for ZMW 20/kg and an average carcass weight of about 15kgs. Regarding the variable costs, the only additions to the expenses are the veterinary inspection fees and council fees, which are incurred if the farmer is selling to the abattoir or butchery. The veterinary offices need to certify that the animal is in good health before it can be sold to the abattoir or butchery.

Given the adjustments made, the estimated gross margin is ZMW 177.67 which approximately 117% of the total costs associated with both production and marketing of goats. In both scenarios, the gross margins are positive though the margins are higher if sold to the abattoirs compared to selling to the traders. Though the producers have to incur extra costs such as veterinary inspection fees and council fees per animal if sold to the abattoirs or butcheries, an average weighing goat yields more profits as opposed to selling to the traders. This, however, is subject to the weight of the animal. In the dry seasons, the weight of the animals is reduced due to insufficient nutrients and lack of supplemental feeding—this has negative implications on the profits that farmers can earn from selling the animals.

**Table 7. Smallholder Producer to Trader Gross Margins for Goats**

ESTIMATED INCOME	Unit	Price/unit (K)	Quantity Per batch	Value/Per Animal Sold (K)
<b>GROSS INCOME:</b>				
Live animal	Each	250.00	1	250.00
<b>Total Income (a)</b>				<b>250.00</b>
ESTIMATED COSTS	Unit	Price/unit (K)	Quantity of goats	Cost Per Animal sold (K)
<b>VARIABLE COSTS</b>				
<b>Feed</b>				
Maize bran	25kg	35.00	1.00	35.00
Sunflower cake	50 kg	40.00	2.00	20.00
Cotton Seed Cake	50kg	60.00	2.00	30.00
<b>Drugs</b>				
Ivomec	20 doses	60.00	20.00	3.00
Dipping (Triatix)	1	6.00	1.00	6.00
Dewormer	20 doses	60.00	20.00	3.00
Labour	Month	350.00	15.00	23.33
Transportation Cost		1.00	10.00	10.00
<b>Variable Costs (b)</b>				<b>130.33</b>
<b>Total Variable Costs</b>				<b>130.33</b>
<b>GROSS MARGIN (a - b)</b>				<b>119.67</b>
<b>% Margin</b>				<b>92%</b>

Source: Author.

**Table 8. Smallholder Producer to Abattoir (Butchery) Gross Margins for Goats**

ESTIMATED INCOME	Unit	Price/unit (K)	Average weight	Value/Per Animal Sold (K)
<b>GROSS INCOME:</b>				
Animal Sales (Kg)	Kg	20.00	15	300.00
Offals	Set	30.00	1	30.00
<b>Total Income (a)</b>				<b>330.00</b>
ESTIMATED COSTS	Unit	Price/unit (K)	Quantity of goats	Cost Per Animal sold (K)
<b>VARIABLE COSTS:</b>				
<b>Feed</b>				
Maize bran	25kg	35.00	1.00	35.00
Sunflower cake	50 kg	40.00	2.00	20.00
Cotton Seed Cake	50kg	60.00	2.00	30.00
<b>Drugs</b>				
Ivomec	20 doses	60.00	20.00	3.00
Dipping (Triatix)	1	6.00	1.00	6.00
Dewormer	20 doses	60.00	20.00	3.00
Labour	Month	350.00	15.00	23.33

<b>ESTIMATED COSTS</b>	<b>Unit</b>	<b>Price/unit (K)</b>	<b>Quantity of goats</b>	<b>Cost Per Animal sold (K)</b>
Transportation Cost (to Abattoirs)		20.00	1.00	20.00
Veterinary inspection		5	1.00	5.00
Council Fees		7.00	1.00	7.00
Variable Costs (b)				152.33
Total Variable Costs				152.33
GROSS MARGIN (a - b)				177.67
% Margin				117%
Assumptions (See 3.5. above)				

Source: Author.

