

**AN ASSESSMENT OF THE SOCIO-ECONOMIC FACTORS AFFECTING GOAT
PRODUCTION. A CASE OF ZHOMBE.**

BY

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CERTIFICATION OF DISSERTATION

The undersigned certify that they have read and recommended for submission to the department of Agricultural Economics and Development, in partial fulfilment of the requirements for the Bachelor of Science Honours Degree in Agricultural Economics and Development, a research project by Mandalaza Tinovimba Eric entitled:

AN ASSESSMENT OF THE SOCIO-ECONOMIC FACTORS AFFECTING GOAT PRODUCTION. A CASE OF ZHOMBE.

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DEDICATION

This study is dedicated to father Mr. G.Mandalaza and Mrs. D.D Mandalaza and siblings Tinashe and Tadiwa for their continued support and love.

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Firstly i thank the almighty GOD for strengthening me throughout this course, because my being at this point is his grace. I also thank my family (The Mandalaza`s) for all the support and encouragement throughout the course. I also express my sincere appreciation to my supervisor and the rest of the departmental staff.

ABSTRACT

The main aim of the study was to assess the factors that affect goat production. The study was concerned with the analysis of socio-economic factors affecting goat production; with special reference to Zhombe district. Zhombe is a communal settlement area that is found in the midlands province of Zimbabwe. It consists of 31 wards but the research was done in ward 12 which is south east of Gokwe. Data collection was done through structured questionnaire administered to 40 respondents selected through random sampling technique. The second study objective was reviewed through the utilization of the multiple linear regression model since it consisted of 9 variables in absence of the dependent variable. This was mainly used because it shows the relationship between the dependent variable and the independent variables. The main objective in using this technique was to predict the viability of the dependent variable based on its covariance with all the independent variables. So, with the methods of analysis used having being descriptive statistics and production function analysis using the ordinary least squares to estimate the parameters of the production function. Linear regression analysis using SPSS (23) and STATA (13) software programs were employed for the modeling of goat production as determined by postulated determinants and to assess the relative importance's of various variables. From the test on the significance of the variables 5 of the 9 variables were significant and they were as follow in their p-values Gender = 0.000, Age = 0.039, market distance = 0.002, inputs cost = 0.005 and poultry production = 0.000 with a prob > F of 0.000 and a R² of 0.9923. These are the variables that are considered to be significantly affecting goat production in the study therefore in conclusion they have to be put into consideration when there is need to improve goat production in Zhombe. From the study results attained I recommend that there is need for increased extension services to goat producers so as for them to have improved production methods. Also, I recommend the government to increase the channels of credit directed to small holder farmers so as to increase production.

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ACRONYMS

SADC	Southern African Development Committee
GDP	Gross Domestic Product
GMO	.....	Genetically Modified Product
FAOSTAT	.....	Food and Agriculture Organisation Statistics
AGRIBANK	.....	Agriculture Bank
AGRITEX	.....	Agriculture Extension
NGO	.....	Non-Governmental Organisation
VIF	.....	Variance Inflation Factor

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

During the last decade substantial private and public funds have been invested goats. The primary aim was to increase the number and improve the productivity of the animals. Improvement was sought through the introduction of the Damascus goat which are characterized by high milk and meat yield Sandheim et al. (2013). Concurrently improved nutritional and managerial methods were promoted to increase production. The structure of the production unit, however, which emerged in the long process of development of this industry was far from clear. Presently the goat production units vary widely in size, productivity, direction of production and feeding programme.

During the past 25 years livestock production has tripled and per capita consumption has doubled in the developing world (FAO, 2005). Developing countries accounted for 80% of the growth in global livestock production during this period (FAO 2005). Livestock production in the SADC region needs to double to fulfill demand during the period to 2020. For this to happen the small-scale livestock producers need to be better integrated into the production of livestock as well as commercial markets.

Zimbabwe has an estimated 3 million goats spread within its borders, (Goat Breeders Association of Zimbabwe, 2014), of which the vast majority is owned by small-scale farmers in mixed crop and livestock systems (Nyoni, 2014). Although these low input systems are not highly productive, households do realize most on-farm income from livestock. Goats, specifically are utilized to supplement household food requirements and sold to purchase food items and fund educational expenses Musara et al, (2013). The recent collapse of the commercial livestock sector in Zimbabwe provides a unique opportunity for small scale farmers to make use of existing infrastructure local and regional markets to commercialize goat production.

However, at present the commercial market for goats remains grossly underdeveloped. Weak public and private sectors are failing to provide necessary inputs and know how (Chimvurahwe et al, 2013) and the erratic climate and frequent droughts often result in dry season feed shortages and high mortalities. This hindered goat production as farmers would

not be able to be serviced well by the market due to market imperfections and knowledge inadequacy to farmers on how to improve their production.

the evolution of goat meat production during the period 1990 to 2012. In world level goat meat production during the period 2000 to 2012 was increased by 41.66% (3.47% per year). During the same period sheep meat production was increased by 29.46% (FAOSTAT, 2013). The largest contribution in meat production was Asia with (70.71%) and Oceania was the lowest contributor with (0.51). At the moment the population of goats is growing at a fast rate so as to meet with the increasing market demand. This also is as a result of the quick turn over on the capital invested on the goat production. Goats are grazers and they are mostly found in areas of low rainfall. This therefore leads to their uneven distribution on earth. Due to their tolerance of heat stress goats can be survive and be produced in the most marginal regions of the world. When managed very well goats can contribute to preservation of the ecosystem and can be used as an ecological tool for contributing to the preservation of the ecosystem and can be used as an ecological tool for controlling the noxious weeds (El Aich and Waterhouse 1999). Goats traditionally had a strong influence on the socio-economic life of human population, especially in rural areas and less favored regions of the world. In these regions this livestock constitutes an important source of proteins by converting different natural resources of lower quality (Dubeuf, et al, 2004). Nowadays goats face many environmental challenges such as degradation of grazing lands, competition of land use and many more. On the other hand, climate change creates additional difficulties on the small ruminant farming (Marino et al 2016).

1.2 Problem statement

A major downfall in the livestock production in Zimbabwe has been noticed ever since there where export issues raised due to safety standard on meat exports. Mostly there has been a more notable fall in goat production than any other livestock animals. This has resulted in shortages of goat by-products like goat meat, goat skin and goat milk on the market. On the other hand, population continue to rise in southern African countries and Zimbabwe in particular suffers from malnutrition, reduced household income and food insecurities. Therefore, there is need to make an assessment on the factors that affect goat production so that there will be room to revert the current situation and recommend on the possible solutions to correcting the issue. This is because only those smallholder communal farmers are now rearing goat and for personal purposes, so an assessment of the factors that affect production would enable the crafting of solutions to a problem that has emerged of low production of goats by both smallholder farmers and large farmers so as to increase household income level and be food secure.

1.3 Research Objectives

The main aim of the study was to analyze factors affecting goat production by smallholder farmers.

Specific objectives

- i. To characterize goat production in Zhombe district.
- ii. To determine the socio – economic factors that affect goat production.
- iii. To identify the correlation between socio – economic factors on goat production.

Research Questions

- i. What is the goat production state by small holder goat farmers in Zhombe?
- ii. What are the factors affecting smallholder goat production farmers in Zhombe?
- iii. What the correlations between socio-economic factors on goat production?

1.4 Justification of the Study

There has been a decline in goat production in Zimbabwe resulting in falling of goat production by most commercial farmers. Therefore, there was need to have knowledge and a deeper understanding on some of the key variables that affect goat production and also its of significant importance for livestock production policies to be sound so as for the attraction of goat farmers into goat production in Zimbabwe. Mawonde, (2017) highlighted that there has been a major decrease in the number of the livestock that had been stocked in Zimbabwe at that time. Mawonde, Department of livestock and veterinary services indicated that the livestock population in Zimbabwe had fallen by nearly 40 000 Beasts. Considering the problems raised in the problem statement of malnutrition, food insecurity and low income of small holder farmers the researcher would address the problems through improved goat production. Communal farmers challenges and the opportunities at hand were uncovered in the research for the farmers so as to motivate to rear and produce goats as a means of revenue generation for their livelihood's betterment. This research can be useful to NGOs, policy makers and any other organizations which may be concerned about how to improve community livelihoods. Few studies have been done on the socio-economic factors that influence goat production. While previous studies have looked into policy factors influencing goat production in Zimbabwe, they have not investigated other factors that may influence goat production. This study, therefore, seeks to find out the socio-economic factors influencing goat production by smallholder goat farmers, a case of Zhombe.

1.5 Organization of study

This study consisted of five chapters with the first chapter introducing the study and its objectives, problem statement, background, research questions, and the justification of the study. This was followed by chapter two which focused on the review of literature and empirical studies so as to broaden the knowledge base of the research topic for the research. That is followed by chapter three which had the methodology used in the study. In this chapter a conceptual framework, research area of study, sampling procedures in the data collection as well as the different instruments used to gather and analyze data were given. Chapter four then followed with its main aim being the discussion of the results and the findings. That is where data obtained from the sampling chosen in chapter three was analyzed using statistical methods and presented in order to easily observe the patterns as they would be given for easy interpretation as well as deriving of the recommendations. Chapter five concluded the study and gave policy recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In this chapter the researcher reviewed the relevant literature from different authors on factors that affected goat production, goat production and their management and the possible benefits for rearing the goats. The chapter looked at the definition of the key terms, factors influencing goat production by small holder farmers and the marketing aspects of goat meat in the world and Zimbabwe in particular.

2.2 Definition of terms

2.2.1 Socio Economic Factors

Field of study that examines social and economic factors to better understand how the combination of both influences something, (business dictionary, 2018). According to (Wahombe, 2012) socio economic factors are the factors that directly impact on the persons and income of the farmer. Socio economic factors have a strong influence on the distribution dynamics and the significance of animal diseases particularly in developing countries where there are great differences in socio economic status of their inabilities. The livestock farming system depends on an interaction between humans, animals, diseases and the environment they are in. (Ngagegize 1989) indicated that apparent production constraints such as 'high' maturity, long birth intervals and slow growth rates may not be as critical to the farmer as production scientist think. The researcher went on to adopt the definition from the business dictionary as it highlights that there is a relationship that exist between the socio-economic factors and a variable being affected and in this study that affected variable would be goat production.

