

**THE PROFITABILITY, FEEDING REGIMES AND CONTRIBUTION OF SMALL-
SCALE POULTRY PRODUCTION PROJECTS TO RURAL HOUSEHOLD
LIVELIHOOD SECURITY IN KWAMKHWANAZI TRADITIONAL WARD,
KWAZULU NATAL, SOUTH AFRICA.**

By
SIMANGELE REJOICE MHLONGO
Student no. 19971820

Dissertation submitted in fulfilment of the requirements for the Degree of Master of Science in
Agriculture and Rural Development



Department of Agriculture
Faculty of Science and Agriculture
University of Zululand

Supervisor:
Prof N. Kunene

Co-supervisor:
Dr S. Mavengahama

January 2017

ACKNOWLEDGEMENTS

The years I spent at the University of Zululand have been of great professional and personal development for me. I am deeply grateful to my supervisors Prof. N Kunene and Dr. S Mavengahama for their valuable support in the writing and creation of this dissertation.

I would like to thank the farm staff at the Poultry Unit at UNIZULU for their support in conducting on- station experiments. Special thanks to the broiler producers in Kwa-Mkhwanazi Traditional ward for their co-operation. Many thanks to my friends especially Sthembele Mpanza, for their encouragement throughout my study.

DEDICATION

This is dedicated to my wonderful husband Mvuselelo Christopher Cele, my son Mpilonhle (To be) Mkhize, my daughter Minathi Cele, my nephew Mxolisi Buthelezi and my nieces, Zamokuhle, Nokwethemba and Nolwazi Cele for their understanding and support when I had to be away from home even at odd hours during my study period. It is also dedicated to my mother Ednah Bongiwe Mnguni and my grandmother Edith Mthethwa (Ncwangozi) without who's nurturing and teachings, I would have not completed this work.

DECLARATION

I, **Simangele Rejoice Mhlongo** declare that:

- The research reported in this thesis, except where otherwise indicated, is my original research.
- This thesis has not been submitted for any degree or examination at any university.
- This thesis does not contain other persons' data, pictures, graphs and other information, unless specifically acknowledged.
- This thesis does not contain other authors' writings, unless specifically acknowledged as being source from them.

Signed..... Date.....

As Research supervisor, I agree to the submission of this thesis for examination.

Signed..... Date.....

Name: Prof. N. Kunene

As Research Co-supervisor, I agree to the submission of this thesis for examination.

Signed..... Date.....

Name: Dr. S Mavengahama

PUBLICATIONS IN PREPARATION

1. Comparative profitability of broilers under commercial and subsistence production systems in Kwa-Mkwanazi ward of UThungulu district in KwaZulu-Natal. To be submitted to the journal *Livestock Research for Rural Development*.
2. Comparative performance of a standard and a modified feeding regime on the performance of broilers fed commercial diets at the University of Zululand poultry unit. To be submitted to the *International Journal of Poultry Science*.

TABLE OF CONTENTS

THE PROFITABILITY, FEEDING REGIMES AND CONTRIBUTION OF SMALL-SCALE POULTRY PRODUCTION PROJECTS TO RURAL HOUSEHOLD LIVELIHOOD SECURITY IN kwaMKHWANAZI TRADITIONAL WARD, KWAZULU NATAL, SOUTH AFRICA.....	0
ACKNOWLEDGEMENTS	i
DEDICATION	ii
DECLARATION	iii
PUBLICATIONS IN PREPARATION	iv
Table of Contents	v
LIST OF FIGURES	viii
LIST OF TABLES	ix
ABSTRACT	x
CHAPTER 1: INTRODUCTION.....	1
1.1 Background.....	1
1.2 Problem statement.....	2
1.3 The main Research Question	3
1.3.1 Specific Research Questions.....	3
1.4 Objectives	3
1.5 Theoretical framework.....	4
1.6 Operational definitions.....	5
1.7 Significance of the study.....	6
1.8 Structure of Dissertation	6
1.9 References.....	7
CHAPTER 2: LITERATURE REVIEW	9
2.0 Introduction.....	9
2.1 Livestock Production in Communal Areas	9
2.1.1 Chickens Production Systems in Communal Areas.....	10
2.2. Crop Production	12
2.3 Livelihood strategies.....	13

2.3.1 Remittances and Government grants	14
2.4 Seasonality in production.....	14
2.5 Profitability of poultry production	15
2.6 Feeding regimes of broilers	16
2.7 The role of women, youth and physically challenged in poultry production	17
2.8 References.....	18
CHAPTER 3: GENERAL RESEARCH METHODOLOGY.....	24
3.1 Study area.....	24
3.1.1 Climate.....	24
3.1.2 Population	24
3.1.3 Economic activities.....	25
3.1.4 Infrastructure.....	25
3.2 Research design	26
3.3 Unit of analysis	28
3.4 Sampling	28
3.4.1 Sampling Procedure.....	28
3.5 Methods of data collection.....	29
3.6 Data analysis and management.....	30
3.7 Limitations of the study	30
3.8 References.....	31
CHAPTER 4: SITUATION ANALYSIS OF POULTRY FARMERS IN KWA MKHWANAZI TRADITIONAL AUTHORITY	32
4.1 Introduction.....	32
4.2 Materials and Methods.....	33
4.2.1 Sampling	33
4.3 Results and discussion of the situational analysis	34
4.3.1 Production type I: Raising day old broiler chicks to marketing stage at 42 days.....	34
4.3.2 Production type 2: Buying matured (3-5 weeks) broiler chickens and selling them at higher price.	35
4.3.3 Production type 3: Raising day old chicks to marketing stage (42 days) and also buying matured (3-5weeks) broiler for profit making.....	36

4.4 The categories for 15 individually managed projects	36
4.4.1 Production type I: Raising day old chicks to marketing stage (42 days).....	37
4.4.2 Production type 2: Raising day old chicks to marketing stage (42 days) and also buying matured (3-5weeks) broiler chickens and selling them at higher price.	37
4.4.3 Production type 3: Buying and selling matured (3-5weeks) broiler chickens to make a profit.....	37
4.4.4 Production type 4: Buying broiler chickens at 3-5 weeks and raising them before selling them at higher price.....	38
4.5 Results and Discussion of household and socio-economic analysis.....	39
4.6 Conclusion	45
4.7 References.....	47
CHAPTER 5: COMPARATIVE PROFITABILITY OF BROILER PROJECTS UNDER COMMERCIAL AND SUBSISTENCE PRODUCTION SYSTEMS IN PARTS OF UTHUNGULU DISTRICT IN KWAZULU-NATAL.	48
5.1 Introduction.....	48
5.2 Materials and methods	49
5.3 Results.....	50
5.4 Discussion.....	53
5.5 Conclusion	55
5.6 References.....	56
CHAPTER 6: COMPARATIVE PERFORMANCE OF A STANDARD AND A MODIFIED FEEDING REGIME ON THE PERFORMANCE OF BROILERS FED COMMERCIAL DIETS AT THE UNIVERSITY OF ZULULAND POULTRY UNIT.....	58
6.1 Introduction.....	58
6.2 Materials and methods	59
6.3 Results.....	64
6.4 Discussion.....	66
6.5 Conclusions.....	68
6.6 References	69
CHAPTER 7 GENERAL CONCLUSIONS and recommendations	72
APPENDIX.....	74
Household Survey Interview Schedule.....	74

LIST OF FIGURES

Figure 6.1 Temperatures recorded in the cage housing chickens fed diet 1 during the winter period	60
Figure 6.2 Temperatures recorded in the cage housing chickens fed diet 2 during the winter period	61
Figure 6.3 Temperatures recorded in the cage housing chickens fed diet 1 during the summer period	61
Figure 6.4 Temperatures recorded in the cage housing chickens fed diet 2 during the summer period	62
Figure 6.5 Feed conversion efficiency of broiler chickens fed recommended diet by Meadow feed company (Diet 1) and the modified diet (Diet 2) which is used at UNIZULU Poultry Unit.	65
Figure 6.6 Average daily gain of broiler chickens fed recommended diet by Meadow feed company (Diet 1) and the modified diet (Diet 2) which is used at UNIZULU Poultry Unit. ..	65