Further, we estimate the gross margins for traders that are participating in the goat marketing. Based on the information gathered from some traders that were interviewed, the cost items that are incurred in trading in goats are highlighted in Table 9. These are average costs for traders that are moving goats from Senanga to Lusaka district. It should, therefore, be noted that some costs such as the council fees, transport costs and veterinary clearance will vary by district (ZNFU 2012). The estimated gross margin for the trader is ZMW 180, which is approximately 82% of the total costs. The positive gross margin shows that it is profitable to engage in goat trading. The gross margins for the traders, however, will vary by district due to the differences in costs that are incurred.

**Table 9. Traders Gross Margins for Goats (Trader to Retailer/Consumer)**

<b>Cost Items</b>	<b>Unit Cost/animal (ZMW)</b>
Average price for Goats from farmers	200
Veterinary Clearance	3
Police fee (per load)	20
Transport cost per animal	40
Council fees	7
Total costs (a)	270
Revenue	
Average Retail price at Chibolya Market (b)	450
Gross Margin (b-a)	180
% Margin	67%

Source: Author.

#### **4. LIVESTOCK POLICY ENVIRONMENT**

There is no specific production or development policy related to goats per se. However, the current livestock policy is used as a general tool to apply to all types of livestock. What seems to be problematic are enforcement issues. Extension efforts for small livestock are not a priority as compared to cattle. Smallholder farmers and other stakeholders need to be sensitized about the importance of small livestock production just as much as for cattle. For some time now, the agricultural policies in Zambia have been highly biased towards maize production with the justification of ensuring food security. To this regard, over 80% of the agricultural budget goes to the Farmer Input Support Program and the Fertilizer Support Program with very little left for other programs including livestock (Kuteya et al. 2016). The Sixth National Development Plan however showed a remarkable shift in policy with livestock development targeted to receive more attention and budgetary allocations though this is yet to be achieved. Furthermore, with the introduction of the electronic voucher, farmers can now utilize this facility to procure livestock related inputs such as drugs and vaccines.

The reported lack of training and low levels of support received by farmers in small livestock production from the government and other stakeholders is evident in low production levels, high disease incidences, and mortality rates experienced by farmers. The majority of the farmers indicated that they lacked the knowledge in disease control and prevention for the small livestock and as a result in the event of disease outbreaks majority tend to use traditional methods while others do not treat their livestock at all. Another area of concern is that government has not updated the livestock statistics for the past 15 years. In the absence of accurate census figures, it would be very difficult to plan and deliver adequate services and resources to the needy areas.

## 5. CONCLUSION AND RECOMMENDATIONS

Small livestock production is highly concentrated among the rural households in Zambia and can contribute significantly to improving the livelihoods of the smallholder farmers. The low cost of production for small livestock presents an opportunity for poor rural households to engage in goat production and marketing. This study analyzed the value chain of goats and the following findings emerged from the study.

Firstly, the estimated gross margins for goats show that net gain from commercialization of small ruminants is positive, though the magnitude of the gain is lower for the producers when compared to the other actors in the value chain.

Secondly, despite this potential for generating income from small livestock, some bottlenecks prevent the expansion of this sector, and these include culture, management issues, and access to the necessary services. Small livestock are easy to cash assets and as such, much of the sales are stirred by the need to sort family expense rather than a business initiative. It was observed that majority of the households that participate in the marketing of goats are those with a bigger flock. Building and maintaining the herd size is of great importance to the smallholder farmers and this affects their marketing decisions.

Thirdly, production of small livestock in Zambia is mostly affected by high disease incidences and mortality rates. Disease and tick control in small livestock are often limited to traditional ways of controlling diseases as most smallholder farmers put more emphasis on large animals. These factors negatively affect the herd sizes of small livestock, which consequently affect the farmer's decision to participate in livestock marketing. Limited production knowledge and management skills in small livestock have also contributed to low productivity. Analysis of the Factors affecting herd size shows that off-farm income, landholding size, the age of the household head and management practices have a positive influence on the size of the flock. Results also show that households that participated in the selling of goat had more livestock compared to non-selling households.