2.2.2 Small holder farmer

(FAO, 2014) defined a smallholder farmer as a farmer with a small piece of farm and rely mainly on family labor. Small holder is the connotation of limited land availability. However, many other aspects of smallness are critical to characterizing resource poor small farmers in the developing world such as limited capital (including animals), fragmented holdings and limited access to inputs. Also, we have to note that resource poor livestock keepers are a very

diverse group, (Chipeta et al 2003) argues that defining the group by the number of animals held as by a household is misleading. (Ekhoir et al 2002.2) states that a small-scale farmer in any region of developing country is the farmer that holds less than 5 ha. The researcher therefore adopted the definition by (FAO, 2014) to be used for this study. This is because he definition highlighted that labor is a factor that has to be considered for a smallholder farmers productivity and the labor is dependent on the family size which is a factor that was considered in this research by the researcher.

2.3 Theoretical Framework

2.3.1 Production Function Model

Population growth is known as the best problem of economic growth as it gives provision of the most publicized argument on the expansion of agricultural production (Schultz, 2005). He went on to rank agriculture production in accordance to the contribution it provides on economic growth worldwide. This was done because of a reason that economic growth means increased national income. This therefore makes agriculture one of the sources of national income.

Throughout the world there are different agricultural practices that are done which range from commercial to small scale productions. Generally the small scale farmers in Zimbabwe are now the ones that are responsible for the production of goats and this would just be in excess of what the family requires and then they would sell the excess. The surplus therefore varies from region to region as also the nature of the farm size would be a factor to consider in production of excess.

An argument was made by (Schultz, 2005) that agriculture was treated as a source of economic growth making it the engine of development, although the form of investment done was going to be important for the realization of this goal. Farmers where to be given incentives in order for them to increase production. The transformation of agriculture by smallholder farmers to highly productive sector depended on the investments that were made in the sector. Schultz continues to say that once traditional agriculture is established, the equilibrium is not readily changeable. He further hypothesizes that there are comparatively few inefficiencies in the allocation of factors of production in traditional agriculture.

Labor is the primary instrument for increasing production within the framework of traditional agriculture. The analysis done by Mellor (2014) states that families with small farms (a small resource base) will maximize utility by providing greater labor input per acre and achieving higher yield per acre than families with larger farms (a large resource base). It is quite possible that in low-income societies the marginal productivity of labor is so low that it will, even under the most favorable circumstances in regard to the supply and displays of consumer goods, still not equal the slope of the utility curves once the traditional subsistence level has been reached.

The analysis done by Hayami and Vernon (1971) confirms that the relative availability of labor and land in the agricultural sector is a result of original resource endowments and the resource accumulation associated with historical growth processes of each economy. For instance, in Asia, land has been the major factor limiting the increase in output while in the new continents; a relatively inelastic supply of labor has represented the most significant constraint on growth of output. In order to ease the limitation set either by land or by labor; farmers try to economize in the use of the limiting factors or to substitute man-made inputs for it, e.g., chemicals for treating the goats. The growth path followed by the countries in the new continents seems to reflect a process of easing the limitation set by labor, and the one suggested by Asian countries reflects a process of easing the limitation by land.

In Zimbabwe land becomes a serious problem because of the high population density. Land is inherited and subdivided according to the number of members of family. This means that the labor is abundant resource. Despite the abundance of labor the grazing lands are being minimized and reduced as most of the land is being used for residential purposes. This affects goat production. The total supply of rural labor is too high (US Census Bureau, population Division, 2005). As stated by Mellor (*ibid*) that there is little relation to the level of factor returns until the population becomes so large that the average product of labor drops close to subsistence level.

There are, however, a number of genotype and environmental factors that influence goat production output, including breed fertility, management diseases and pests. There seems to be little, if any, variations in genotype factors among smallholder goat farmers, whereas,

environmental factors vary across different agro-ecologies in Zimbabwe. Goat, a drought tolerant animal is reared in a variety of agro-ecological conditions. Goats are therefore reared in areas with heat minimal rains and even those with the harsh conditions for as long as there are grazing lands and water for their survival (Northwood, 2012; and Opeke, 2012).

The economic model commonly used to determine the relationship between the various factors and the output in agriculture is production function model. The production function of any farmer is determined by resource availability of the farmer. In agriculture, the production inputs consist of land, labour and capital as the basic factors of production. The expected relationship between output and land is that as more land is brought under production, output is increased (Malassis, 1975). The simplified form of production function is given by:

$$Q=f(L_d,K,L) \tag{1}$$

Where Q is the production output, which is a function of land (Ld), the capital (K) and the labour force (L) used in production of the same output. A production function may be defined as a mathematical equation showing the maximum amount of output that can be realized from a given set of inputs. The mathematical form of the Cobb-Douglas production function is given by:

$$Q=AL^\alpha K^\beta \tag{2}$$

Where Q is the output, A is the technology used in the production of output, L is labor input, K is capital input and both are elasticity. Alternatively, a production function can show the minimum amount of inputs that can be utilized to achieve a given level of output (Malassis, 1975). We adopted Malassis idea and extend it by adding other variables including price, fertilizers and physical capital as economic factors, extension services and education as Social factors so that to find out the impact of these factors on farm level production of goats on farmers in Zhombe District, the functional relationship is specified

Simple form of production is as follows

$$Q = f (L_d, K, L) \tag{1}$$

Where:

Q= production output

K = capital

L = labour

L_d = land

2.3.2 Cobb-Douglas function

the Cobb-Douglas functional form of production functions is widely used to represent the relationship of an output to inputs. Cobb Douglas Production Function is regarded as a distinctive case of a production function and is homogeneous of the degree one (Henderson & Richard, 1980). This implies that a change in inputs of any magnitude would lead to a change in output of the same magnitude. Most production functions are believed to be curvilinear (Mafoso, 1999). The Cobb-Douglas production function is given by:

$$\text{_____} \quad (2)$$

Where

Q = output

A = technology used to produce the output

L = Labour

K = Capital

α and β = are the output elasticities of labor and capital, respectively

The functional relationship has to be specified so as to find the impact of factors on Goat production. The study used Cobb-Douglas production function because of its simplistic and shows the relationships between the all factors.

2.3.4 Specifications of the study model

$$Q = f(A, G, Ed, HS, IC, AC, SP, CP, PP, S) \text{_____} \quad (3)$$

2.3.5 Limitations of the study

The major limitations to this study emerged as the funds to finance movement from one area to another. Also, another limitation was time as the available tend to be insufficient to accommodate all the participants. Therefore only 40 farmers where randomly selected so as to give information on factors that affected goat production. The data was collected in a period

where people were looking forth to election period which was just around the corner most of the people were not willing to give out information easily thereby creating another major limitation.

2.4 Empirical review

Several models have been used to analyze factors which affect production of goats by small holder farmers. (Shalander Kumar and A.D Upadhyay, 2009) did a study on goat farmers coping strategy for livelihood security in arid Rajasthan through goat production, so as to quantify the linkages amongst various components of farming systems and the factors that affected their production of goats. The static input output model was used (Leontief 1996; Sharma et al, 1991; Kumar and Jain, 2002). These scholars used the input output model to show the linkages between the components of different sectors. For their data collection they used the stratified random sampling. Their method of sampling was different from the method that was used in this study as the researcher used random sampling technique so as to ensure that answers from strata's would not be from the same type of people would be picked in a biased way so to give access to all respondents random sampling was done.

An analysis of the socio-economic determinants of small ruminants' production among farmers in Osun State, Nigeria was done by (E.O Fakoyo and oloruntuba, 2009). In their study they used the regression model to analyze the ascertain contributions of selected farmers socio economic characteristics to small ruminant production systems. Findings show that older farmers (55%) dominated ownership of goats and sheep. Semi intensive system was still practiced with majority dependent on forage grazing for the animals. Major identified problems constraining small ruminant production included lack of capital/credit, land, pests/diseases and feed shortage. The multiple linear regression model was adopted to make the analysis on this study. A regression analysis result showed that certain socio-economic variables such as income, years of rearing experience and educational level had direct impact on small ruminant production ($R^2=0.78$). The findings suggest that improved small ruminant production could be achieved by considering those significant variables; creating enabling environment through the provision of micro-credit and extension services to ameliorate the problems faced by the farmers. The model in this instance showed the co efficient of multiple determination, which explains the goodness of fit for the relationship between the dependent

variable which would be goat head size and each independent variable in the equation. Like the study of (Fakoyo and oloruntuba, 2009) the researcher used the linear regression model which also indicated that there are certain factors that affected production of goats. However, there were differences in these factors which might have been a result of differences in locations.

Several studies have been done on agricultural production using the production function model, and supply response model to estimate the impact of various factors on output changes. The combination of both allows estimating total impacts of institutional reforms, price realignments and technological factors on agricultural production. (Macours and Swinnen 2007), in their study they quantify the relative importance of the different causal factors of the changes in livestock production in Central and Eastern Europe since 1989 using a production function and supply response approach. The analysis shows that the deterioration of the livestock terms of trade explains a considerable part of the production change. The shift of the production to family farms caused a productivity increase due to improved labor effort but the process of disruption of the production structures caused a (temporary) negative effect. The net effect of the restructuring was slightly positive.

Macours and Swinnen, 2007 used the same approach as Lin (2002) who analyzed the impact of Chinese reform on livestock output and smallholder farmers goat productivity. As Lin, they applied a production function model and a supply response function model to aggregate (sector-level) data. The different causal factors can influence production by inducing changes in input use, or by causing changes in productivity. With the production function model, the factors that influence productivity can be identified. The supply response function model allows indicating all causal factors, the ones that have an impact on productivity as well as the ones that influence the use of production factors. This idea is supported by Mbithi (2000) that the supply response has an impact on economics as well as on agricultural development, poverty, equity and the environment at large; so, policy makers need supply response information on both individual activities and on the sector aggregates.

According to A.M. Mahanjana¹ and P.B. Cronjé, 2010 the aim of this survey was to characterize the economic, social and nutritional importance of goat farming in the Mgwala district of the Eastern Cape region of South Africa, and to identify critical constraints and opportunities for use in future development initiatives. The majority (68%) of the heads of households were males, of which 66% were older than 50 years of age. The majority (60%)

had received schooling for five years or less. Most respondents (86%) kept goats. The mean flock size was 16 head, of which 76.7% consisted of does, 15.8% castrates and 7.5% bucks. The mean kidding percentage was 76% for maiden does and 64% for older does. The annual mortality rate was 7%; adult does account for 47% of deaths, and abortions for 29%. The main reasons given for keeping goats were for slaughter during traditional ceremonies (35%) and for cash sales (23%), and only 15% kept goats for home meat consumption. The motivation for the sale of goats was mainly to pay debts or save money (45%) and to buy other foodstuffs (27%). The majority of sales (91%) took place during the summer months, and buyers (possibly migrant workers returning home during the Christmas vacation) used the goats mainly for traditional ceremonies, funerals and weddings. Only 10% of farmers indicated that they would invest in goat farming if granted a loan that had to be paid back. This would appear to be related to labour constraints, as 44% of goat owners herded their flocks themselves and 37% relied on school-going children for this purpose. Only 19% of respondents indicated that they hired labour to herd their flocks. It would appear that future expansion of goat farming in this area is severely constrained by labour constraints and the fact that goat meat ranked lowest on the scale of eating preferences. The initiatives aimed at improving the economic, nutritional and health status of this community through increased goat production.