LIST OF TABLES

Table 4.1 Household size of respondents	39
Table 4.2 Gender and age of respondents	40
Table 4.3 Educational level, working status and broiler project membership of the respondent in each household.....	41
Table 4.4 Professions of some of the household members in the study area.....	42
Table 4.5 Purpose and sizes of land holdings owned by respondents	42
Table 4.6 Sources of energy and heating used for broiler rearing in the study area.....	43
Table 4.7 Type of water facilities used by respondents in the study area	43
Table 4.8 Types and purposes of livestock owned by respondents	44
Table 4.9 Availability of food in the households throughout the year	45
Table 5. 1 Profitability analysis for broilers produced at UNIZULU Poultry unit and those produced by individual farmers raising day old chicks and or buying matured chickens in kwa Mkhwanazi traditional authority in summer and in winter seasons.	51
Table 5. 2 Profitability analysis for broilers produced at UNIZULU Poultry unit and those produced by groups of farmers raising day old chicks and or buying matured chickens in Kwa-Mkhwanazi traditional authority in summer and in winter seasons.....	52
Table 6. 1 A comparison of the recommended Meadow feeds and the modified University of Zululand feeding programme for broiler chickens	62
Table 6. 2 Chemical composition (label values) of commercial broiler feeds bought from Meadow Feeds used in the study	63
Table 6. 3 A comparison of the amount of broiler feed recommended (Meadow feeds) and the modified (UNIZULU) consumed between winter and summer season.....	64
Table 6. 4 Comparative weight gain of broilers fed a standard (Meadow feeds) diet and modified (UNIZULU) diet in winter and summer seasons. Values are mean± standard error.	64

ABSTRACT

Poverty is a common phenomenon amongst rural households in Kwa-Zulu Natal, South Africa. Estimates have indicated KwaZulu-Natal as the most populous province in South Africa, containing about 21.0 % of the country's population. The majority, more than half of the population in the KZN province resides in rural areas. Rural households are engaged in many livelihood strategies to alleviate poverty. Livelihood strategies used by rural households include community gardens, one home one garden, large stock, small stock and poultry production. The most prevalent livelihood strategy is poultry production since it needs less space and less growing time compared to large and small stock and income is generated over a short period. Poultry production is reported as important for income generation and poverty alleviation in many rural areas in Africa. The objectives of this study were to describe the socio economic status of households participating in the poultry production project, describe assets and resources available to households, describe livelihood strategies of participating households and to investigate profitability of small-scale poultry production projects. This study employed mixed methods i.e. The combination of qualitative and quantitative research designs, because they complement each other. The quantitative research design in this current study was composed comprised a survey and experiment. The survey was a situational analysis survey. The experiment was on- station broiler experimental research which compared broiler production in summer and winter. Documentary reviews were done to review existing data that relate to this study. The field of research was an ethnographic study which included observing and interviewing people in their natural setting by interacting with them to gain understanding of the social world. The data collection instruments for quantitative data were structured situation analysis survey interview schedule, broiler record cards for on- station experiments and for summer and winter data for individually -managed and group- managed broiler projects.

The situational analysis of broiler production revealed that broiler production was indeed an important livelihood strategy in the study area. There were 17 group-managed broiler projects and 15 individually- managed broiler projects. The two groups of projects were further divided into different categories according to their production type as follows: raising day old chicks to

marketing stage, buying matured chickens and selling them at higher price, raising day old chicks to marketing stage, and buying matured chickens and selling them at higher price.

The economic study investigated the profitability of broilers under commercial and subsistence production systems production systems. Study conducted at University of Zululand, a total of 400 broiler chicks were used for the experiment. For the small scale production the farmers were responsible for the management of their broilers and taking their own records. The researcher assisted them with record keeping. The study suggested that in general broiler production was profitable. The results from the community show that there was profitability for all the groups involved in the study.

The controlled experiment investigated the comparative performance of a standard and a modified feeding regime on the performance of broilers fed commercial diets at the University of Zululand poultry unit. The experiment was conducted in summer and in winter at the University of Zululand poultry unit. A total of 400 broiler chicks were used in the experiment. In winter, 200 day-old chicks were raised in two cages assigned with 100 chicks each. In summer 200 day-old chicks were also raised in two cages each with 100 chicks. Feed for the broiler was from Meadow Feeds Millers purchased from local retailers. The first group (Diet 1) was fed according to Meadow Feeds recommendations and the second group (Diet 2) was fed according to the modified University of Zululand poultry unit programme. The study revealed that the modified diet 2 led to higher feed conversion efficiency and higher growth performance of broilers compared with the modified.

CHAPTER 1: INTRODUCTION

1.1 Background

Poverty is a common phenomenon amongst rural households in Kwa-Zulu Natal, South Africa (Pauw, 2005). De Beer and Swanepoel (2000) reported some of the causes of poverty as physical weakness, inability to cultivate large areas, and low wages. Earlier, Moreki (1997) suggested that poor households needed to improve food self-sufficiency if their income and employment opportunities were to increase. Estimates have indicated KwaZulu-Natal (KZN) as the most populous province in South Africa, containing about 21.0 % of the country's population. The province's Gross Domestic Product was reported lower than the national average (Pauw, 2005; Mohamed, 2007). In the same report, agricultural households earned less than non-agricultural households, and poverty rates among agricultural households were very high (81%) compared to 50% for non-agrarian households. Africans, who make up the larger percentage of the population, were reported as the worst affected by poverty (poverty rate of 64.4 %). Poverty was more prevalent in rural areas (78.2 %) than (28.9 %) in urban areas (Pauw, 2005; Mohamed, 2007).

Rural households are engaged in many livelihood strategies to alleviate poverty. Agricultural - based livelihood strategies used by rural households include community gardens, (such as the one home one garden policy), keeping of large and small livestock, and poultry production (KwaZulu-Natal Department of Agriculture and Rural Development (KZNDARD), 2015). The most prevalent livelihood strategy is poultry production since it needs less space and less growing time compared to large and small stock, and income is generated over a short period (Rana, 2005). Poultry production is reported as important for income generation and poverty alleviation in many rural areas in Africa (Mganga and Assa, 2012). Non -agricultural based livelihood strategies employed by rural households include informal trading, wage employment, rural migrant remittances, state old pension and social grants.

Small- scale poultry production, which includes layers, broilers and indigenous chickens, has the potential to stimulate the socio-economic growth of resource- poor households. Layers takes a long time before they can be productive i.e. 18 to 21 weeks and are kept on the farm for 52 to 54 weeks compared to broilers which are raised from day old and reach maturity or slaughter weight at five to six weeks which is 42 days (Khan et al. 2006). Broilers are raised for a shorter period compared to layers and indigenous chickens. So the study focused on broiler production since it takes a shorter period to be raised, thus providing quicker income, and is a fast livelihood strategy. The poultry production venture can be owned by an individual within a household or by a group of community members as a community project.

The KZNDARD has been promoting community poultry projects among rural dwellers in KZN province. Community poultry projects have the potential to enhance household food security (Dolberg, 2003) and contribute to poverty reduction through provision of supplementary food, income and employment (Mandal *et al*, 2006). This is because households pull their resources together and benefit from cooperation. Cooperatives make it easier to seek finances, training and technical advice. The purpose of this present study was to characterise the socio economic circumstances of subsistence farmers of Kwa-Mkhwanazi Traditional Authority and determine the contribution of poultry projects to their livelihoods. The research questions and objectives are analysed in the following sections.

1.2 Problem statement

Small-scale broiler production amongst livelihood strategies has the potential to stimulate the socio-economic growth of resource poor rural households. Among other livelihood strategies, broiler production is an important means of support in the rural areas of Kwa-Mkhwanazi. Farmers in the study area were modifying the commercial feed in various ways in order to reduce feed cost and increase profitability. It was summarized that this modified diet might lead to impaired or reduced poultry growth resulting in unintended negative results to the desires of the farmers. This study was undertaken to measure the performance of broilers to different regimes and compare their profitability and to determine which diet would provide maximum performance at minimum cost. Results generated from the study would be of importance to

resource poor rural farmers. To give informed advise to the farmers and extension officers in order to secure livelihood of rural households. In order to have comprehensive results it became necessary to characterize the study with the background of broiler farmer in terms of socio-economic status, farming types and generally livelihood strategy hence these became additional objectives of the present study.

1.3 The main Research Question

The main research question was: How do broiler production projects contribute socio-economically to rural livelihoods?

1.3.1 Specific Research Questions

The specific research questions were as follows:

- What are the broiler farming patterns and the types of the existing poultry projects?
- What is the socio-economic status of households participating in poultry production project?
- Which livelihood strategies do participating households employ?
- Are small-scale poultry production projects profitable?
- What is the performance of broilers in response to different feeding regimes

1.4 Objectives

The objectives of this research were to:

- To assess the socio- economic status of households participating in poultry production projects.
- To establish the poultry farming patterns and the types of the existing poultry projects.
- To evaluate the livelihood strategies of households participating in poultry projects.
- To investigate the profitability of broiler production projects in the study area.
- To measure the growth performance of broilers subjected to different feeding regimes.

1.5 Theoretical framework

The study was located in a rural setting in Northern KwaZulu-Natal province in South Africa. The farming system in the study area is predominantly subsistence. It is under this setting that farmers run broiler productions as a way of generating income to contribute to their livelihoods. This section attempts to outline the main concepts that run through this study. This project investigated how poultry projects, specifically broiler projects contribute to the livelihoods of rural farmers who rely on subsistence farming. A discussion paper by Bruntrup and Heidhues (2002) on subsistence farming observed that the term “subsistence agriculture” is used synonymously with other concepts such as low input, low income, resource poor peasant, and small scale farming. They also observed that subsistence farming is generally regarded as inefficient and backward and holding down the economic growth and performance (Bruntrup and Heidhues, 2002) of the farmers who practice it. However, the authors argued that even though subsistence farming may be seen as backward, it is often the only way for rural people to persist under enormously difficult conditions, thus it is a way of adapting and plays an important role in the lives of many rural people in Africa and the rest of the developing world.