Fourth, it is evident that the presence of veterinary extension personnel is key to the successful improvement of the livestock sector in Zambia, particularly for small livestock, which is owned by many smallholder farmers. However, there are few extension services offered to livestock producers, and they are often directed to large ruminants (cattle). Some farmers even expressed ignorance that they can seek veterinary services for the small livestock as most of them have no knowledge of the available vaccines and drugs that can be administered to small livestock to treat/prevent diseases.

Fifth, the marketing channel for over 80% of the goats and village chickens, is informal, and this has a bearing on the prices that farmers receive from the buyers. There is no standardized pricing, and in most cases, farmers tend to receive very low prices for their animals. The sales are higher when schools are about to re-open, and most traders strategically target this period to buy goats at lower prices. Further, the results from the probit regression analysis show that the choice of the marketing channel used is influenced by the herd size of the animals, the gender of the decision maker as well as the geographical location. It was observed that households with big herd sizes were more likely to sell to traders as opposed to selling to individual households. The choice of the marketing channel used by the farmer has a bearing on the price received and the gross margins.

Based on the findings from this study, the following are some of the recommendations that can contribute to improving the small livestock sector:

- i) To address the problem of disease incidences, the government should introduce sanitary mandates: in economically disadvantaged areas, the promotion of the private sector can be difficult. Because of this, the possible use of “sanitary mandates” as a means of promoting the private sector could be helpful to the rural farmers. Sanitary mandates entail contractual arrangements where the state contracts the private sector to implement animal health services such as vaccinations for diseases of national importance that are carried out in the national interest and normally at the cost to the “state.” This can be revised to mean “assistance from other stakeholders in the development of the livestock value chain. These mandates could establish an income base enabling the establishment of private practicing in the areas of extensive husbandry systems, which would not normally support such an enterprise. This would overcome the persistent absence of government officers who still get their full pay with or without these visits.
- ii) Extension and community participation: most small-scale farmers cling to the old paternalistic approach to veterinary services whereby the state made most disease control decisions and implemented them at no cost to the beneficiary. However, this approach can no longer be sustained. Therefore, communities need to take on these responsibilities themselves. There is a need for communities to appreciate their responsibilities in disease control. This could include the necessity of locally enforceable legislation through the local authorities and traditional leadership. Accordingly, extensive publicity/extension campaigns need to be undertaken to inform and explain to the communities of the need for their involvement in the preparation of alternate provision of animal health services. There is need to educate the farmers on the difference between national importance disease and management diseases. The management diseases are the responsibility of farmers. Some farmers do not know this, hence, they think all the diseases are of national importance, and government is responsible.
- iii) Farmers’ organizations can play a pivotal role in livestock development process. Input supply organizations may grow and become centers for various services such as breeding, veterinary assistance, marketing of animals and animal-related products. Farmer organizations must arise and be based on local initiative though with help from external sources. Well-organized farmer groups have the function of channeling the interests of their members and making these known in political circles, thereby, influencing livestock policies, extension services, and project development. Besides economic benefits, capacity building efforts through farmers’ organizations should raise the awareness amongst women, build leadership qualities, and help them to gain a positive self-image. Literacy skills enhancement must be a priority because poor literacy levels are often a major factor limiting women’s access to information and credit.
- iv) Training of Community Livestock Auxiliaries (CLAs): this concept must be revisited as it is the surest way veterinary services could be delivered to remote areas. The decision on whether these are needed must rest between the communities themselves and the CLAs. Assistance for the training could be obtained from District Veterinary Office staff, non-governmental organizations, and donor agencies with interest in livestock development and production. This can be augmented further through the formation of community groups to assist in community-based animal health care. The community and the CLA must sign contractual undertakings that stipulate how these issues will be addressed.