A study by J.M. Caste et al, (2002) attempts to describe the semi-extensive goat farming sector in Andalusia (south of Spain) and to establish its characteristics. Eighty-nine goat farmers were surveyed in three areas of this region. The survey examined all aspects of the systems, from socio-economy to management. A multivariate analysis (multiple correspondence and cluster) was used to determine the different farm characteristics. Most of the goat farms studied are single-worker or family managed. The farmers lack training and are elderly, so that continuity of the activity is not assured, although newcomers are usually young. All the farms have some area in ownership, although the farms most specialized in dairy goat products are the smallest in both ownership and total area. Feeding depends largely on grazing, with little area being cultivated to produce feed for the goats. Little distinction is made for the production level. Olive or acorn tree branches (*Quercus ilex* spp.) are used as feedstuff, depending on the types of tree predominating in the area. Five farm types were established, the differences depending on 14 variables of socio-economic aspects, level of production, infrastructure and installations, and feeding. Generated information from this study entails an advance into knowledge of goat farming systems in the Mediterranean area (where little information is generated). The relevance of this study is important since Andalusia has 40% of goats in Spain that produce

more than half of the total goat milk in the country, which points out the socio-economic importance for most depressed areas in the region. This work supposes previous steps for improving the semi-extensive goat farming sector. From a methodological point of view, the discussion on variable types and utility establishes farm type characteristics.

(Mohammed Ibrahim Girel, 2017) in his paper examined the socio-economic factors influencing small ruminant production in Nigeria. Livestock subsector has an enormous contribution to developing countries economy, especially in the provision of food, raw materials, employment, foreign exchange earnings, and provision of market for the products of the industrial sectors. Structured questionnaire was distributed to one hundred and twenty small ruminant farmers using multi stage random sampling techniques. The data obtained were analysed by the use of simple descriptive statistics (mean, average and percentages) and multiple linear regression analysis. The result of the analysis shows that, majority (84.167%, 57.5%, 67.5 % and 58%) of sheep and goats' farmers were male and fall within the age range of 44- 56 years, were married and obtained primary education respectively. The majority of the farmers practiced extensive system of management. The study reveals that lack of capital/credit, insecurity, poor management system, pest and disease, lack of access to drugs were the most serious constraints, others were lack of contact with extension staff, in adequate feed and lack of favorable market also affect sheep and goats production in the area. The regression result reveals that Sex, Accessibility to market, Educational level, Farming experience, Membership of Association and Access to credit facilities, were having positive impact on small ruminant production (R^2) = 0.864. The findings suggest that improved small ruminant production could be achieved by considering those significant variables and the major constraints faced by the farmers, and also creating enabling environment through the provision of micro-credit will be of paramount importance in small ruminant production. Similarities existed between the study that was done by Ibrahim and what was done by the researcher. This is identified where the researcher used the structured the questionnaire but differences then arose on the sampling technique. This is because the multi stage random sampling tends to eliminate other respondents as they would not be able to participate in some of the staged thereby becoming biased where as the researcher used the random sampling technique.

CHAPTER THREE RESEARCH METHODOLOGY

3.1 Introduction

In this chapter the researcher looked at the methodology that was used when the study was conducted. The way this research was designed, sampled, how the data was collected and the possible relevant analysis tools used would be reviewed in this chapter. This chapter's main purpose was to bring out a description of the techniques and the methods used in the conduction of the research and this chapter consist of the conceptual research frame work, the area of study, methods of data collection, data requirements and analytical framework and data processing method was also closely reviewed.

3.2 Research Paradigm

This study was done with a positivist view. This study therefore is a quantitative research as the researcher was objectivist. The entomology of the study was focused on testing if there was a relationship between goat herd size and each of the variables on the other hand. The epistemology of the study was calculated through the testing of hypothesis objectively using statistics. The method was through the use of questionnaires collecting data for analysis then the data was used in the test for relationship between goat herd size at each of the variables. This was structured in such a way that a model was developed to test the relationship between the dependent variable and the independent variables one by one. Based on the literature review the researcher measures the hypothesis through analysing the relationship in the model H_0 - H_1 , H_2 , H_n , where H_0 is the dependent variable, H_1 is Age, H_2 is Gender and H_n means the last independent variable.

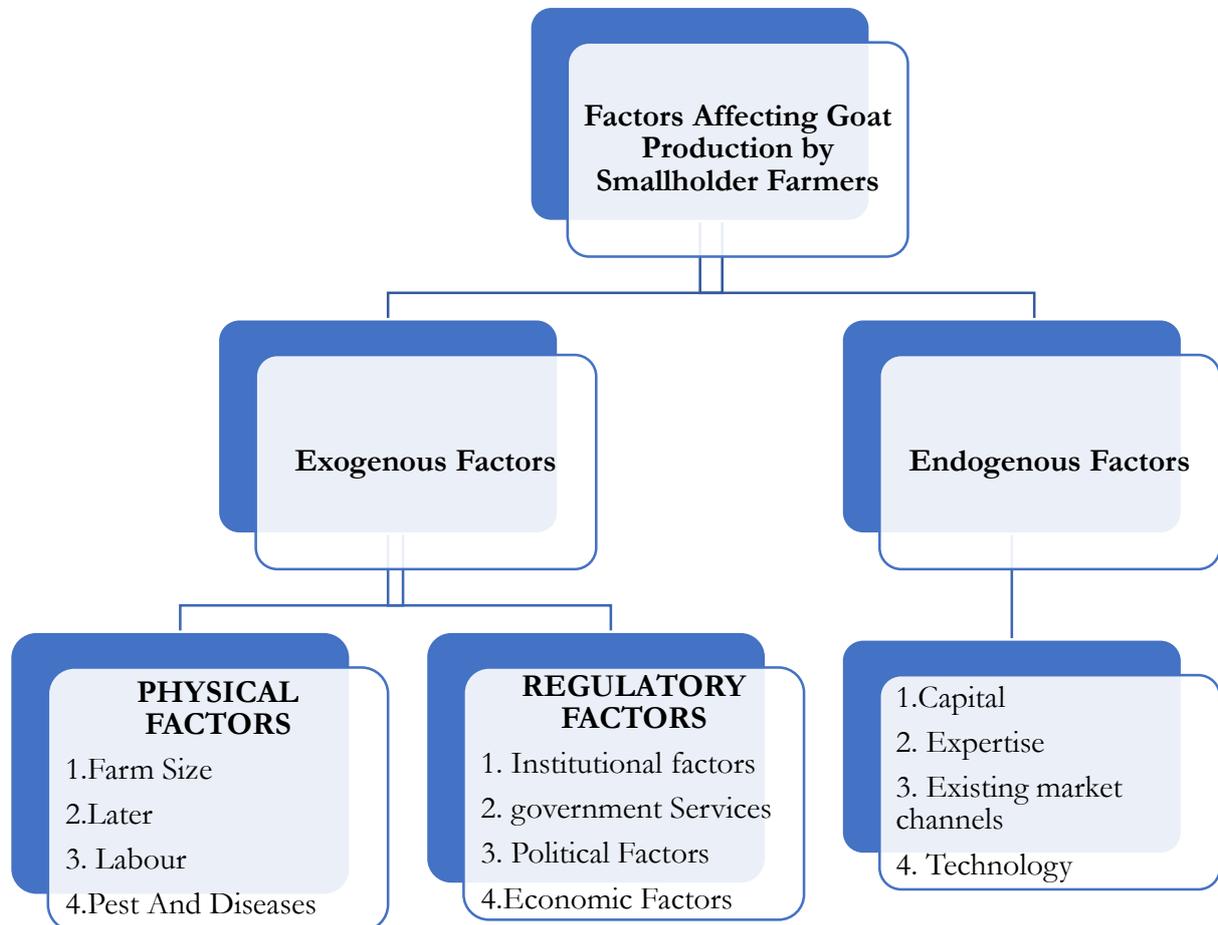
3.3 Research Design

The researcher used the descriptive survey design in the process of inquiring into the socio-economic factors that were influencing smallholder goat production in Zhombe ward 12. As for this study the researcher stated variables that influenced goat production and the influence they exert on production. As for an appropriate data collecting, classifying, analysing, comparing and interpreting, (Kombo and Tromp, 2006) stressed out that a research design is appropriate and necessary. Qualitative and quantitative research methods are useable complementing each other (Mahotra, 1993). As for this study the interaction that existed in-between the variables was investigated through a descriptive survey.

3.4 Conceptual Framework Work of the Study

Despite that great efforts have already been made and great works have been done in the livestock Research Institutes, (Chukungwe and Onyegbule, 2006) indicated that farmers had been restricted from taking advantage of the market price increases because of the different barriers they face. The researcher therefore designed this study in such a way that it addresses critically analyses the factors that affect goat production and the magnitude of contribution considering that the study with hope might be recommended for solutions to the factors, constraints and indicate the possible opportunities that might arise n the future from goat production. Below is a conceptual framework stressing out the factors affecting goat production.

The conceptual framework illustrated in Figure below represents the most important variables hypothesized to influence goat production by smallholder farmers in the study area.



Source: Modified from Bagchi; K and Udo; G. (2007)

Figure 1 Conceptual Framework

Fig 1 above is a conceptual framework showing the factors that affect goat production

Factors affecting smallholder goat production can be accessed by looking at the factors internal and external factors affecting goat production. The above conceptual framework has two main classes of the factors which are the exogenous factors and the endogenous factors. The endogenous factors indicate the inputs needed so as for production to occur which include labor, capital and entrepreneurship. Labor here represents all the human resources, farmers

management as well as expertise, experience and the acquired level of education. This consist of all the factors which are integrated and take initiative in producing goats. Exogenous factors are those kinds of factors that the farmer had no control over. Such factors consist of climatic conditions which is nature, pest and diseases as well as land and other natural resources. Other exogenous factors include institutional factors, economic factors as well as political factors.