Various authorities have developed frameworks that can be used in the studies that attempt to define and understand the term livelihoods. For example the three international development agencies *viz.* United Nations Development Programme (UNDP), the UK’s Department of International Development (DFID) and the non-governmental organization CARE all have defined some sustainable livelihoods that they use in their work. The different definitions of the mentioned organizations all seem to have been derived from the definition of Chambers and Conway (1991) which itself was based on the 1987 World Commission on Environment and Development concept of livelihoods (Chambers and Conway, 1991) This definition for livelihoods is as follows:

“A sustainable livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shock, maintain or enhance its

capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term”

The authors also elaborated that although this definition of livelihoods can be applied at various hierarchies in society, it is most commonly used to describe activities at the household level, itself a concept that needs clarification. Among other definitions Chambers and Conway (1991) defined a household as

“...the household, usually meaning the human group which shares the same hearth for cooking”.

The concept of the household in the Zulu culture was discussed by Mtshali (2002). The term could refer to humans only, or could apply to humans and their dwellings and belongings (Mtshali, 2002). Other concepts that are used interchangeably with household are family and homestead, especially applying to rural settings. The concepts can be quite complicated in the African setting, with the homestead, being regarded as a standalone household, but at times being a collection of households of the extended family (Mtshali, 2002)

1.6 Operational definitions

- Small-scale broiler production is the process of raising up to 1000 day old chicks per cycle to marketing stage.
- In this study, broiler production is the process of raising chickens.
- A project is an enterprise carefully planned to achieve a particular aim.
- Rural refers to a geographical area away from large urban settlements and towns, which is inhabited by rural people.
- Broiler performance is the weight gained by chickens after consuming feed
- Profitability is income obtained after subtracting liabilities

- Subsistence farming is used synonymously with other concepts such as low input, low income, resource poor peasant, and small scale farming (Bruntrup and Heidhues, 2002).
- Livelihood security is the adequate and sustainable access to income and resources to meet basic household needs (including food, potable water, health facilities, educational opportunities, housing and time for community participation and social integration) (Frankenberger, 1996).

1.7 Significance of the study

Agricultural products are mostly produced for consumption and excess is sold. Broilers are mainly produced for selling and income generation. Various community groups and individuals are engaged in poultry production projects, especially broiler projects. This study is important for understanding the processes of broiler production projects Kwa-Mkhwanazi subsistence farming. It elucidates the role played by broiler projects in improving the welfare of these rural farmers. This study reflect the poultry farming patterns , the type of existing poultry projects , the socio-economic status of project participants, and profitability of broilers, and the performance of broilers to different feeding regimes. The results obtained from this study will be used by the Department of Agriculture and Rural Development in planning strategies for sustainable broiler production in communal areas.

1.8 Structure of Dissertation

This dissertation is written in publication format. Chapter 1 gives a general introduction and background to orient the reader. Chapter 2 presents a review of the literature and theoretical framework. Chapter 3 provides a general materials and methods section and outlines the methods that were common to all the different studies. Chapter 4 presents results of the situational analysis of broiler production projects in the Kwa-Mkhwanazi as well as the socio economic status of households with one or more members participating in broiler project. The profitability of broilers was determined on the on station experiment to determine the type of feeding regime that would be more profitable and the results are presented in Chapter 5. Chapter 6 presents the results on growth performance of broilers fed different regimes.

1.9 References

Babatunde, RO. (2013). On-Farm and Off-farm Works: Complement or Substitute? Evidence from Rural Nigeria. In: Proceedings of the 4th International Conference.

Bruntrup M and Heidhues F. (2002). Subsistence Agriculture in Development: Its Role in Processes of Structural Change. Institute of Agricultural Economics and Social Sciences in the Tropics and Subtropics. Research in Development Economics and Policy, Discussion Paper 1/2002.

Chambers R & Conway GR. (1991). Sustainable rural livelihoods: practical concepts for the 21st century. IDS Discussion Paper 296. Institute of Development Studies, Brighton, United Kingdom. 33pp.

De Beer F & Swanepoel H (Ed). (2000). Introduction to Development Studies. Oxford University Press, South Africa.

Dolberg F. (2003). Review of household poultry production as a tool in poverty reduction with focus on Bangladesh and India. Pro-Poor Livestock Policy of FAO, PPLPI working paper 6:1-40.

Frankenberger TR. (1996). In In Measuring Household Livelihood Security: An Approach for Reducing Absolute Poverty. Paper prepared for the Applied Anthropology Meetings.

Khan SH, Sardar R and Siddique B. (2006). Influence of enzymes on performance of broilers fed sunflower-corn based diets. Pakistan vet. J., 2006, 26(3): 109-114.

Krantz L. (2001). Livelihood Approach to Poverty Reduction: An Introduction. Division for Policy and Socio-Economic Analysis, SIDA – Swedish International Development Cooperation Agency. 44pp.

KwaZulu Natal Department of Agriculture and Rural Development. (2015). Strategy for Agrarian transformation in KwaZulu Natal, South Africa.

Mandal MK, Khandekar N & Khandekar P. (2006). Backyard poultry farming in Bareilly district of Uttar Pradesh, India: an analysis. *Livestock Research for Rural Development* 18: 101 <http://www.lrrd.org/lrrd18/7/mand18101.htm>.

Mganga M & Assa M. (2012). Poultry production and rural poverty among small-scale farmers in Mzimba District of Malawi. *Livestock Research for Rural Development* 24: 177 <http://www.lrrd.org/lrrd24/10/assa24177.htm>

Mohamed N. (2007). Provincial demography, socio-economic and spatial statistics. Kwa Zulu Natal. Department of Economic Development.

Moreki JC, Petheram RJ & Mapulole TL. (1997). *A Study of Small Scale Poultry Production Systems*. INFPD Publishers, Botswana.

Mtshali, S.M. (2002). Household livelihood security in rural KwaZulu-Natal, South Africa. Unpublished PhD thesis, Wageningen University. 271pp.

Pauw K. (2005). A profile of KwaZulu Natal: Demographics, poverty inequality and unemployment. Provide project background paper series: 1(5).

Rana SK. (2005). Export possibilities of broilers from Bangladesh; Some issues. In: *Proceedings of 4th International Poultry Show and Seminar*, Dhaka, Bangladesh. The World's Poultry Science Association, Bangladesh Branch.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

Poor rural households combine their resources in a variety of ways to enable them to maintain a minimum living standard. The households are engaged in diverse livelihood strategies which include farm based livelihood strategies that is composed of claim against the state e.g. pension, wage, labour and reliance on social networks like stokvels (NDA, 1998). To conceptualise livelihoods especially of the poor, a livelihoods framework adapted from Ellis (2000) is used since it focuses on rural livelihoods. The concept of livelihood is employed in this study in order to clearly understand rural households and their use of livelihood assets resulting in pursuing livelihood strategy which is poultry mainly broiler production in this case that will contribute in ensuring household livelihood security (Ellis, 2000).

Rural households diversify their plant and animal production activities, in order to secure their livelihoods. Poultry, especially broilers are produced throughout the year. Most of crops and vegetables are produced seasonally and this results in income variation and also profitability variation per season. This also affects food availability as there will be less food during the dry season. When practicing broiler production for sales, the entrepreneur have to consider the issue of profitability and feed cost, failure to keep track of these might result in the households realising a net outflow of cash from the household or project.

2.1 Livestock Production in Communal Areas

Kwa-Zulu Natal is one of the main livestock farming areas in South Africa (Mutibvu *et al*, 2012). The province has a total of 6.5 million hectares of land for farming purposes of which 82 percent is suitable for extensive livestock production and 18 percent is arable land. Poultry production, mainly chickens, is an important agricultural sector in South Africa (Rainbow chicken, 2013). It is a source of livelihood since it nourishes the human body with proteins. It is also a good source of relatively quick income. Poultry can be used for bartering, that is, they can be exchanged for other commodities to meet the needs of a household.

2.1.1 Chickens Production Systems in Communal Areas

Chickens are raised by rural households as a source of income (Gue'ye, 2003) and or for household own consumption (Natukunda *et al*, 2011). Well managed poultry projects can provide good employment to reduce unemployment rate in rural areas (Gue'ye, 2000; Iqbal and Pampori (2008). Poultry is used for rituals, traditional and religious ceremonies (Umayya, 2014). The most common types of poultry are broiler, layer and indigenous chickens. The poultry industry in rural areas is divided into the traditional and commercial sectors (Moreki, 2011). The traditional sector rears indigenous chickens with low or no shelter and with little or no feed supplementation. The Commercial sector uses exotic breeds. The industry can further be categorised as subsistence, small scale or commercial poultry production.