Obviously, the CLA must be picked from the midst of the farmers to avoid issues of distance. The CLAs should be allowed to provide veterinary inputs at a cost to other farmers.

- v) One of the factors that has been highlighted in literature that affects the choice of the marketing channel, is the issue of high transactional costs. One way of minimizing transaction costs is for smallholder farmers to form livestock marketing groups. By pooling resources together, it has the potential to increase the participation of small livestock keepers in formal markets and improve access to information.
- vi) Extension officers have a role to play in educating farmers on management practices that can warrant increased productivity and herd size. Helping farmers build and conserve herds will stimulate livestock marketing. Since studies have shown that livestock sales increased significantly with increased household's herd size.
- vii) Some of the farmers interviewed in the focus group meetings indicated that they preferred barter system as opposed to cash based transaction due to low prices offered by traders. For farmers to actively participate in goat marketing, there is need to establish formal markets where farmers can be offered high prices for their products. The existing supermarkets, chain stores, and the well-established butcheries can be engaged to take up the opportunity of stocking processed goat meat only when there is a consistent supply of quality goat meat. Assuming this works, it is hoped that farmers will be encouraged to embrace good management practices that could lead to higher production and productivity.
- viii) In the areas visited, there are no abattoirs or slaughter slabs for goats. The slaughtering of goats is usually done in the backyard of the homestead and the meat is sold to the consumers. There are a number of traders that process and roast goat meat along the Lusaka-Livingstone road and it is not clear where these animals are slaughtered or if the animals have been cleared by the veterinary officers to be free of diseases. These pose health risks and hence, there is need to establish slaughter slab or abattoirs that are frequently inspected by the veterinary department. Most of the existing abattoirs and slaughter slabs are privately owned and therefore, we would encourage more private participation in establishing more abattoirs. Similarly, the government can also build slaughter slabs in selected districts with a high population of livestock.
- ix) Research, Planning and Breeding
  - a) The government must invest in research in the livestock sector in activities such as breeding, handling, feeding, and health care.
  - b) Planning must deliberately target an increase in women's access to information and training in modern livestock management, which is currently limited and indirect. Successful training must be oriented towards household members who execute these tasks.
  - c) Breeding Services: Grants must be made available to selected individuals or institutions to create and manage breeding centers and programs on behalf of the people or government. These must be in a reasonable number to discourage monopoly and to ensure availability of the goats all the time. The centers must operate on a cost recovery basis for sustainability and viability. However, as a business enterprise, the breeding centers must not be restricted to producing restocking animals for other farmers only, but to seriously

engage in the full range of operations of the entire livestock value chain. Depending on the level of production, these centers could help in the skills training of the beneficiaries.

x) Public Private Partnerships

To encourage entrepreneurs to pursue value addition activities such as processing, pasture production, etc., the government through related agencies must partner with private firms/institutions in the facilitation of the development of facilities currently deemed expensive and unattractive to the entrepreneur in remote areas to lure individuals to participate in the markets. Using the Chibolya market model, the government would initially own the facilities but lease out operations to individuals or groups of individuals who shall run the facility at competitive market rates. These must be established in selected districts with production potential.

With the introduction of the Ministry of Fisheries and Livestock, there is hope that the ministry will address most of the production bottlenecks that are faced by the smallholder producers. This, however, requires sustained funding towards the sector that can help improve the technical and extension service support that is offered to the small livestock farmers.