3.5 Study area

This study was done in Zhombe. Zhombe is a communal area which is a rural settlement with a few commercial farmers within its borders and a handful of resettlements areas. It is found in the Midlands province of Zimbabwe. The midlands province of Zimbabwe which contains Zhombe is found in agro-ecological region four. The administrative hub and capital of Zhombe is Joel Growth Point which is located 60 km north-west of Kwekwe and 80 km south-east of Gokwe. Zhombe consist of several wards from 1 to 31 but however the research was conducted in ward 12. The researcher selected Zhombe to be the study area because there was an initiative being conducted by ZFU offering goats and sheep to smallholder farmers so as to recapitalize them Zhombe. This therefore brought the idea of knowing the socio-economic factors that affect goat production in Zhombe.

3.6 Data types and collection Method

The study required primary data usage. Data collection was done through the use of questionnaires consisting of structured questions that is the open ended and closed ended questions. The study unit for the data collection was per household. The data collection process was assisted by some local members of the community assigned by the community leadership. Since the period when data collection was done there where elections approaching there was a challenge with the people refusing to respond to the questionnaires due to the fear of the unknown. Because of this challenge the response rate was 51% as seventy-seven questionnaires which were issued out.

3.7 Sampling Technique

Random sampling was used as the sampling technique for the data collection. Random sampling is a method of sampling that involves the random picking of respondents from a large population. Random sampling method is a probability sampling method. A sample size of 40 household heads was used for the study. From the oral sources like the councilors and the village heads the total population of the ward was 815 people. Therefore, considering the statistical theory by (Abebe, Daniels, McKean) that 5% of a population can be used for a study representing the total population with the study being considered viable, the researcher therefore used 40 respondents as it is 5% of the total population.

The survey was conducted focusing on the heads of the households as the main participants of the survey but in instances of their absence their spouses or other family member would represent the household head and fill in the questionnaire. Data that was collected for this study was primary data.

3.8 Data Analysis

Both quantitative and qualitative approaches were applied to process and analyze the data. Two complimenting analysis software were used to do the analysis of the data that is the SPSS, E-Views and STATA to bring out the significance tables, cross tabulations, and the descriptive statistics. The analyzed results were presented using tabulations, charts and graphs. The next chapter is involved with the description qualitative data and analysis of the data as well as the interpretation of the results.

So as to address the first objective of characterizing smallholder goat farmers the researcher used descriptive statistics to present the smallholder farmers characteristics and their demographics. The researcher did this using the chi square and T-Test for all the variables.

The researcher went on to use the multiple linear regression model to satisfy the second objective which measures the magnitudes of affection by each of the variables on the dependent variable. This model was stressed out as below

Multiple linear regression model given as;

$$Y = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Gender} + \beta_3 \text{Education Level} + \beta_4 \text{House Hold Size} + \beta_5 \text{Distance to Market} + \beta_6 \text{Inputs Cost} + \beta_7 \text{Access to Credit} + \beta_8 \text{Sheep Production} + \beta_9 \text{Cattle Production} + \beta_{10} \text{Poultry Production}$$

$Y = \text{Goat Herd Size}$

$\beta_0 =$ is a constant

$\beta_1 = \text{Age}$

$\beta_2 = \text{Gender}$

$\beta_3 = \text{Education Level}$

$\beta_4 = \text{Household Size}$

$\beta_5 = \text{Market Distance}$

$\beta_6 = \text{Inputs Cost}$

$\beta_7 = \text{Access to Credit}$

$\beta_8 = \text{Sheep Production}$

$\beta_9 = \text{Cattle Production}$

$\beta_{10} = \text{Poultry Production}$

The regression model that has been used in this study was used to ascertain the contributions of the selected farmers socioeconomic characteristics to goat production hence goat herd size. The model shows the coefficient of multiple determination (R^2), which explains the goodness of fit for the relationship between the dependent variable and each of the independent variables in the equation. The model was adopted from (Hum, 2009) and was also used in the study of (Fakoya and Oloruntoba, 2009).

The researcher addressed the third objective that see the viability of goat production as compared to poultry production. Gross margins were used to address this variable and see if it is viable to venture into goat production forgoing poultry production.

3.8.1 Discussing Variables

Age of the house hold head is an important variable to the production of the small ruminant animal. This is because it is believed that there is a certain level of experience that is associated with age of the farmer. Therefore, the higher the age of the farmer the more it is the experience accumulated over the years in the rearing of the goats. So, there is a need to test for the relationship that is between the age of the household head and the size of the herd of goats they would be having.

Gender of the household head is considered to be a real factor that affects goat herd size in African communities. This is because it is believed that the men are the heads of the households therefore they would be owning almost all the assets and livestock therefore they work hard to expand the wealth. However, there are some instances whereby the women are the heads of the households with large herds of livestock. With this in mind there is need to test for the level of association that is found in between gender and the goat herd size.

Access to credit has been an issue of real concern in the production these days. This is because even those in other sectors of production and agriculture also are seeking financial assistance from financial institutions in the form of credit. Financial institutions like the Agri bank and Z.b bank have introduced farmer loaning schemes to assist farmers. This therefore indicates that there is need to see the size of the impact that is exerted by farmers ability to access lines of credit for finance goat production.

Cattle production, sheep production and poultry production are other production that are believed to be competitors on resources with the production of goats. This is because the resources required to finance goat production are the same as those that are required for sheep production and cattle production therefore it would be necessary to consider them as factors that affect production of goats. Financial resources and land resources required for goat production might be diverted towards poultry production therefore it would be necessary to test for the relationship between them.it is necessary to see the levels of association and the impacts that each of these exerts on goat production.

Diagnostic Test

Link test

Multicollinearity

When testing for multicollinearity, the researcher used the Variance inflation factor. Through the use of VIF value that would be measured in between 1 to 10 it can be concluded that there is multicollinearity or there is no multicollinearity.

3.9 Limitations of the study

The major limitations to this study emerged as the funds to finance movement from one area to another. Also, another limitation was time as the available tend to be insufficient to accommodate all the participants. Therefore only 40 farmers where randomly selected so as to give information on factors that affected goat production. The data was collected in a period where people were looking forth to election period which was just around the corner most of the people where not willing to give out information easily thereby creating another major limitation.

3.10 Expected Outcome

From the first objective of characterizing goat production farmers the researcher expected to have results that indicated how smallholder goat production farmers are viewed. The researcher also expected results that indicated the magnitude of association that are found between the goat herd size and each of the independent variables. This was to be tested through the use of the Chi-Square and T-Test. The researcher expected to get results that indicated the significant variables from a list of variables considered for the study. These variables would explain the magnitude of effect that is exerted to the dependent variable by the depended variable through their level of statistical significance.

The researcher expressed his expected outcomes after the regression for testing the relationship between each and every one of the independent variables with the dependent variable in a table below.

Table 1: Variables used into linear regression model

Variable	Description	Expected Relation to the dependent
Age of household head	Continuous	+
Gender of household head	Categorical (Dummy) Variable	+/-
Education Level of household head	Continuous Variable	+/-
Market Distance	Continuous Variable	-
Inputs	Categorical Variable	+/-
Access to Credit	Categorical Variable	+/-
Sheep Production	Continuous Variable	+/-
Cattle Production	Continuous Variable	+/-
Poultry Production	Continuous Variable	+/-

3.10.1 Age is positively

Age is positively related to goat production output. The more the age of the household head the more the goat herd size was expected to increase. The researcher expected both to get either a positive or a negative relationship between gender and goat herd size was tested. This was because both males and females have the capability to rear and produce big goat herd sizes despite of their gender. Goat herd size`s output was expected to have a positive relationship with education level. This is because those with higher education level would be associated with more technicality in production therefore it would lead to increased productivity. There is a positive relationship between household size and goat herd size that is produced. This is because labor force increases output would also increase. However due to the marginal returns effect if there is continual increase in the household size output would also decrease due to the marginal effect. Market distance was expected to be negatively related to output. This therefore indicated that inputs cost and herd size are positively related. An increase in inputs cost results in increased output.

3.11 Conclusion

This chapter gave insights on the research methods used in the study. Therefore, the next chapter looks on the analysis of the data collected using methods specified in the chapter as well as the presentation of the results from the analysis.

CHAPTER FOUR RESULTS AND DISCUSSION

4 Introduction

This chapter presented and discussed results from the findings. Characterisation of the smallholder goat farmers was done in this chapter. Constraints that were faced by smallholder farmers are also discussed in this chapter as well as the opportunities that existed in the production of goats.

4.1 Characterization of variables

The researcher presented table 2 below which gives figures that summed up the characteristics of smallholder farmers. This has been done through the mean, standard deviation, maximum value and minimum value. The researcher was addressing the first objective of the study.

Table 2 Shows the variables with their corresponding Mean and Standard Deviations

Variable	Mean	Standard Deviation	Maximum value	Minimum value
Goat Head Size	20.5500	7.70598	37	5
Age (Years)	47.1750	9.09462	66	30
Education Level (years)	14.1750	3.98644	17	0
Household Size (No ^o of family members)	9.9250	2.09257	13	5
Market Distance (Km)	9.3500	3.83339	13	0.8
Inputs (Access / No access)	.8500	.36162	1	0
Sheep Production (Sheep flock size)	6.1500	7.46462	30	0
Cattle Production (Cattle herd size)	13.0500	5.08366	25	0
Poultry Production (Number of birds)	19.0250	8.74273	36	0

In Zhombe the households are headed by people who averaged an age of 47 years old as indicated by the mean value in the table above. The maximum age group that existed in Zhombe area at the time of the study considering those who were interviewed was 66 years old as indicated by the table 2 above. The minimum age of the household heads in Zhombe in the study was found to be 30 years old as indicated in the table. Household heads age tends to be of importance as in agricultural productivity as it indicated the level of experience and also the other knowledge on the social and physical environments (Hofferth, 2008).

The average distance that the smallholder farmers for goats travelled to the market was 9.35km and they tend to have a minimum distance of 0.8 km and a maximum distance of 13km as indicated in the table above. (Buckmaster, 2012) in his study indicated that as distance to the market increases the probability of agriculture production output or production output for sale at the market decreases. This means that those farmers who are closely located to the market are likely to produce bigger herd sizes than those who are located far from the market. (Dorward et al, 2010) therefore highlights that as a farmer gets located far from the market place then their transportation cost would be high and this could affect their production.