2.1.1.1 Traditional Poultry Sector in Rural Areas

The traditional poultry sector is mainly focusing in indigenous chickens in the KwaMkhwanazi study area. This sector is composed of the following:

2.1.1.1.1 Indigenous Chickens for Household Consumption

Chickens raised in rural areas are predominantly of the Indigenous variety, as they have adapted to local environmental conditions (Mlambo *et al*, 2011), are disease resistant and can survive by looking for food themselves (Iqbal and Pampori, 2008; Muchenje *et al*, 2000 and Lambrou, 1993). They take a longer time to grow compared to broilers. There is little or no housing provided. There are fewer inputs required in keeping these chickens (Okeno *et al*, 2011; Petrus *et al*, 2011). Their meat is generally believed to be tastier and healthier than broiler meat (Umayya, 2014). Indigenous chickens are raised in many poor rural households for livelihood security (Moreki *et al*, 2011). They are a means of having raising cash fast in times of emergency (Dinka *et al*, 2010).

2.1.1.1.2 Indigenous chickens kept for income generation

The indigenous chickens are raised for income generation and profit making (Natukunda *et al*, 2011; Okeno *et al*, 2011), although they provide a low level of income (Meena *et al*, 2012). They are used for healing rituals, so they can be sold for that purpose (Moreki, 2010). The normally

used scavenging system in raising indigenous chicken poses the threat of predators and theft, resulting in low income (Natukunda *et al*, 2011). There is a need to provide some shelter and food supplement to chickens when profit is to be made (Umaya, 2014). These chickens are tolerant to diseases (Simainga *et al*, 2011). The most problematic disease which kills most chickens in rural areas is Newcastle Virus disease. It is important to control diseases and to vaccinate chickens to prevent loss (Natukunda *et al*, 2011). In light of the above, when income is to be generated it is important to provide shelter for chickens in order to reduce mortality and ease of providing vaccination. The scavenging system of production where chickens look for food themselves, changes to semi scavenging as they look for food and are also provided with food, shelter and medication.

2.1.1.2 The Commercial Poultry Sector in Rural Areas

The commercial poultry sector in rural areas is categorised as subsistence and small scale. Commercial poultry production is rare or none existent in rural areas. This is mostly due to the shortage of large markets that need live broilers. There is a lack of broiler abattoirs in rural areas and this limits the marketing and processing of the broiler meat (Hanekom, 1998). There are also very stringent regulations governing the establishment of abattoirs in South Africa. As a result broilers are mostly sold alive. This is also because in rural areas broilers are needed alive when used for rituals.

2.1.1.2.1 Subsistence Broiler Production

Subsistence broiler production is when broilers are kept for household own consumption and selling only occurs when need arises (Emuron *et al*, 2010). Some households raise broilers in small quantities e.g. ten broilers for household consumption. This is done by families who want to consume neither frozen chicken pieces nor indigenous chickens. These are meant for consumption and selling and can only occur if there is a sudden need for money, or if someone or a neighbour is in sudden need of a broiler. Selling of small numbers of broilers is done by farmers with less capital to start a bigger broiler business. These broilers are raised to generate income in order to ensure livelihood security. It is also practiced by people who no longer want to raise more broilers due to the high cost of inputs (mostly feed).

2.1.1.2.2 Small commercial scale broiler production

These chickens are confined and fed commercial diets (Moreki, 2010). Commercial broilers are raised with the aim of generating income and making profit. They provide a high potential for creating employment opportunities since there is a shortage of jobs in rural areas. Broilers can be raised commercially by an individual member within a household or by a group of members from the same or different households by forming a cooperative. Working in cooperatives makes it easier for members to access any assistance they may need e.g. financial or technical. There is high potential for a project to expand and make more profit, thus securing more livelihoods. Commercial broiler production in South Africa is dependent on exotic breeds brought in the country, namely by Ross from the United Kingdom; Cobb, Hubbard and Arbor Acres from the United States of America, and Hybro from the Netherlands. In South Africa there are two commercial breeds of chicken that lay eggs for the commercial market, Lohmann and Hyline. Both are imported (Rainbow chicken, 2013). Broiler producers in rural areas lack slaughter facilities and as a result they sell live chickens. There is generally no formal market and chickens are sold on farm (Moreki, 2010).

2.2. Crop Production

In the study area, crops are grown for own consumption and for marketing. Different types of crops are grown in different seasons of the year. Crops grown include amadumbe, sweet potatoes, maize, and sugar- cane. The marketing of the crops is done to generate income and to improve living standards of the households. The sugar cane is the crop that has a well-established market since there are sugar millings, where sugar cane is processed to sugar, in most rural areas.

In the study area vegetables are produced as a livelihood strategy and for food security. They are grown for market and for own consumption. Some of the vegetables can be grown throughout the year but there are challenges concerning pest and diseases. Vegetables are grown as home gardens where a household has a garden for its own consumption and sells the surplus. They are also grown in communal gardens where a number of households work together as a cooperative and share responsibilities and the benefits from the communal garden. The area has indigenous vegetables that grow naturally and are rich in nutrients (Lewu and Mavengahama, 2011). They

are consumed and some are harvested for market e.g. amaranthus). They are a good source of the vitamins and minerals needed by the human body.

Poverty in rural areas is strongly associated with lack of assets, or inability to put assets to productive use. Capital assets that can be used productively by rural people to sustain and secure their livelihoods are human, physical, financial, social and natural capital (Scoones, 1998). Hamilton-Peach and Townsley (2004) described the sustainable livelihood approach as a way to improve understanding of the livelihoods of poor people. Different livelihood strategies are employed in order to reach livelihood security. Livelihood security is the adequate and sustainable access to income and resources to meet basic household needs (including adequate access to food, potable water, health facilities, educational opportunities, housing and time for community participation and social integration).

2.3 Livelihood strategies

Livelihood strategies are a means of putting food on the table and or generating income. Livelihood strategies employed by households include the income generating activities of agriculture and self-employment (Wilkins, 1998). Different livelihood strategies require the use of different assets within a household as per its needs (Mburu *et al*, 2012). An improvement in livelihoods could result in the following outcomes: increased well-being, improved food security, more sustainable use of natural resources, and increased income (Carney, 1998). It is mostly women and children who are responsible for raising and selling chickens in rural areas (Moges and Dessie, 2010).

According to Davis (2006) rural non-farm activities might include manufacturing (i.e. agro processing) and be accumulative (e.g. setting-up a small business), adaptive, switching from cash crop cultivation to commodity trading (perhaps in response to drought), coping (e.g. non-agricultural wage labour or sale of household assets as an immediate response to a shock), or a survival strategy as a response to livelihood shock. Diversification from farm to non-farm activities is done in order to increase household income when on farm income only cannot support household livelihood security. It is also practiced to generate income for purchasing

inputs and generates income when there is inadequate credit for investment in productivity enhancing technologies. The profits from non-farm activities enabled households to hire labour and to undertake timely or seasonal cultivation practices. (Babatunde, 2013).

2.3.1 Remittances and Government grants

Like most rural people in South Africa households in northern KZN also receive remittances from household members employed in various sectors. The elderly, children, disabled and orphaned also receive government social grants (Hanekom, 1998). These incomes supplement the incomes from other livelihood sources. These grants are the main source of income in many households since there is a shortage of employment; most households rely on grants to carry out living needs and to put food on the table.

2.3.2 Stokvel

Stokvel is livelihood strategy employed by a number of household members in rural areas (Mtshali, 2002 and Hanekom, 1998). It has become popular as an income generating activity. It brings household members with common goal together. In KwaMkhwanazi area stokvel may be for providing households with enough food or for generating income. Food provision stokvels are prevalent in summer in KwaMkhwanazi area and income generating stokvels can be on any month as per group's arrangement. It is an activity that brings a sense of belonging to rural households and societal acceptability. It assists its members and their households to achieve great goals in improving their living standards. This is achieved by amongst other things generating income to start business. The businesses may include amongst others hawking and also starting tuck shop, or projects i.e. broiler projects.

2.4 Seasonality in production

Seasonality refers to the fact that many rural livelihood strategies (especially in agriculture) result in seasonal fluctuations in income. In broiler production projects in KwaMkhwanazi area there is a lack of access to broiler chicks towards festive month. This results high demand and less supply of broiler chickens during festive time. Accessing day old chicks is a problem to rural small scale projects (Hanekom, 1998).

The production of agricultural products is mostly seasonal. This affects livelihood security, and people usually try to reduce seasonal income fluctuations or their vulnerability to them. In reducing seasonal income fluctuations they diversify farming activities and also engage on non-farm activities (Mtshali, 2002). Livelihood strategies carefully planned to cater for seasonality will result in improved rural household livelihood security and access to food and income throughout the year.