## REFERENCES

- Alexandre, G. and N. Mandonnet. 2005. Goat Meat Production in Harsh Environments. *Small Ruminant Research*. 60.1–2: 53–66. Available at <http://www.sciencedirect.com/science/article/pii/S092144880500218X>.
- Al-Khaza'leh J, C. Reiber, R. Al Baqain, and A. Valle Zárate. 2015. A Comparative Economic Analysis of Goat Production Systems in Jordan with an Emphasis on Water Use. *Livestock Research for Rural Development*. 27: Article #81. Retrieved from <http://www.lrrd.org/lrrd27/5/khaz27081.html>.
- Barrett, C.B., M.F. Bellemare, and S.M. Osterloh. 2006. Household-Level Livestock Marketing Behavior among Northern Kenyan and Southern Ethiopian Pastoralists. In *Pastoral Livestock Marketing in Eastern Africa: Research and Policy Challenges*, ed. P.D. Little and J.G. McPeak. London: Intermediate Technology Development Group Publishing. Available at <https://experts.umn.edu/en/publications/household-level-livestock-marketing-behavior-among-northern-kenya>.
- Barrett, C.B. and J.G. Mcpeak. 2003. Poverty Traps and Safety Nets. In *Poverty, Inequality, and Development*, ed. A. de Janvry and R. Kanbur. Prepared for Poverty, Inequality and Development: A Conference in Honor of Erik Thorbecke, 10-11 October, Ithaca, NY. Available at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.496.8870&rep=rep1&type=pdf>
- Barrett, C.B., T. Reardon, and P. Webb. 2001. Nonfarm Income Diversification and Household Livelihood Strategies in Rural Africa : Concepts , Dynamics, and Policy Implications. *Food Policy* 26.4: 315–331. Available at: <http://www.sciencedirect.com/science/article/pii/S0306919201000148>.
- Bellemare, M.F. and C.B. Barrett. 2006. An Ordered Tobit Model of Market Participation: Evidence from Kenya and Ethiopia. *American Journal of Agricultural Economics* 88.2: 324–337. Available at <http://ajae.oxfordjournals.org/content/88/2/324.short>.
- Bosman, H.G., H.A.J. Moll, and H.M.J. Udo. 1997. Measuring and Interpreting the Benefits of Goat Keeping in Tropical Farm Systems 53.4: 349–372. Available at <http://www.sciencedirect.com/science/article/pii/S0308521X96000479>.
- de Bruyn, P., J.N. de Bruyn, N. Vink, and J.F. Kirsten. 2001. How Transaction Costs Influence Cattle Marketing Decisions in the Northern Communal Areas of Namibia. *Agrekon* 40.3: 405–425. Available at [http://www.repository.up.ac.za/dspace/bitstream/handle/2263/2581/DeBruyn\\_How\(2001\).pdf?sequence=1](http://www.repository.up.ac.za/dspace/bitstream/handle/2263/2581/DeBruyn_How(2001).pdf?sequence=1).
- Chapoto, A. and O. Zulu-Mbata. 2015. Rural Agricultural Livelihoods Survey. Lusaka, Zambia: Indaba Agricultural Policy Research Institute. Available at <http://www.iapri.org.zm/news/item/396-2015-rual>.
- Central Statistical Office and Ministry of Agricultural and Cooperatives (CSO/MACO). 2013/14. Post-Harvest Survey Data (PHS). Lusaka: Central Statistical Office and Ministry of Agricultural and Cooperatives.
- Central Statistical Office, Ministry of Agriculture and Livestock and Indaba Agricultural Policy Research Institute (CSO/MAL/IAPRI). 2012-2015. Rural Agricultural Livelihoods Survey Data. Lusaka, Zambia: CSO/MAL/IAPRI.