The table above summarises the household sizes attained in the study. In Zhombe households tend to have an average of nine people. Households ranged from a minimum of five people per household and a maximum of thirteen people per household. An average number of people per household represents the number of people who are considered to stay at the household permanently. Due to the family sizes of smallholder goat farmers in Zhombe very few of the farmers hired labor for goat production purposes, this is in line with (Paddy, 2009) who noted with concern that as family sizes increase the households would have been provided with the required labor for their agricultural production.

Farmers in Zhombe had an average of 6 sheep per household as indicated by the results of the study. This is because some of them opted to do goat production. Also, those with the largest herd size of sheep tend to have 30 sheep as indicated by the maximum value in the table while those ones with minimum value of sheep have nothing at all. This might be because some people prefer the rearing of goats over sheep as they use the same resources.

Cattle production in Zhombe is something that tends to be of greater social value. This is indicated by an average number of cattle that are found at a household which is 13. With an average of 13 cattle per household most farmers then have cattle and those with the most cattle tend to have 25 as indicated by the table above. With Zhombe not being actually a place where

cattle production is of speciality there are some other households that actually do not own any cattle at all. This is indicated by a minimum value of zero cattle at some households.

The table above presents the farmers that had access to credit and those who did not have the access. This variable was coded (0:1) while 0 represented no access and 1 represented access. A mean of .8500 was attained and also there is a standard deviation of .38481 that was attained. More of the farmers have access to credit as indicated by a higher mean. Farmers ability to access credit enables them to finance their production and increase production.

Poultry production in Zhombe averaged 19 poultry birds per house hold. With an average of 19 birds per household the farmers with the highest poultry tend to have 36 poultry birds at their homesteads. there are also those farmers who had no poultry birds at all resulting in a minimum value of zero. This indicates that there is some form of diversification in production by the smallholder farmers in Zhombe as some of them do both goat production and poultry production well.

The population of Zhombe can be considered to be a literate one. This is indicated by the average number of years that the population spent in school which is 14 years. This in this study implies that most of the people in the sampled population attended secondary level of education thereby indicating that the population is literate. The maximum number of years that were spent in school as indicated by the table above was 17 years. This implies that there is part of the population that managed to attend school at tertiary level. There were other members of the population in Zhombe that did not attend school at all. This is indicated by a minimum value of zero which is in the table. (Feder, 2010) noted that due to educational differences that exist uniformity is rare in adoption of new technologies and production methods. This is probably because the levels of understanding by the farmers would be different in terms of enterprise management and educational differences.

Access to credit is of essential value these days to farmers. With that in mind the number of farmers that had access to credit tend to be very high than those without access to credit. This is indicated by a mean of .8250 considering that the variable was coded (0:1) this shows that most of the farmers had access to credit as .8250 is closer to 1 representing access to credit.

4.2 Characterizing smallholder Goat farmers

4.2.1 Education level of Household Head

The level of education that a smallholder farmer possessed affects the productivity that happens at their household. Therefore below is a table 3 showing a cross tabulation table between goat herd size and education level showing the relationship between the two.

Table 3 showing a cross tabulation table between goat herd size and access to credit

Goat Head Size	Education Level					Total
	No School	Primary Level	Secondary Level	Advanced Level	Tertiary School	
Herd Size (-20)	1	1	2	10	6	20
Herd Size (+20)	1	0	1	7	11	20
Total	2	1	3	17	17	40
Pearson Chi Square P-Value = .504						

At a low production of (-20) there was 1 farmer with no school attendance at all and also 1 farmer doing production above 20 goats. There was 1 farmer doing production with primary level of education attendance producing a goat herd size that is above 20 goats while there were no farmers producing above 20 goats with primary level of education. Two farmers produced goats below 20 at secondary level of education while only one farmer with secondary level of education produced more than 20 goats making a total of 3 farmers with secondary level. A total of 17 farmers produced goats at advanced level with 10 producing below 20 goats and 7 producing above 20 goats. At tertiary level of education 17 farmers produced goats with 6 producing less than 20 goats and 11 producing more than 20 goats. The person value of 3.333 was recorded. A p-value of .054 was recorded indicating that there is no statistically significant relationship between education level and goat herd size. Therefore, we would fail to accept the hypothesis that says there is statistically significant association between goat herd size and education level. Phi value of .289 was recorded showing that the effect size of education level

on goat herd size is of medium strength when considering the Phi coefficient levels by Cohen whereby .289 is closer to .3 for moderate level. Table above shows that 2.5 % of the population did not attend school at all, 12.5% of the population attended the lowest level of education which is the primary level of education therefore they had a general understanding as they considered literate. Huebler 2006 indicated that where a population has about 79% of its people reaching secondary school they are to be considered a literate society. In this case where 37.5% for secondary school summed up with 47.5 for tertiary reaches 85 % surpassing what was marked by Huebler. Therefore, the area of study is considered literate with most of the households having spent 11 years or more in school.

4.2.2 Access to Credit

Table 4 showing a cross tabulation table between goat herd size and access to credit

Farmers ability to access credit is considered to be having a relationship with the goat herd size that is produced by a farmer. This is because of the marginal returns theory which assumes as more of income is invested then output has to increase also.

Goat Head Size	Access to Credit		Total
	No Access	Access	
Herd size (-20)	6	14	20
High size (+20)	1	19	20
Total	7	33	40
Pearson Chi Square P-Value = .037**			

Farmers with no access to credit where 6 producing goats less than 20. Those with access to credit while still producing herd sizes below 20 goats where 14. Only one farmer was producing above 20 goats while having no access credit while 19 farmers who had access to credit produced goat herd sizes above 20. The Pearson Chi Square value of 4.329 was recorded from the results. A P-value of .037 was recorded. This shows that it is statistically significant at 5% and indicates that there is a significant association between access to credit by the farmers and the goat herd size they would be having. A Phi value of .3 according to Cohen indicates moderate level of effect. Therefore, Phi of .329 which is closer to .3 was recorded in the results

of testing for an association between access to credit and goat herd size. This indicates the size of the effect on goat herd size by farmers access to credit to be of medium strength. This is supported by the Phi value which has an approximate significance of .037 which is significant at 5% level of significance. Those households with more access to credit are deemed to be productive than these who do not have that access this is because in addition to their own income still they have more income to finance their production process. 57.5% of the sampled household heads are able to access credit lines which are income for their production. 42.5 % of these households do not have access to the finance. Studies conducted by Idachaba, 2005, Adebayo, 2008, and Olagunju and Olalolade, 2013 show that there is a positive correlation between access to credit and agricultural productivity despite some empirical studies having revealed cases of credit insufficiency.

4.2.3 Gender

Table 5 showing a cross tabulation table between goat herd size and gender

Table 5 below shows the frequencies of the gender distribution on household heads. This affects the levels of production that happens at households as those households headed by males are considered to be more productive, therefore the table below highlights the frequencies attained in the study.

Goat Head Size	Gender		Total
	Female	Male	
Herd Size (-20)	5	15	20
High Size (+20)	0	20	20
Total	5	35	40
Pearson Chi Square P-Value = .017**			

A total of 5 farmers produced goats below 20 being females and no male farmers where 15 at the same level of production. No female farmers produced goat herd sizes above 20 while there were 20 male farmers producing goat herd sizes above 20. This indicates that male farmers own most of the goats. A chi square value of 5.714 was attained from the results with one

degree of freedom. The P-value for an association between gender and goat herd size was .017 which is below the alpha value therefore it is statistically significant and we would accept the alternate hypothesis which says that there is a significant association between goat herd size and gender. This therefore means that goat herd size is not independent of gender but it is dependent of gender. In accordance to what Cohen highlighted a Phi of .378 is closer to 3 than to .5 meaning that there is a medium strength relationship between goat herd size and gender.

4.2.4 Inputs Cost Cross Tabulation

Inputs cost are an important variable in determining the level of output that a farmer produces. This is because those farmers that tend to have higher cost in terms of inputs are usually associated with higher outputs. therefore table 6 below shows the distribution of farmers according to their cost and their levels of production.

Table 6 showing a cross tabulation table between goat herd size and inputs costs

Goat Head Size	Input Cost		Total
	Low Cost	High Cost	
Herd size (-20)	6	14	20
Herd size (+20)	0	20	20
Total	6	34	40
Pearson Chi Square P-Value = .008***			

Six farmers had inputs cost that ranged low producing goat herd sizes that were below 20 goats while there were no farmers producing goat herd sizes above 20 with low cost of production. There were 14 farmers with high cost of production while producing goat herd sizes below 20 while there were 20 farmers with high cost producing goat herd sizes above 20. This indicate that there is an association between high variable cost and herd sizes as most farmers with high cost also produce bigger goat herd sizes. There is a significant association between goat herd size and the level of variable cost that a farmer incurs. This is indicated by a statistically significant person Chi square asymptotic significance value of .008. This is below the alpha value meaning that goat herd size is dependent on inputs cost level. This therefore mean that

we accept the alternative hypothesis which says that there is an association which is significant between goat herd size and inputs cost.

4.2.5 Age

So as to test if there was a relationship between age and the herd size the researcher used the T-Test. The T-Test table 7 below then shows the mean, T-Value and the P-Value proving the statistical significance of the relationship.

Table 7 below shows T-Test results for Goat Herd Size * Age

Label	Goat Herd Size	
	High	Low
Mean	53.20	8.50
T-Value	-5.577	-5.577
P-Value	.000	.000

Age of the household herd and goat herd size have a statistically significant relationship. This is indicated by a p-value of .000 which is significant at 1% indicating that there is a strong association between age and goat herd size. We therefore reject the null hypothesis which states that there is no association between goat herd size and age of the household head. This strong association might be as a result of the experience that a person attains as they grow older in their day to day rearing of the goats. That experience is usable to resulting in high goat herd size.

4.2.6 Household Size

The size of the household determines he need for the hiring of labor or not. This is because those households with many family members have higher production levels as delegation of work in the production system would be necessary.

Table 8 below shows T-Test results for Goat Herd Size* House Hold Size

Label	Goat Herd Size	
	High	Low
Mean	11.35	8.50
T-Value	-5.871	-5.871
P-Value	.000	.000

The results of testing for an association between goat herd size and house hold herd indicated that there is a statistically significant relationship between goat herd size and the house hold size. This is indicated by an p-value of .000 which is significant at 1% implying that we reject the null hypothesis which says there is no association between household size and the goat herd size. This might be as a result of delegation of work towards the rearing and production of goats as labour increases results in increases in output as well.