Formal agriculture provides employment (including among others, seasonal and contract employment) for about 1 million farm workers, often at very low incomes. In addition, the smallholder sector provides full or part-time employment for at least a further 1 million households. Thus some 2 million households derive some or all of their income from agriculture. This represents about 10 million people or almost 25 % of South Africa's population. Furthermore, while farming is an important direct source of employment in the economy, these figures underestimate its significance, as they ignore the employment effects of agriculture's linkages with the rest of the economy. For example, agro-processing and the food industry generally are major sources of employment. Generally, the number of jobs created per unit of investment is higher in agriculture compared to other sectors. This implies that growth in agricultural output overall has a greater impact on employment creation (Hanekom, 1998).

2.5 Profitability of poultry production

Broiler projects are among the most common business projects in rural areas (Mengesha *et al*, 2008a). Profitability of broilers is highly feasible (Amos, 2006). This is because of the short production cycles which ensure quicker income. The income can also be made continuous by having overlapping production cycles or batches. Besides income the farmers also have a ready source of protein (Mandal *et al*, 2006). Broilers are relatively easy to produce and can be produced at smallholder level without the need of inputs like electricity. The manure from broiler production which is rich in nitrogen is usually used in vegetable gardens for the production of high value vegetables. Thus broiler production indirectly leads to improved diets. However the profitability of broilers is often reduced by various factors, among which are the high cost of feed since it is bought from distant companies (Gadzirayi *et al*, 2006) and mortality of the

chickens. High mortality in summer, due to excessive heating without easy means of cooling, is a major constraint on production, especially in rural areas where there may be no electricity.

Poultry are kept throughout rural areas and constitute a significant portion of the animals kept by poorer households for consumption and marketing (Mengesha *et al*, 2008b). They have the particular advantage of being able to provide producers with regular significant cash income, and therefore fit in well with the increasing need for alternative sources of income for rural people (Simainga *et al*, 2011). Poultry production has been reported to be market driven, with limited support from the government. Poultry Production systems run the whole value chain range, from household flocks, through small-scale broiler or egg production to sophisticated production in specialized housing. The demand for poultry products in the rural areas is considerable and adequate to support local marketing enterprises. The Agricultural Research Council's Fowls for Africa programme is a significant contributor to the drive to expand household poultry keeping in the rural areas in South Africa. It provides training, adapted genetic material, access to supplies, and health care (Hanekom, 1998).

2.6 Feeding regimes of broilers

Most of the production cost involved in raising broilers is attributed to feed costs (Nyoupayou, 1990 cited in Gadzirayi *et al*, 2006). Broilers are mostly fed specific commercial diets. This commercial feed is the greatest cost in broiler production. When feeding broilers, it is important to feed them with balanced nutrients so that the chickens will not be undernourished or overfed. The primary diet parameters to be balanced are proteins and energy. Energy needs are met with poultry fat (Kidd, 2000). The cost of feed in Southern Africa have been rising due to several factors, among them drought, which have greatly reduced grain crops output. Grain crops (maize, soyabean, sunflower) are the major component of poultry feed. In South Africa, low levels of profitability in broiler production have been attributed to high maize prices coupled with non-increasing poultry meat prices (Kleyn, 2003).

To reduce production costs in the small scale, farmers use different strategies (Rohaeni, 2015), among them the modification of commercial feed through the addition of crushed maize or the

omission of certain recommended feeds. For example, some farmers omit grower and post-finisher feed and only give starter for the first two weeks and then finisher until maturity. It was therefore necessary to evaluate the effect of this modification on the growth rate of the chickens, as well as the effect on the profitability of the broiler production enterprise as a whole.

2.7 The role of women, youth and physically challenged in poultry production

Women plays a major role in poultry production. They own and manage poultry projects in rural areas. Women generate cash and make income from raising chickens. Women are assisted by children and physically challenged in running their poultry projects (Mtshali, 2002).

Amongst the Black youth, there is little interest in considering a professional career in agriculture. This is due to lack of awareness about scope and opportunities in the agricultural field, including a lack of awareness around the economic diversity of agricultural enterprise (Agriculture youth, 1998).

2.8 References

Agriculture Youth Policy Development Initiative for South Africa in the South African Agricultural sector, (1998).

Amos, TT. (2006). Analysis of Backyard Poultry Production in Ondo State, Nigeria. *International Journal of Poultry Science* 5 (3): 247 – 250.

Babatunde R.O (2013). On-farm and Off-farm works: Complements or Substitutes? Evidence from Rural Nigeria Department of Agricultural Economics and Farm Management, University of Ilorin P.M.B. 1515 Ilorin, Nigeria Andre Leliveld African Studies Centre, 2300 RB Leiden, The Netherlands pp 1-25.

Carney, D. (ed.) (1998). *Sustainable Rural Livelihoods: What contributions can we make?* London. Department for International Development.

Davis J, (2006). Rural non-farm livelihoods in transition economies: emerging issues and policies. *eJADE electronic Journal of Agricultural and Development Economics Agricultural and Development Economics Division (ESA) FAO* available online at www.fao.org/es/esa/eJADE 2006, vol. 03, issue 2.

Dinka H, Chala R, Dawo, Leta S, Bekana E (2011). Socio economic importance and management of village chicken production in rift valley of Oromia, Ethiopia (2010). *Livestock Research for Rural Development* 22 (11).
<http://www.lrrd.org/lrrd22/11/dink22203.htm>.

Ellis F (2000). *Rural livelihoods and diversity in developing countries*. Oxford: Oxford University Press.

Emuron N, Magala H, Kyazze FB, Kugonza DR, Kyarisiima C.C. (2010). Factors influencing the trade of local chickens in Kampala city markets. *Livestock Research for Rural Development* 22 (4). <http://www.lrrd.org/lrrd22/4/emur22076.htm>.

Gadzirayi CT, Mutandwa E, Chihya J, Mlambo R. (2006). A comparative economic analysis of mash and pelleted feed in broiler production under deep litter housing system. *International Journal of Poultry Science* 5(7): 629-631.

Gue`ye EF (2000). Women and family poultry production in Africa. *Development in Practice* 10: 98-102.

Gue`ye EF (2003). Information dissemination for family poultry research and development (2003). *Livestock Research for Rural Development* 15 (2).
<http://www.lrrd.org/lrrd15/2/guey152.htm>.

Hamilton-Peach, Townsley P. (2004) Sustainable livelihood approach (2004). IFAD.

Hanekom D. (1998) Agricultural policy in South Africa, A discussion document Minister for Agriculture and Land Affairs, National Department of Agriculture, Pretoria
<http://www.lrrd.org/lrrd27/5/roha27084.html>.

<http://www.rainbowchicken.co.za> (Accessed on 2012/05/03).

Iqbal S, Pampori ZA. (2008). Production potential and qualitative traits of indigenous chickens of Kashmir *Livestock Research for Rural Development* 20 (11).
<http://www.lrrd.org/lrrd20/11/iqba20182.htm>.

Kleyn R. (2003). Cost effective broiler nutrition through improved formulation. SPESFEED. Available at: http://www.spesfeed.co.za/cost_effective_broiler_nutrition.htm.

Kidd MT. (2000). Nutritional consideration concerning threonine in broilers. *World's Poultry Science Journal* 56, 139-151.

Lambrou L. (1993). Indigenous poultry in Zimbabwe. *Farming World* 19 (3): 11-12

Lewu FB, Mavengahama S (2011). Utilization of wild vegetables in four districts of northern KwaZulu-Natal Province, South Africa. *African Journal of Agricultural Research* 6 (17): 4159-4165.

Mandal MK, Khandekar N, Khandekar P. (2006) Backyard poultry farming in Bareilly district of Uttar Pradesh, India: an analysis. *Livestock Research for Rural Development* 18 (7). <http://www.lrrd.org/lrrd18/7/mand18101.htm>.

Mburu S, Zaibet F, Ndiwa N (2012). The role of working animal in the livelihoods of rural communities in West Africa. *Livestock Research for Rural Development* 24 (9).

Meena KC, Singh B, Shivhare MK (2012). Nutritional and Livelihood Security through Backyard Poultry for small and landless labourers *Current Opinion in Agriculture* 1(1): 24 - 26.

Mengesha M, Berhan T, Tadelle D. (2008). Socio- economic contribution and labour allocation of village chicken production of Jamma District, South Wollo, Ethiopia. *Livestock Research for Rural Development* 20 (10). <http://www.lrrd.org/lrrd20/10/meng20160.htm>.

Mengesha M, Berhan T, Tadelle D. (2008) Village chicken characteristics and their seasonal production situation in Jamma District, South Wollo, Ethiopia. *Livestock Research for Rural Development* 20 (8). <http://www.lrrd.org/lrrd20/8/meng20128.htm>.

Mlambo T, Mbiriri DT, Mutibvu T, Kashangura MT, (2011). Village chicken systems in Zhombe communal area of Zimbabwe. *Livestock Research for Rural Development* 23 (7).