- Dercon, S. 1998. Wealth, Risk and Activity Choice: Cattle in Western Tanzania. *Journal of Development Economics* 55.1: 1–42. Available at: <http://www.sciencedirect.com/science/article/pii/S0304387897000540>.
- Dossa, L., B. Rischkowsky, R. Birner, and C. Wollny. 2008. Socio-economic Determinants of Keeping Goats and Sheep by Rural People in Southern Benin. *Agriculture and Human Values* 25: 581–592. Available at <http://link.springer.com/article/10.1007/s10460-008-9138-9>.
- Araújo, Gherman Garcia Leal de, Tadeu Vinhas Voltolini, Mario Luiz Chizzotti, Silvia Helena Nogueira Turco, and Francisco Fernando Ramos de Carvalho. 2010. Water and Small Ruminant Production. *Revista Brasileira de Zootecnia* 39.(Supplement): 326–336. Available at <https://dx.doi.org/10.1590/S1516-35982010001300036>.
- Heifer International. 2012. A Study on Goat Value Chain In Nepal. Bardibas, Samadhan Nepal: Heifer International Nepal. Available at: [http://www.heifernepal.org/sites/default/files/2.%20Goat\\_value\\_chain\\_study\\_heifer\\_2012.pdf](http://www.heifernepal.org/sites/default/files/2.%20Goat_value_chain_study_heifer_2012.pdf).
- Hichaambwa, M. 2012. *Urban Consumption Patterns of Livestock Products in Zambia and Implications for Policy*. IAPRI Working Paper No. 65. Lusaka, Zambia: IAPRI. Available at: <http://www.iapri.org.zm/images/WorkingPapers/WP65.pdf>.
- Hichaambwa, M. and T.S. Jayne. 2012. *Smallholder Commercialisation Trends as Affected by Land Constraints: What Are Policy Implications?* IAPRI Working Paper No. 61. Lusaka: IAPRI. Available at <http://fsg.afre.msu.edu/zambia/wp61.pdf>.
- Holloway, G. and S. Ehui. 2002. Expanding Market Participation among Smallholder Livestock Producers. International Livestock Research Institute Working Paper No. 48. Nairobi, Kenya: International Livestock Research Institute. Available at: <https://idl-bnc.idrc.ca/dspace/bitstream/10625/30834/1/122247.pdf>.
- Jaitner, J., J. Sowe, E. Secka-njie, and L. Demp. 2001. Ownership Pattern and Management Practices of Small Ruminants in the Gambia—Implications for a Breeding Programme. *Small Ruminant Research* 40.2: 101–108. Available at: <http://www.sciencedirect.com/science/article/pii/S0921448800002212>.
- Kuteya, A., N.J. Sitko, A. Chapoto, and E. Malawo. 2016. *An In-depth Analysis of Zambia's Agricultural Budget : Distributional Effects and Opportunity Cost*. IAPRI Working Paper No. 107. Lusaka, Zambia: Indaba Agricultural Policy Research Institute (IAPRI) Available at: <http://www.iapri.org.zm/images/WorkingPapers/wp107.pdf>.
- Legese, G., A. Haile, A.J. Duncan, T. Dessie, S. Gizaw, and B. Rischkowsky. 2014. Sheep and Goat Value Chains in Ethiopia : A Synthesis of Opportunities and Constraints. ICARDA/ILRI Project Report. Nairobi, Kenya: International Center for Agricultural Research in the Dry Areas/International Livestock Research Institute. Available at: <https://cgspace.cgiar.org/handle/10568/42181>.
- Lubungu, M. and R. Mofya-Mukuka. 2012. *The Status of the Smallholder Livestock Sector in Zambia*. IAPRI Technical Paper No. 1. Lusaka Zambia: IAPRI. Available at: [http://www.iapri.org.zm/images/TechnicalPapers/Technical\\_Paper\\_1.pdf](http://www.iapri.org.zm/images/TechnicalPapers/Technical_Paper_1.pdf).