4.2.7 Market Distance

Table 7 below shows T-Test results for Goat Herd Size * Market Distance

Label	Goat Herd Size	
	Low	High
Mean	7.40	11.30
T-Value	-3.705	-3.705
P-Value	.001	.001

Market distance proved to be a factor that hinders goat herd sizes. This is because after testing for the relationship between goat herd size and the market distance faced by the farmer a p-value of .001 was attained. This indicated that there is a statistically significant relationship which implies that as distance from the market increases the goat herd sizes decrease. This

implies that we fail to reject the null hypothesis which says that an increase in the distance from the market results in decreased goat herd size.

4.2.8 Sheep Production

Table 8 below shows T-Test results for Goat Herd Size * Sheep Production

Label	Goat Herd Size	
	Low	High
Mean	6.90	5.40
T-Value	.631	.631
P-Value	.532	.532

There is an insignificant relationship between goat herd size and sheep production. This is indicated by the p-value which is above the alpha value which is at .532 this implies that there if no association between goat herd size and sheep production at any of the significance levels that is the 1%,5% and 10%.

4.2.9 Poultry production

Table 9 below shows T-Test results for Goat Herd Size * Poultry Production

Label	Goat Herd Size	
	Low	High
Mean	12.30	25.75
T-Value	-7.659	-7.659
P-Value	.000	.000

Results from a test of the association between goat herd size and poultry production indicated that there is a great association between the two. This is indicated by the p-value which is at .000, which is very significant at 1% level of significance.

4.3 Linear Regression Analysis

The researcher here was addressing the second objective of the study which sought to determine the socio – economic factors that affect goat production. Table 10 below presents the linear regression model results from the study. The table shows the significant and insignificant variables from the study, their relative coefficients, standard error values, t values and p values.

4.3.1 Table 10 showing Linear Regression Results

Goat Herd Size	Coefficient	Standard Error	T	P> |t|
Gender	-4.216207	.9121598	-4.62	0.000***
Age	.0718804	.0331742	2.17	0.039**
Gender	-4.216207	.9121598	-4.62	0.000***
Education Level	.0132443	.0320285	0.41	0.682
Household Size	.0763404	.1590976	0.48	0.635
Market Distance	-.4685436	.1344637	-3.48	0.002***
Inputs Cost	4.637019	1.533639	3.02	0.005***
Access to Credit	-.2371836	.7198647	-0.33	0.744
Sheep Production	.0264604	.0194445	1.36	0.184
Cattle Production	-.0138102	.033395	-0.41	0.682
Poultry Production	.9518159	.0507017	18.77	0.000***
Constant	2.447095	1.387194	1.76	0.088*
Number of Observations N	40			
R Squared	0.9943			
Adjusted R-Squared	0.9923			
Prob > F	0.000			

Note * = significant at 10%, ** = significant at 5%, *** = significant at 1%

As indicated by the table above 5 of the 10 variables are statistically significant ($P < 0.1$). The statistically significant variables are Age at 5%, Gender at 1%, Market distance at 5%, inputs Cost at 5% and poultry production at 1%.

The variables are explained in detail below. The ordinary least squares method of estimating the parameters was used in a linear regression model. Results attained shows that R Squared = 0.9943 which means that 99% of the factors that affect goat production are explained by the explanatory variables. Prob > F = 0.000 implying that probability of rejecting the model is zero because it is significant at 1%. This means that the model used was correctly specified.

4.3.3 Age

The results show that output of goad herd size is positively related to the age of the household head as this is shown by a coefficient of 0.7188. this is significant at 10% level. This means that as the age of the household head increase the quantity of the goats in the household herd tends to increase. An 1 % increase in the age of the household head leads to a 71.88% increase in the goat head size. This might be because of the experience that one attains in production as they spend more time in the production of the same product. A $P > |t|$ value of 0.039 was attained on the results showing that age it is a significant factor in the production and size of the head as it is significant at 5%. Umma et al, 2014 indicated that most of the farmers who are into goat production are ranged 40 – 49 years mostly. This is almost similar to the range of farmers age group on this study.

4.3.4 Market Distance

Goat production output is negatively related to the market distance as indicated by the coefficient (.4685436), this has a $P > |t|$ value of 0.002 showing that it is significant at 1%. This implies that farmers close to the market tend to produce more goats than those who are far from the market. This implies that as the distance from the market increases the head size of the goats a household owns decreases. A 1% increase in the market distances tends to lower the herd size by 46.85436 %. This might be because as the farmers go away from the market they might face marketing problems. A high market distance attracts a high transportation fee therefore this might lead to a reduced head size for the farmers as they would try to stay within

their financial capacities. Mohamed Ibrahim, 2017 did a relevant study and was able to attain results that are in line with those of this study.

4.3.5 Poultry Production

Poultry production proved to be a very important variable in the study. Poultry production has a $P > |t|$ value of 0.000 which is significant at 1%. This result implies that an increase in the production of poultry birds was related to an increase in the production of goats. This might be because the two productions are not directly to each other therefore they do not directly compete for production resources so an increase in production of both at once is possible. A coefficient of 0.9518 was achieved implying that, as there is an increase in goat production by 1% there also would be an increase in the poultry production by 95.18% and this is significant at 1%.

4.3.6 Gender

Gender of the house hold head proved to be a factor to consider when it comes to goat production. This is because most of the house holds that were headed by males had the largest of head sizes. 35 of the 40 households surveyed were headed by males which is 87.5% of the population. The remaining 12.5% of the households were headed by females. Therefore, Gender proved to be a significant variable with a $P > |t|$ value of 0.000 while it also had a coefficient of (4.216207). This coefficient implies that there is a negative impact from gender which is exerted by an increase in the number of households headed by females. As there is an increase in the number of households headed by females the head sizes of goats would be negatively affected that is decreasing. This finding is in line with (Adam and Oleyankera, 2014 and Mabe, 2010) who observed that male participate more in ruminant production than the females.

4.3.7 Inputs Cost

From the results it shows that goat head size is positively related to inputs cost as indicated by the coefficient 4.63 which is significant at 10%. This therefore implies that an increase by 1% in inputs cost results in an increase in herd size by 463%. This is because most of the production

of these goats has been dependent on natural rearing processes like grazing therefore where there is supplementary feeding, medication and other production would be boosted causing a significant margin of difference.

Diagnostic Test

The researcher was now addressing the third objective which was aimed at a identifying the correlation between socio-economic factors on goat production.

An assumption was made by (Gujarati and Porter, 2009) which indicated that a regression model used in the analysis is “correctly” specified, but if there is a model that is “incorrectly” specified then a problem arises in the model specification error or even a model specification bias.

When the linear regression model was done the researcher then went on to conduct a link test to test the model specification if it is correct and found out that the probability ($P > |t|$) of hatsq was .206 which is 20.6% meaning that the model specification error has been good.

Table 11: Link Test results

Source	SS	D.F	MS
Model	2303.1718	2	1151.5859
Residual	12.728197	37	.344005324
Total	2315.9	39	59.3820513

Table 11.1: link test results

Goat Herd Size	Coefficient	Standard Error	t	P > |t|	95% confidence	Interval
Hat	.930527	.0553104	16.82	0.000	.8184632	1.042602
Hatsq	.0017078	.0013261	1.29	0.206	-.0009792	.0043947
Cons	.6080544	.5428024	1.12	0.270	-.4917677	1.707877
Number of observations	40					
F (2, 37)	3347.58					
Prob > F	0.0000					
R-Squared	0.9945					
Adjusted R-Squared	0.9942					
Root MSE	.58652					

Source: Field Survey Data. 2018

Test for Multi-collinearity

The researcher after testing the link test and observing that a model was well conducted, the researcher then on to conduct a multi-collinearity test. If multi-collinearity exists among the variables then the researcher has to drop some of the correlated variables. (Gujarati, 2007) went on to say that if there is the existence of the multi-collinearity problem there are only two ways that can be done either to follow the rules of thumb or do nothing. On the variance inflation factor a value of 1.44 was attained by the researcher. (Gujarati, 2009. page 340) states that as the VIF value becomes bigger the more it becomes troublesome or collinear. When following a rule of thumb on VIF which states that as VIF goes beyond 10 as a result of R^2 which is bigger than 0.90 their variance tend to be identified as highly collinear. Below is an estimation results table.

Table13: Variance Inflation Factor

Variable	1/VIF	VIF
Household education level	.868	1.153
Sheep production	.734	1.369
Cattle production	.553	1.809
Mean VIF		1.44

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1 Introduction

This study mainly aims at the analysis of the socio-economic factors that affect production by smallholder farmers in Zhombe. An estimation of the relationship between goat herd size and several socio-economic factors was conducted and the results shown that various socio-economic factors had to be reviewed in order to improve the production of goats output in the country

5.2 Conclusion

The regression results of the findings highlighted that Gender, Age, Market Distance, Inputs Cost and Poultry Production are the significant factors and are the determinants of goat production in the study area. The study has revealed that so as to have an effective uplift of livelihood for the smallholder goat producing farmers there is need for provision of training, provision of loans for production expansion, the creation of markets to purchase the farmers output.

Although production systems are still at the infancy with little of external input , inadequate grazing lands and feed for goats and poor market structures since there is no clearly defined management practices, diseases control programs, if carefully prepared and carried out and are supposed to compliment feeding and lower mortalities and rise the overall performance and productivity of farmers that can result in more income, increased protein available to the rural populace and ultimately increasing the community standards of living.

After the conduction of the regression the results indicated that Gender, Age, Market Distance, Inputs Cost and Poultry Production had statistically significant effect on the goat herd sizes which is the output and hence they are the determinants of goat production in the study area (Zhombe). Gender and Poultry production were significant at 1% where as Age, Market Distance and Inputs Cost where significant at 5%. These are the factors whereby there is need for increased governmental emphasis in addressing so as for the increase in production of goat production to be necessary. Access to credit and Cattle production showed negative coefficients but explained a negative relationship to the goat production output. One of the reasons could

be the liquidity crunch that prevailed in the country in the past year causing inaccessibility of channels of credit in the economy to support small holder farmers.

The regression results were associated with an R-Squared of 0.9943 and this means that 99.43% of the variations in goat production output are explained by the factor inputs. Various coefficients were attained indicating the elasticity of the various inputs to the output. However, putting into consideration, the findings on the study we can reach a conclusion that gender, Age, Market Distance, Inputs Cost and Poultry Production are important socio – economic factors that affect goat production in Zhombe.