Moges F, Dessie T. (2010). Characterization of village chicken and egg marketing systems of Bure district, North-West Ethiopia. *Livestock Research for Rural Development* 22 (10). <http://www.lrrd.org/lrrd22/10/moge22196.htm>

Moreki JC, Poroga B, Dikeme R (2011). Strengthening HIV/AIDS food security mitigation mechanisms through village poultry *Livestock Research for Rural Development* 23 (2). <http://www.lrrd.org/lrrd23/2/more23030.htm>.

Moreki JC. (2011). Poultry meat production in Botswana *Livestock Research for Rural Development* 23 (7). <http://www.lrrd.org/lrrd23/7/more23163.htm>.

Moreki JC. (2010). Opportunities and challenges for the Botswana poultry industry in the 21st century. *Livestock Research for Rural Development* 22 (5). <http://www.lrrd.org/lrrd22/5/moreb22089.htm>.

Moreki JC. (2010). Village production in Serowe-Palapye sub district of Botswana. *Livestock Research for Rural Development* 22 (3). <http://www.lrrd.org/lrrd22/3/more22046.htm>.

Mtshali, S.M. (2002). Household livelihood security in rural KwaZulu-Natal, South Africa. Unpublished PhD thesis, Wageningen University. 271pp.

Muchenje V, Manzini MM, Sibanda S, Makuza M. (2000). Socio-economic and biological issues to consider in smallholder poultry development and research in Southern Africa in the new millennium. A paper presented at the regional conference on animal agriculture and crisis mitigation in livestock dependent system in Southern Africa, 30 October to 1 November 2000 at Malawi Institute of Management, Lilongwe, Malawi. pp 134 – 144.

Mutibvu T, Maburutse BE, Mbiri DT, Kashangura MT. (2000). Constraints and opportunities for increased livestock production in communal areas: A case study of Simbe, Zimbabwe. *Livestock Research for Rural Development* 24 (9).

<http://www.lrrd.org/lrrd24/9/muti24165.htm>.

National Department of Agriculture. (1998). *Agricultural policy in South Africa: A Discussion document* — Ministry for Agriculture and Land Affairs, Pretoria.

Natukunda K, Kugonza DR, Kyarisiima CC. (2011). Indigenous chickens of the Kamuli Plains in Uganda: 1. Production system and flock dynamics. *Livestock Research for Rural Development* 23 (10). <http://www.lrrd.org/lrrd23/10/natu23220.htm>.

Nyoupayou JND. (1990). *Country report of Small Rural International on Rural Poultry Production*. Thessalonik, Greece.

Okeno TO, Kahi AK, Peters KJ (2011). Breed selection practices and traits of economic importance for indigenous chicken in Kenya. *Livestock Research for Rural Development* 23 (10). <http://www.lrrd.org/lrrd23/10/oken23209.htm>.

Petrus NP, Mpofu I, Lutaaya E. (2011). The care and management of indigenous chickens in Northern communal areas of Namibia. *Livestock Research for Rural Development* 23 (12). <http://www.lrrd.org/lrrd23/12/petr23253.htm>.

Rohaeni ES. (2015). The effects of the protein level from soybean meal and poultry meat meal on the growth of broiler chickens. *Livestock Research for Rural Development* 27 (5).

Scoones I. (1998). *Sustainable Rural Livelihoods. A Framework for Analysis* IDS Working Paper, No 72.

Simainga S, Moreki JC, Band F, Sakuya N. (2011). Socioeconomic study of family poultry in Mongu and Kalabo Districts of Zambia. *Livestock Research for Rural Development* 23 (2). <http://www.lrrd.org/lrrd23/2/sima23031.htm>.

Umayya SR. (2014). The uniqueness and immune competence and meat quality of native chickens: A specialized review. *World Journal of Pharmacy and Pharmaceutical Sciences* 3 (2): 2579-2588.

Wilkins N. (1998). *Poverty and Inequality in South Africa. Summary Report for the Office of Executive Deputy President and Inter-Ministerial Committee for Poverty and Inequality.*

CHAPTER 3: GENERAL RESEARCH METHODOLOGY

3.1 Study area

Mkhwanazi Traditional Area is in Umhlathuze Local Municipality under Uthungulu District Municipality, Kwa-Zulu Natal, South Africa. The Mkhwanazi Traditional Area is divided into Mkhwanazi North Traditional Area, which is approximately 84 square kilometers, and Mkhwanazi South, which is approximately 57 square kilometers. The area has four municipal wards with four councillors and fifteen sub-wards with 16 headmen.

3.1.1 Climate

The City of uMhlathuze at UThungulu district is characterized by a warm to hot and humid subtropical climate, with warm moist winters. Average daily maximum temperatures range from 29°C in January to 23°C in July, and extremes can reach more than 40°C in summer (Department of Cooperative Governance and Traditional Affairs, 2011). The highest degree of temperature in summer requires sufficient cooling facilities in broiler production. The average annual rainfall is 1228mm and most (80 %) of the rainfall occurs in the summer, from October to March. Extreme rainfall and thundershowers has occurred on several occasions in the Zululand Region, resulting in extensive flooding with loss of life, property and infrastructure. An increasing trend in the frequency of cyclonic activity has been observed, which needs to be considered in future planning of the region. The amount of rainfall received indicates the availability of clean water for use by households as well as by broilers since water should be provided *ad libitum* to chickens.

3.1.2 Population

The municipal population has increased by, on average, 1.45% per annum from 2011. In 2001 there were 289 189 people in the municipality and in 2011 the census indicated a population of 334 459. The number of households increased from 67 127 in 2001 to 86 609 in 2011 and poverty rate is 60.13%. The increase in population including the number of households means increase in demand for food. This implies the potential of expansion of broiler production

provided enabling facilities are provided i.e. proper modern broiler housing, abattoir, park house and proper storage facilities (Department of Cooperative Governance and Traditional Affairs, 2011).

3.1.3 Economic activities

The uMhlathuze Municipality has an important role in the national, provincial and district economies on account of the bulk-handling harbor facilities at Richards Bay that enable international trade links. Richards Bay is the largest deep water port in Africa, and handles the bulk of South Africa's exports. Its development has provided the impetus for large -scale industrial growth. UMhlathuze has the most developed economy of all the municipalities in the district and is the major contributor to the District GGP. It is the third largest economy in KwaZulu-Natal. The presence of harbor is significant for the expansion of broiler production projects to access market through exporting chicken meat within the country and to other countries (Department of Cooperative Governance and Traditional Affairs, 2011).

3.1.4 Infrastructure

Uthungulu district has got the third highest access to infrastructure amongst the districts in the province. An overview of household access to infrastructure in the district shows an improvement in access from 36% in 1996 to 53% in 2009. Water and electricity infrastructure are the main contributor to the improvement in the district's infrastructure in general (Department of Cooperative Governance and Traditional Affairs, 2011).

3.1.4.1 Water and electricity

The city of uMhlathuze is a licensed electricity provider, however in rural areas electricity is still supplied by ESKOM. The use of electricity is important in providing light for broilers. This will increase eating time thus quickening the growth of broiler chickens. In 1996, household access to electricity connections was at a lower level of 39%. Access has, however, increased over the years by almost 36% reaching 75% by 2009. Water infrastructure is the main contributor to the

improvement in the district's infrastructure in general. Access to piped water above RDP level increased from 29% to 69% from 1996 to 2009. Similarly, there has been a slight increase as well in access to piped water below RDP level. About 20% of the households do not have access to piped clean water at all (Department of Cooperative Governance and Traditional Affairs, 2011).

3.1.4.1 Sanitation

With regard to access to sanitation, the district municipality's household access to hygienic toilets has gone up from 31% in 1996 to 46% in 2009. The improvement in access to sanitation in general in the Municipality is mainly due to the increase in the use of pit latrines with ventilation which was around 15% in 2009 (Department of Cooperative Governance and Traditional Affairs, 2011).

3.2 Research design

Research design refers to planning, the visualization of data and the problems associated with the employment of those data in the entire research (Leedy, 1997). This study employed mixed methods, i.e. the combination of qualitative and quantitative research designs because they complement each other. A Quantitative research design or approach is used to answer questions about relationships among measured variables with the purpose of explaining, predicting and controlling phenomena. A Qualitative research design is used to answer questions by collecting numerous forms of data and examining them from various angles to construct a rich meaningful picture about the complex nature of a multifaceted situation. The focus of a Qualitative approach is on phenomena that occur in natural settings that is the real world and secondly studying of phenomena in all its complexity (Neuman, 1997).

According to Leedy, (1997) a quantitative study is “an inquiry into a social or human problem, based on testing a theory composed of variables, measured with numbers and analysed with statistical procedure, in order to determine whether the predictive generalizations of the theory hold true.” On the other hand Neuman (1997) defined qualitative study as “inquiry process of

understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, conducted in a natural setting.”

The quantitative research design in this current study comprised a survey and an experiment. The survey was a situation analysis survey and household survey interview schedule. The experiment was on- station broiler experimental research which compared broiler production in summer and winter.