- Lubungu, M., N.J. Sitko, and M. Hichaambwa. 2015. *Analysis of Beef Value Chain in Zambia: Challenges and Opportunities of Linking Smallholders to Markets*. IAPRI Working Paper No. 103. Lusaka Zambia: IAPRI. Available at <http://www.iapri.org.zm/images/WorkingPapers/wp103.pdf>.
- McPeak, B.J. 2004. Contrasting Income Shocks with Asset Shocks: Livestock Sales in Northern Kenya. *Oxford Economic Papers* 56.2: 263–284. Available at: <http://oep.oxfordjournals.org/content/56/2/263>.
- Musemwa, L., C. Chagwiza, W. Sikuka, G. Fraser, M. Chimonyo, and N. Mzileni. 2016. Analysis of Cattle Marketing Channels Used by Small Scale Farmers in the Eastern Cape Province, South Africa. *Livestock Research for Rural Development* 19. Article No. 131. Available at <http://www.lrrd.org/lrrd19/9/muse19131.htm>.
- Negassa, A. and M. Jabbar. 2008. Livestock Ownership, Commercial Off-Take Rates and Their Determinants in Ethiopia: Major Findings. Proceedings of the 15th Annual Conference of the Ethiopian Society of Animal Production (ESAP) held at Addis Ababa, Ethiopia, 4-6 October 2007. pp. 49-55. Addis Ababa, Ethiopia: Ethiopian Society of Animal Production. Available at: <https://cgspace.cgiar.org/handle/10568/1427>.
- Rich, K.M., R.B. Ross, A.D. Baker, and A. Negassa. 2011. Quantifying Value Chain Analysis in the Context of Livestock Systems in Developing Countries. *Food Policy* 36.2: 214–222. Available at <http://www.sciencedirect.com/science/article/pii/S0306919210001326>.
- Shiimi, T., P. Taljaard, and H. Jordaan. 2010. Transaction Costs and Cattle Farmers' Choice of Marketing Channels in North-Central Namibia. Contributed paper presented at the joint 3<sup>rd</sup> African Association of Agricultural Economists (AAAE) and 48<sup>th</sup> Agricultural Economists Association of South Africa (AEASA) Conference, 19-23 September. Cape Town, South Africa. Available at <http://ageconsearch.umn.edu/bitstream/96641/2/190.%20Cattle%20marketing%20in%20Namibia.pdf>.
- Simbaya, J. 2002. Potential of Fodder Tree/Shrub Legumes As a Feed Resource for Dry Season Supplementation of Smallholder Ruminant Animals. In *Project Summary: Development and Field Evaluation of Animal Feed Supplementation Packages (AFRA PROJECT II-17 - RAF/5/041)*, ed. H.P.S. Makkar. Vienna, Austria.
- Swanepoel, F., A. Stroebel, and S. Moyo. 2010. *The Role of Livestock in Developing Communities: Enhancing Multifunctionality*. Bloemfontein, South Africa: UFS and CTA.
- Togarepi, Cecil, Benisiu Thomas, and Margareta Kankono. 2016. Cattle Marketing Constraints and Opportunities in North-Central Communal Areas of Namibia, Ohangwena Region. *Livestock Research for Rural Development* 28.7: Article No. 132. Available at <http://www.lrrd.org/lrrd28/7/toga28132.html>.
- Umunna, M.O, O.A. Olafadehan, and A. Arowona. 2014. Small Ruminant Production and Management Systems in Urban Area of Southern Guinea Savanna of Nigeria. *Asian Journal of Agricultural and Food Sciences* 2.2: 107-114. Available at [https://www.researchgate.net/profile/Olurotimi\\_Olafadehan/publication/267156002](https://www.researchgate.net/profile/Olurotimi_Olafadehan/publication/267156002).
- Ungerfeld, R. and A. Bielli. 2012. Seasonal and Social Factors Affecting Reproduction. In *Animal Reproduction in Livestock (1-15)* Oxford, UK: Eolss Publishers Co. Ltd. Available at <https://www.eolss.net/Sample-Chapters/C10/E5-15-20-03.pdf>.

World Bank. 2015. GDP per Capita Indicator [WWW Document].

<http://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=ZM>.

ZNFU 2012. A Review of Council Fees and Charges on Livestock Sector in Zambia.

Available at <http://www.znfu.org.zm/content/review-council-fees-and-charges-livestock-sector-zambia>.