5.2.0 Recommendation

5.2.1 Policy Recommendations

The following are policy recommendations which are aimed at ensuring increased goat production. Below are some recommendations that are useful in both the public and government view to increase goat production as well as improve social welfare of the society. With the basics of the research, hereunder are some of the recommendations that are aimed at increasing productivity at household level.

With basics on the above findings it is recommended that:

Land is a fixed factor of production and therefore it affects productivity as there will be limited land for grazing land therefore there is need to adopt the use of hay and supplementary like what is done under other programs like command agriculture and the presidential inputs scheme. This makes the small holder farmers have some resources to use and inputs affordable if they are subsidized.

There is need for the government to encourage the private sector to invest into the small holder farmers. This can be done through the opening up of credit facilities directed to smallholder farmers at affordable rates. Having the financial institutions create small scale banks through the correct legislative procedures enables smallholder farmers to have access and acquire credit at reasonable rates thereby making them able to have more income to inject into the production process.

The extension services offered by the government need to be involved more in the production of goats by smallholder farmers in Zhombe and other areas. This enables the passing on of education and mobilization of farmers to adopt the new methods of production apart from the cultural ways. This enables the adoption of chemicals in the production of goats to cure diseases and pest that might result in increased mortalities rates.

There are infrastructural problems that are being faced by the farmers. Such include roads causing other farmers away from the market to lower or even abandon the production as most likely they would be failing to access the market and the transportation process would be expensive due to the state of the roads. Also there is need for the improvement of the energy and communication and market infrastructure as it enables the farmers to communicate and get latest information on how best to maximize production techniques and market news in terms of the prices.

Recommendations to the farmers.

Smallholder goat production farmers are recommended to invest adequate capital into the goat production process as this would enable availability of liquidity in the production process required to purchase various inputs. In line with the returns to scale assumptions the higher the capital induced would lead to a higher out put being produced as more resources would be there to enable development.

Production has always been affected by the location it is happening at. Therefore, for the smallholder goat farmers to avoid such things as locational utility there is need for them to site their production enterprises close to the market and by doing so they would have removed the problem of poor transportation facilities like roads

5.2.4 Areas of further research

Having looked at socio-economic factors affecting small holder goat production the researcher recommended further studies on the analysis of the factors that are affecting goat milk markets from flourishing. Also, there is need to have further studies on the possible systems that could be introduced to farmers so that they adopt to make their production competitive on the international stage.

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(Ibrahim Girei & Bosede Ayoola, 2017)

Questionnaire

An Analysis of factors affecting smallholder goat production

Questionnaire Number

Section A Site and location details

1. Full name of respondent
.....
2. Village name
.....
3. Ward number
.....
4. Farm size
.....

Section B

Household characteristics and demography

1. Sex of house hold head 1 = Male () 2 = Female ()
2. Age of household head ()
3. Marital status of household head
1. Single / Never Married () 2. Married () 3. Widowed () 4. Divorced ()
4. Education level of household head and spouse
 1. No school ()
 2. Primary but not completed grade 7 ()
 3. Completed grade 7 ()
 4. Vocational school ()
 5. Completed secondary school ()
 6. Completed advanced level ()
 7. Completed tertiary school ()

5.Number of people in the household ()

Complete the table by sex and age group

Write 0 if there are none	Members aged under 5 years	Members aged 5 – 17 years	Number of members aged 18 -59	Number of members aged 60 +
6.Male				
7.Female				
8.Orphan's			X	X
9.Chronically ill (unable to work)				
10.Physically/mental challenged				

Section C House Hold Characteristics

Type of assets	1.Cling if household own indicate by writing, if household own/keep any in working condition? 0 = no 1 = yes	2.How many are in working condition? Enter number and 0 if there is none	
		Keep for others	Own
Ox drawn ploughs			
Cultivators			
Rippers			
Tractors			
Scotch Cart			
Wheel Barrows			
Ox drawn harrows			
House hold assets			
Nap Sack Sprayers			

Trucks			

Livestock Ownership (Please tell us how many of the following do you keep)

Livestock Type	3.Number kept	kept		Livestock Type	4.Number own	5 Kept for others	
		others	own			Own	Others
Cattle				Goats			
Donkeys				Pigs			
Sheep				Poultry birds			

INCOME SOURCES

Please complete the table using codes below	6.What are your households main income activities throughout the yea? (use activity codes)	7.Who participates in this activity? (use codes below)
Main		
Second		
Third		
Forth		
Other Activity		

Income Activity Codes	Member Codes
1 = Crop sell	1 = head of household
2 = animal/ meat sells	2 = spouse to head of house only
3 = unskilled wage labor	3 = men only
4 = skilled wage labor	4 = women only
5 = small business	5 = adults only
6 = remittances	6 = children only
7 = petty trading	7 = women only
8 = rental property	8 = men and children
9 = government allowance	9 = everybody
10 = others specify	

Section D Rural services and credit

<p>1. Have you ever received any type of formal training in any agricultural subject</p>	<p>1. YES () 2. NO ()</p>		
<p>2. From whom did you receive this training?</p>	<p>Source 1;</p> <p>Sex:</p> <p>Source 2:</p> <p>Sex:</p>		
<p>3. How do you acquire information about the prices prevailing in the markets for the commodities you produce and sell? (Multiple response is allowed please use ALL codes)</p> <p>1= From hearsay among friends and neighbors.</p> <p>3= From radio</p> <p>5= From newspaper</p> <p>7= From produce buyers</p> <p>9= Farmer organization/ co-operatives</p> <p>11= Government / Extension</p> <p>13= Unable to respond (if applicable, place in Always row)</p>	<p>Frequency</p> <p>Sometimes</p> <p>Often</p> <p>Always</p>	<p>Never</p>	<p>Enter as range of numbers if many in one category (e.g. 1-5)</p>

Section E Access to credit

What are the terms of credit or loans received since January 2017?

1. Source 0 = None 1 = Produce buyer 3 = Farmer group / co 5 = Bank / Credit Union 7 = Local Money Lenders 9 = Family and Friends 11 = Community Group 13 = Other (describe)	2. Month and Year	3. Loan Amount (US \$)	4. Form of Loan? 1 = Money 3 = Drugs 5 = Feeds 7 = Equipment 9 = Chemicals 11 = Other (describe)	5. How much did you have to repay?	7. What did you use the loan for? (specify the crop or animal and general items purchased)
1					
2					

SECTION F. ACCESS TO MARKETS INPUT AND OUTPUT

Stock information

1.What are the parent stock breeds?		
2.What was the age of the parent stock, (in months)?		
3.What was the cost of each breeding stock?	US\$	
<p>4.Where was the breeding stock acquired?</p> <p>1 = small trader</p> <p>2 = large trader</p> <p>3 = store merchant</p> <p>4 = friend / neighbor</p> <p>5 = family / relative</p> <p>6 = cooperative</p> <p>7 = itinerant trader</p> <p>8 = research / extension</p> <p>9 = international organization</p> <p>10 = NGO</p> <p>11 = government source</p> <p>12 = other</p>		

Other Inputs

<p>5. Where was the input purchased? Specify by type of inputs</p>	<p>Feed Source (s)</p>	<p>Drugs Source (s)</p>	<p>Chemicals source (s)</p>
<p><u>Input Sources</u> Use codes below 1 = Product leftover 2 = Neighbor had some 3 = product from dealer / shop 4 = Government 5 = Other</p>			
<p>7. Quality of inputs obtained/ month? Specify by type of input</p>			
<p>8. Cost of inputs</p>	<p>US\$</p>	<p>US\$</p>	<p>US\$</p>
<p>9. Quantity of inputs used / month?</p>			
<p>10. Other inputs used besides the ones above</p>			

OUTPUTS

Meat Sales (for the last month)

11. What type of transaction	Code (transport)	1	2	3	4	5
12. What type of output	Code (output)					
13. Where did this transaction take place	Code (list market location)					
14. Distance: transaction point from farm	Enter travel time (enter units)					
15. When did the transaction take place?	Enter month (Month)					
16. How much was sold? (transaction quantity)	Quantity sold (Enter Amount)					
17. Price of transaction per unit	Unit (Unit)					
	Price per unit					

TRANSACTION	OUTPUT	TRANS LOCATION	MONTH
1= sale (out)	1= Goat meat	1= Own farm	1= January
2= barter (out)	2= Skin	3= Neighbors farm	2= February
3= Gift (out)	3= Manure	5= Village	3= March
4= Gift (out)	4= Goat hair	7= Outside Village	4= April
5= Other	5= Breeding stock	9= Other	5= May
	6= Others		6= June
			7= July
			8= August
			9= September
			10= October
			11= November

			12= December
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QUESTIONS CONCERNING GOAT PRODUCTION

1.What is the number of goat units?

2.How is the experience in goat farming ?.....

3.What is the main reason for keeping goats?
 ?.....

4.Are there any prevalent diseases in the area?

5.Are there any extension visits? [] YES [] NO

6.Do you plan to increase the head size? [] YES [] NO

7.What are your major challenges in the production of goats?