The qualitative research design for this study involved the reviewing of secondary information sources (documentary reviews) and field research. The documentary reviews were done in order to review existing literature that relate to this study. The field research was an ethnographic study which included observing and interviewing people in their natural setting (events in progress), by interacting with them to gain understanding of the social world and make theoretical statements (describe and explain) about their perspectives yielding qualitative data (Neuman,1997). Thus the field research was composed of interviews and observations. The interviews in field research were semi-structured interviews of individuals and groups involved in broiler projects. Observations in the field research included taking notes and recordings.

The descriptive aspect of the study was a situation analysis survey, which was used to provide systematic descriptions of existing phenomena, in order to describe the present situation of the small-scale poultry projects in KwaMkhwanazi Traditional area. The exploratory aspect of the study involved unstructured interview schedules, observations, and documentary reviews.

The experimental aspect included conducting on- station experiments in order to determine broiler performance and profitability at the University Of Zululand Department Of Agriculture Poultry Unit. The aim was to recommend the best profitable feeding regime. This was done in order to determine which diet would provide maximum performance at a minimum cost. The importance of the experiment was that the recommendations for the most profitable combination of feed between the two different diets will be made and be available to broiler farmers in the study area for their use. This aspect was quantitative in its research design. In addition, visits to broiler projects were undertaken with the aim to observe, provide training on record keeping, and

to collect summer and winter data on income and expenditure in rearing broilers thus determining profitability of broiler projects in the study area.

3.3 Unit of analysis

For the qualitative study, the unit of analysis was the household. The household was defined as the group of people or social group, which resided in the same place, shared the same meals, and made joint or coordinated decisions over resource allocation and income (Nombo, 2007). In each household interviewed in this study, there were one or more members participating in broiler production projects. The household was the unit of analysis since broiler production activities were mostly performed by household members since broiler production projects houses in the study area were within households homes to reduce theft. Broiler production activities were mostly performed by women, children and elders within the household.

3.4 Sampling

A sampling frame was not available so the researcher had to travel extensively to all sections of the area searching for functioning projects. At the time of sampling there were no broiler project funded by KZNDARD that were functional so KZNDARD data base was not useful for the researcher. The researcher used a project list provided by the KwaMkhwanazi Community Trust. This list too had a lot of broiler projects that were not functional and very few in operation.

3.4.1 Sampling Procedure

Sampling was done in such a way that all projects had an equal chance of being selected for inclusion in the survey. Group- managed projects and individually- managed projects were sampled using the stratified sampling method. Stratified sampling was adopted to differentiate the 32 projects. The Kwa-Mkhwanazi Traditional Area has 4 Municipal Councillors and 16 headsmen with 15 sub wards. The sample was drawn from individuals and groups involved in broiler production projects in the KwaMkhwanazi Traditional ward. The researcher used a project list provided by the KwaMkhwanazi Community Trust and made visits to sub wards in the study area in order to find functioning poultry projects.

A situation analysis survey schedule was used to interview project owners in the case of individually managed projects, and the chairperson or an active member in the case of group managed projects.

3.5 Methods of data collection

Data collection instruments for quantitative data were a structured situation analysis survey interview schedule, and broiler record cards for on station experiments and for summer and winter data for individually -managed and group managed- broiler projects. Data collection instruments for qualitative data were unstructured in-depth interview schedule, an observation sheet and documentary reviews.

Data collection was done in four stages.

Stage 1

Structured survey interview schedule were used in survey to conduct situation analysis in the study area. This schedule collected data on present situation on functioning broiler projects which included socio-economic status of projects participants. The survey stage was important because it provided data that helped the researcher in finding out how many projects were in the study area and how they differed from each other. This information helped the researcher in selecting projects for in-depth interviews.

Stage 2

The in-depth interview schedule collected qualitative data from the case study. The in-depth household survey interview schedule collected qualitative data from the households having a member participating in broiler production project.

Stage 3

Field research in the form of interviews and observations was conducted to collect data on poultry production during summer and winter productions in order to determine profitability of broiler projects. Data collected was from unstructured interviews on cost involved for raising chickens and income gained per cycle.

Stage 4

On station experimental research was conducted at the University Of Zululand Department Of Agriculture Poultry Unit. A controlled experiment was conducted to compare the effect of standard feed and modified feed on the growth and final dressing weight of broiler chickens. This was done to determine which diet would maximize performance at minimum cost. In addition, data on expenditure and income were collected and used to compute the profitability of the different feeds. The data were collected using broiler record cards and records of feed used and cost, as well as records on weights at different stages of growth.

3.6 Data analysis and management

Qualitative data collected using questionnaires were coded into variables and cases and analysed using the PASW (SPSS) statistical program. The analysis done was mainly descriptive statistics in the form of frequencies. Quantitative data from the experiment were subjected to analysis of variance.

3.7 Limitations of the study

The limitations of the study were that the study area was large and as a result had a large population. A sampling frame was not available so the researcher had to travel extensively to all sections of the area searching for functioning projects. This required a lot of time and traveling costs were high.

3.8 References

Department of Cooperative Governance and Traditional Affairs (2011) UThungulu District Municipality Profile.

Nombo .CI. (2007). When aids meets poverty implications for social capital in a village in Tanzania. Wageningen Academic Publishers.

Leedy .PD. (1997). Practical Research: Planning and Design, 6th edition, Macmillan Publishing Company, United States of America.

Neuman. WL. (1997). Social Research Methods: Qualitative and Quantitative Approaches 3rd edition. Neuman. Allayn and Bacon, United States of America.

CHAPTER 4: SITUATION ANALYSIS OF POULTRY FARMERS IN KWA MKHWANAZI TRADITIONAL AUTHORITY

4.1 Introduction

To ensure secured livelihoods, rural households in KwaMkhwanazi Traditional area are engaged in agricultural activities. The area is composed mostly of sugar cane farmers since sugar cane farming is suitable for the area. Sugar cane farming is practiced together with other agricultural activities because the income gained from it is not enough to sustain a living. Agricultural activities practiced in KwaMkhwanazi Traditional Area include forestry, crop production, vegetable production, ruminants production (especially cattle), and non-ruminants production (mostly chickens).

Poultry farmers in KwaMkhwanazi Traditional Area farm with the aim of generating income. The money generated is used to feed and to clothe the household members and to assist when need arises (Moreki and Poroga; 2010). The profit gained helps in reducing poverty in farming families (Adonga, 2004). The use of profit generated from broiler production as one of a livelihood strategy in assisting household members, indicates that broiler production indeed contributes to rural household livelihood security.

There is no documentation of the types of broiler projects established by the farmers at neither KwaMkhwanazi community nor how they impact on the livelihoods. Lack of literacy and numeracy skills is a negative contribution as no proper records of the projects are kept by the farmers. Understanding the type of broiler projects, the biographical data and the types of training received by the farmers is important for the planning an advisory program. Results from the study when combined with the report of the profitability (Chapter 5) can inform the plans of the officials in the Department of Agriculture and Rural Development to improve broiler production in the rural areas.

Mlonzi (2003) reported a number of challenges faced by communal poultry farmers such as inadequate broiler management skills, lack of access to capital and lack of training in broiler production.

The objective of this study was to characterize the socio-economic background of the study area and establish the poultry farming patterns and the types of the existing poultry projects.

The specific objectives were to:

- i) Establish the types of projects on broiler farming in the study area.
- iii) Determine the socio economic status of the broiler chicken participants.

4.2 Materials and Methods

4.2.1 Sampling

Sampling was done in such a way that all projects had an equal chance of being selected for inclusion in the survey. Group- managed projects and individually- managed projects were sampled using the stratified sampling method. Stratified sampling was done in order to differentiate the 32 projects as follows:

The Kwa-Mkhwanazi Traditional Area has 4 Municipal Councillors and 16 headsmen with 15 sub wards. The sample was drawn from individuals and groups involved in broiler production projects in the Kwa Mkhwanazi Traditional ward. The researcher used a project list provided by the Kwa Mkhwanazi Community Trust. The researcher made visits to sub wards in the study area in order to find functioning poultry projects.

A situation analysis survey schedule was used to interview project owners in the case of individually managed projects, and the chairperson or an active member in the case of group managed projects. The preliminary results from the situation analysis survey showed that there were 32 functioning broiler production projects in the Kwa-Mkhwanazi Traditional Area, but there were no layer chicken projects.

4.3 Results and discussion of the situational analysis

There were 17 group-managed broiler projects and 15 individually managed broiler projects. The above two groups of projects were further divided into different categories according to their production type as follows:

4.3.1 Production type I: Raising day old broiler chicks to marketing stage at 42 days

In production type 1, there were 13 group managed projects involved in raising day old chicks to marketing stage at 42 days. From the above, 6 groups were selected for in-depth interview. The selection was based on: number of members in a group, group age composition (i.e. youth or adults), members training on poultry production number of chickens raised and employment status of project members. Characteristics of the 6 Groups raising day old chicks to marketing stage were as follows:

Group A

The first group, group A, was composed of 7 members including one physically challenged member. They were all younger than 35 years old, meaning that this is a youth project. 4 of the members were unemployed, one employed, and other 1 studying at a tertiary institution. Only the chairperson had been trained on broiler production. They normally raised 150 chicks per cycle (42 days).