THANK YOU

APPENDICEIS

APPENDIX 1 Data Set

	A	B	C	D	E	F	G	H	I	J	K	L	M
	Age	Gender	Educatio	HHSize	Dirtanno	InputrCa	AccorrTo	SheepPr	CattlePr	PoultryP	GoatHeadSize		
1	1	30	0	14	5	0	0	0	15	0	0	5	
2	2	31	0	17	6	0	0	0	14	0	0	8	
3	3	45	1	17	9	10	1	1	0	12	16	17	
4	4	46	1	14	9	10	1	1	6	14	15	16	
5	5	33	0	14	6	5	0	0	6	15	9	10	
6	6	47	1	14	11	10	1	1	10	12	17	18	
7	7	46	1	0	10	10	1	1	0	10	15	16	
8	8	48	1	0	10	11	1	1	0	25	19	20	
9	9	50	1	11	12	12	1	1	20	25	29	30	
10	10	45	1	17	11	10	1	1	0	15	22	23	
11	11	44	1	17	8	11	1	1	0	20	14	15	
12	12	52	1	17	13	12	1	1	8	20	26	27	
13	13	48	1	17	11	10	1	1	4	12	18	19	
14	14	44	1	17	10	10	1	1	0	11	17	18	
15	15	65	1	14	12	13	1	1	0	14	32	33	
16	16	66	1	17	13	13	1	1	10	22	36	37	
17	17	44	1	11	9	10	1	1	5	10	15	16	
18	18	45	1	14	9	10	1	1	8	10	16	17	
19	19	42	1	14	10	10	1	1	0	12	17	18	
20	20	36	0	11	7	0	0	0	22	10	3	9	
21	21	32	0	17	5	0	0	0	30	7	0	6	
22	22	45	1	14	9	10	1	1	10	9	14	15	
23	23	47	1	14	10	10	1	1	0	13	25	26	
24	24	54	1	14	12	12	1	1	20	14	27	28	
25	25	55	1	17	12	12	1	1	18	11	25	26	
26	26	62	1	17	13	11	1	1	0	15	30	31	
27	27	46	1	17	12	10	1	1	5	13	25	26	
28	28	42	1	14	10	10	1	0	0	17	19	20	
29	29	53	1	17	10	13	1	1	0	13	26	27	
30	30	36	1	7	8	0	0	0	5	9	11	12	
31	31	42	1	14	11	10	1	1	0	14	20	21	
32	32	40	1	14	9	10	1	1	0	13	17	18	
33	33	44	1	14	9	12	1	1	3	12	14	15	
34	34	66	1	17	13	13	1	1	6	16	29	30	
35	35	47	1	14	10	10	1	1	4	14	20	21	
36	36	50	1	14	10	10	1	1	4	10	22	23	
37	37	45	1	14	10	10	1	1	0	13	18	19	
38	38	58	1	17	11	12	1	1	5	10	28	29	
39	39	60	1	17	12	11	1	1	8	18	31	32	
40	40	56	1	17	10	11	1	1	0	12	24	25	

APPENDIX 2 Descriptive Statistics

	Mean	Std. Deviation	N
GoatHeadSize	20.5500	7.70598	40
Age	47.1750	9.09462	40
Gender	.8750	.33493	40
EducationLevel	14.1750	3.98644	40
HHSize	9.9250	2.09257	40
DistanceToMarket	9.3500	3.83339	40
InputCost	.8500	.36162	40
AccessToCredit	.8250	.38481	40
SheepProduction	6.1500	7.46462	40
CattleProduction	13.0500	5.08366	40
PoultryProduction	19.0250	8.74273	40

APPENDIX 3 Regression Results from stata

Source	SS	df	MS	
Model	2302.6013	10	230.26013	Number of obs = 40
Residual	13.2986998	29	.458575856	F(10, 29) = 502.12
Total	2315.9	39	59.3820513	Prob > F = 0.0000
				R-squared = 0.9943
				Adj R-squared = 0.9923
				Root MSE = .67718

GoatHeadSize	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Age	.0718804	.0331742	2.17	0.039	.0040315	.1397293
Gender	-4.216207	.9121598	-4.62	0.000	-6.081783	-2.350631
EducationLevel	.0132443	.0320285	0.41	0.682	-.0522612	.0787498
HHSize	.0763404	.1590976	0.48	0.635	-.2490508	.4017316
DistanceToMarket	-.4685436	.1344637	-3.48	0.002	-.7435527	-.1935346
InputsCosts	4.637019	1.533639	3.02	0.005	1.500375	7.773664
AccessToCredit	-.2371836	.7198647	-0.33	0.744	-1.709472	1.235105
SheepProduction	.0264604	.0194445	1.36	0.184	-.0133081	.0662288
CattleProduction	-.0138102	.033395	-0.41	0.682	-.0821107	.0544903
PoultryProduction	.9518159	.0507017	18.77	0.000	.8481193	1.055512
_cons	2.447095	1.387194	1.76	0.088	-.3900357	5.284225

APPENDIX 4 Correlation results from e – views

Correlation													
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	GOATHEAD...	AGE	ACCESSTO...	CATTLEPR...	DISTANNCE...	EDUCATION...	GENDER	HHSIZE	INPUTSCOS...	POULTRYP...	SHEEPPRODUCTION		
2													
3	GOATHEAD...	1.000000	0.922039	0.674464	0.602105	0.779734	0.243019	0.643266	0.913758	0.674464	0.988191	-0.225688	
4	AGE	0.922039	1.000000	0.663090	0.511140	0.777801	0.212720	0.621858	0.857603	0.663090	0.913854	-0.211907	
5	ACCESSTO...	0.674464	0.663090	1.000000	0.520254	0.945193	0.089823	0.899735	0.764098	1.000000	0.739252	-0.523391	
6	CATTLEPR...	0.602105	0.511140	0.520254	1.000000	0.622748	-0.124437	0.500719	0.598127	0.520254	0.639770	-0.221831	
7	DISTANNCE...	0.779734	0.777801	0.945193	0.622748	1.000000	0.136833	0.833781	0.808870	0.945193	0.837492	-0.471426	
8	EDUCATION...	0.243019	0.212720	0.089823	-0.124437	0.136833	1.000000	-0.040809	0.146081	0.089823	0.201454	0.090433	
9	GENDER	0.643266	0.621858	0.899735	0.500719	0.833781	-0.040809	1.000000	0.754558	0.899735	0.727886	-0.576891	
10	HHSIZE	0.913758	0.857603	0.764098	0.598127	0.808870	0.146081	0.754558	1.000000	0.764098	0.926530	-0.265189	
11	INPUTSCOS...	0.674464	0.663090	1.000000	0.520254	0.945193	0.089823	0.899735	0.764098	1.000000	0.739252	-0.523391	
12	POULTRYP...	0.988191	0.913854	0.739252	0.639770	0.837492	0.201454	0.727886	0.926530	0.739252	1.000000	-0.312414	
13	SHEEPPRO...	-0.225688	-0.211907	-0.523391	-0.221831	-0.471426	0.090433	-0.576891	-0.265189	-0.523391	-0.312414	1.000000	
14													

APPENDIX 5.1 Cross tabulation for Goat herd size * Gender

GoatHeadSize * Gender Crosstabulation					
			Gender		Total
			Female	Male	
GoatHeadSize	low (-20)	Count	5	15	20
		Expected Count	2.5	17.5	20.0
	high(+20)	Count	0	20	20
		Expected Count	2.5	17.5	20.0
Total		Count	5	35	40
		Expected Count	5.0	35.0	40.0

APPENDIX 5.2 Cross tabulation for Goat herd size * Education Level

GoatHeadSize * EducationLevel Crosstabulation								
			EducationLevel				Total	
			No school	Primary level	Secondary Level	Advanced Level		tertiary Level
GoatHeadSize	low (-20)	Count	1	1	2	10	6	20
		Expected Count	1.0	.5	1.5	8.5	8.5	20.0
	high(+20)	Count	1	0	1	7	11	20
		Expected Count	1.0	.5	1.5	8.5	8.5	20.0
Total		Count	2	1	3	17	17	40
		Expected Count	2.0	1.0	3.0	17.0	17.0	40.0

APPENDIX 5.3 Cross tabulation for Goat herd size * Inputs Cost

GoatHeadSize * InputsCost Crosstabulation					
			InputsCost		Total
			low Cost	High Cost	
GoatHeadSize	low (-20)	Count	6	14	20
		Expected Count	3.0	17.0	20.0
	high(+20)	Count	0	20	20
		Expected Count	3.0	17.0	20.0
Total		Count	6	34	40
		Expected Count	6.0	34.0	40.0

APPENDIX 5.4 Cross tabulation for Goat herd size * Access to Credit

GoatHeadSize * AccesstoCredit Crosstabulation					
			AccesstoCredit		Total
			No Access	Access	
GoatHeadSize	low (-20)	Count	6	14	20
		Expected Count	3.5	16.5	20.0
	high(+20)	Count	1	19	20
		Expected Count	3.5	16.5	20.0
Total		Count	7	33	40
		Expected Count	7.0	33.0	40.0

APPENDIX 5.5 T-Test table goat herd size * Poultry Production

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
PoultryProduction	Equal variances assumed	1.996	.166	-7.659	38	.000	-13.450	1.756	-17.005	-9.895
	Equal variances not assumed			-7.659	34.782	.000	-13.450	1.756	-17.016	-9.884

APPENDIX 5.6 T-Test table goat herd size * Cattle Production

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
CattleProduction	Equal variances assumed	.194	.662	-3.540	38	.001	-5.000	1.412	-7.859	-2.141
	Equal variances not assumed			-3.540	37.990	.001	-5.000	1.412	-7.859	-2.141

APPENDIX 5.7 T-Test table goat herd size * Sheep production

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
SheepProduction	Equal variances assumed	.316	.577	.631	38	.532	1.500	2.379	-3.316	6.316
	Equal variances not assumed			.631	36.867	.532	1.500	2.379	-3.321	6.321

APPENDIX 5.9 T-Test table goat herd size * Market Distance

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
MarketDistance	Equal variances assumed	36.030	.000	-3.705	38	.001	-3.900	1.053	-6.031	-1.769
	Equal variances not assumed			-3.705	21.511	.001	-3.900	1.053	-6.086	-1.714

APPENDIX 5.10 T-Test table goat herd size * household size

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
HouseholdSize	Equal variances assumed	2.389	.130	-5.871	38	.000	-2.850	.485	-3.833	-1.867
	Equal variances not assumed			-5.871	32.599	.000	-2.850	.485	-3.838	-1.862

APPENDIX 5.11 Link test Table

. . linktest						
Source	SS	df	MS	Number of obs = 40		
Model	2303.1718	2	1151.5859	F(2, 37) = 3347.58		
Residual	12.728197	37	.344005324	Prob > F = 0.0000		
Total	2315.9	39	59.3820513	R-squared = 0.9945		
				Adj R-squared = 0.9942		
				Root MSE = .58652		
GoatHeadSize	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
_hat	.9305327	.0553104	16.82	0.000	.8184632	1.042602
_hatsq	.0017078	.0013261	1.29	0.206	-.0009792	.0043947
_cons	.6080544	.5428024	1.12	0.270	-.4917677	1.707877

APPENDIX 5.11 Correlation Table

```
. pearson GoatHeadSize Gender EducationLevel DistanceToMarket SheepProduction CattleProduction
```

	GoatHe-e	Gender	Educat-l	Distan-t	sheep-a	Cattle-n
GoatHeadSize	1.0000					
Gender	0.6433	1.0000				
EducationLevel	0.2430	-0.0408	1.0000			
DistanceToMarket	0.7797	0.8338	0.1368	1.0000		
SheepProduction	-0.2257	-0.5769	0.0904	-0.4714	1.0000	
CattleProduction	0.6021	0.5007	-0.1244	0.6227	-0.2218	1.0000