Group B

This group had 6 members, all women who were not employed. Members older than 35, dominated the group, making it an adult group. Three members had training in broiler production. They normally raised 50 chicks per cycle (42 days).

Group C

This group was composed of 11 members, men and women. Members above 35 years dominated the group, making it an adult group. Some of the members were employed, and others unemployed. None of the members had been trained on broiler production. They normally raised 150 per cycle (42 days) chicks.

Group D

The fourth group (D) was composed of 51 members, who were adult men and women. They were all above 35 years. Only twenty members had been trained on broiler production. All members were unemployed and some were old age pensioners. They normally raised 50 chicks per cycle (42 days).

Group E

Group five (E) was composed of 50 members. Members less than 35 years dominated the group which made it a youth project, there were males and females. None of the members had been trained on broiler production. They normally raised 150 chicks per cycle (42 days). The broiler rearing skills were obtained by observing other broiler projects and gathering of information from feed suppliers.

Group F

The sixth group, group F was composed of 20 members. Members younger than 35 years of age dominated the group, making it a youth group, with young men and women. All 20 members had been trained in poultry production. They normally raised 100 chicks per cycle.

4.3.2 Production type 2: Buying matured (3-5 weeks) broiler chickens and selling them at higher price.

In production type 2, there were 2 group-managed projects involved in buying matured chickens and selling them at higher price.

Group A

This group was composed of 11 members. Members above 35 years dominated the group. Two members had been trained in business skills. They normally bought 50 chickens, which started to be sold on arrival.

Group B

This group was composed of 5 members. Members younger than 35 years dominated the group. They normally buy 50 chickens, which start to be sold on arrival. None of the members had been trained on broiler production.

4.3.3 Production type 3: Raising day old chicks to marketing stage (42 days) and also buying matured (3-5weeks) broiler for profit making.

In production type 3 there were 2 groups involved in raising day old chicks to marketing stage and also buying matured chickens and selling them at higher price. Both projects were selected for in-depth interview.

Group A

This group comprised 9 members. Members younger than 35 years dominated the group. They normally bought 50 chickens, which started to be sold on arrival. They also bought 50-day-old chicks and raise them to marketing stage. None of the members had been trained on broiler production.

Group B

This group was composed of 13 members. Members younger than 35 years dominated the group. They normally bought 60 chickens, which started to be sold on arrival. They also bought 50 -day-old chicks and raised them to marketing stage. None of the members had been trained on broiler production.

4.4 The categories for 15 individually managed projects

There were 4 production types for individually managed broiler projects. They were categorized based on member's age, member training on poultry production, number of chickens raised and the production type.

4.4.1 Production type I: Raising day old chicks to marketing stage (42 days)

There were 4 individuals involved in raising day old chicks to marketing stage. Two projects were selected for the interview and the results are highlighted below:

Individual A

The individual was a 72 year old man. He was trained on poultry production. He raised 100-day-old chicks to marketing stage.

Individual B

The individual was a 33 years old man. He was not trained on poultry production. He raised 300-day-old chicks to marketing stage.

4.4.2 Production type 2: Raising day old chicks to marketing stage (42 days) and also buying matured (3-5weeks) broiler chickens and selling them at higher price.

Only one individual was involved in raising day old chicks to marketing stage and also buying matured chickens and selling them at higher price. This project was selected for in-depth interview as its details are as follows:

Individual A

This individual was a young man aged 25. He was trained on poultry production. He raised 100-day-old chicks to marketing stage. He also bought 20 matured chickens and sold them at a higher price.

4.4.3 Production type 3: Buying and selling matured (3-5weeks) broiler chickens to make a profit

There were 5 individually –managed projects involved in buying matured chickens and selling them at higher price. However, only 2 projects were selected to provide information as shown below.

Individual A

Individual A was a woman aged 60. She normally bought 50 ready to sell chickens and sold them from arrival date at a higher price. She had no training on poultry production.

Individual B

This individual was a male aged 45 years. He normally bought 20 ready to sell chickens and sold them from arrival date at a higher price. He was trained on poultry production.

4.4.4 Production type 4: Buying broiler chickens at 3-5 weeks and raising them before selling them at higher price.

There were 5 individually –managed projects involved in buying chickens at 3-5 weeks and raising them before selling them at higher price, 2 projects were selected for in-depth case study.

Individual A

He was 40 years old. He was not trained on poultry production. He normally bought 40 chickens and raised them for two weeks before selling them.

Individual B

She was 42 years old. She was not trained on poultry production. She normally bought 100 chicks at 3 weeks old, raised them and sold them at different prices depending on size and age.

There were more group managed projects compared to individually managed but it was found that in most groups, members were not active as a result the so called group projects were individual projects.

In both group and individually managed projects, category for raising day old chickens was prevalent. It is believed that raising broilers from day old and selling all at six weeks, makes more profit than buying matured chickens and selling them at high price. Profit is reduced if chickens are kept for a longer period, since they consume more feed. Most of the farmers kept their broilers for more than six weeks since they did not have many bulk buyers except for pension pay-points sales in the sub-wards. They relied on people coming to buy on the farm,

when chickens are ready. The pension pay points marketing strategy is also fading away since pensioners are now paid at the banks.

In this study age was important in order to check whether youths were involved in poultry production. Nevertheless there were more adult dominated than youth dominated projects and same goes to individual managed projects. From the results it is clear that much less members had training on how to raise and manage broiler production projects. There is need for broiler production training in the area. Trained members are able to produce administer medication correctly thus producing healthy chickens. They are also able to see whether they are making profit. At the time of the study the farmers had not received any assistance from the extension services, only two group projects were assisted by University of Zululand (UNIZULU) Centre for Rural Development in obtaining broiler production training and feed and equipments supply.

4.5 Results and Discussion of household and socio-economic analysis

The socio-economic analysis of the study area revealed a complex array of scenarios discussed in the following sections. The socio economic survey revealed that the household size in the study area ranged from 2 to 18 members per household (Table 4.1). 26% of the households ranged from 2 to 5 people per household, which was the smallest household size. The results show that there were more male than female respondents (Table 4.2). This indicates that in households respondents were not only the projects participants but also the household heads. The majority of households (31.9%) comprised 6 to 9 household members, followed by (29.8%) household size of 10 to 13 members. The largest household size (13%) had 14 to 18 members.

Table 4.1 Household size of respondents

Household size	Frequency	Percentage
1 – 5	12	25.6
6 – 9	15	31.9
10 – 13	14	29.8
14 – 18	6	12.8

Adults, middle aged and elderly people were the majority involved in broiler projects (Table 4.2). Most respondents, fifty three percent were between 36 and 59 years and forty three percent were over 60 years old. Only two percent were aged between 21 and 35 years. That indicated that youth and young adults were not involved in broiler production. Most of them, forty nine percent were married and thirty two percent widowed. Single respondents and those living together were six percent each. Divorced, separated or never married respondents were only two percent, which was the smallest percentage. The survey had more male respondents than female respondents (Table 4.2). The respondents in the study were household heads and this indicates that most households were headed by males. The households in the study included family, relatives and even unrelated people that were living together.

Table 4.2 Gender and age of respondents

Characteristic	Frequency	Percentage
Gender		
Male	29	61.7
Female	18	38.3
Age		
21 – 35	1	2.1
36 – 59	26	53.3
60 – above	20	42.6

The highest percentage of respondents, thirty eight percent, did not finish primary school and twenty six percent has never attended school (Table 4.3). That indicated that there was a literacy problem in the study area. Most respondents were self-employed and pensioners, 34 % in each category, and two percent were unemployed. Only six percent had finished tertiary school.

Table 4.3 Educational level, working status and broiler project membership of the respondent in each household

Education level	Frequency	Percentage
Never went to school	12	25.5
Primary school unfinished	18	38.3
Primary school finished	1	2.1
Secondary school unfinished	12	25.5
Secondary school finished	1	2.1
Tertiary finished	3	6.4
Membership in broiler project of the respondent in the household		
Yes	23	70.2
No	14	29.8

Most of the respondents were not working and 4.3% reported that they could not find jobs because there are no jobs available. Some respondents were unemployed due to different illnesses, including HIV/AIDS. Disability contributed by 8.5% to unemployment. Respondents who were employed said they did not earn enough income to support their households since 10.7% received the income range from R500 to R2500 and only 4.3% earned above R7000. So there was need for household members to generate income from other sources. Most of the income (59.4%) was generated from government grants.

Although most of the respondents did not complete secondary education and were unemployed, there were a few who did complete tertiary education and were employed. There was also a range of occupations of the few employed respondents. This status of unemployment for a large proportion of respondents justifies a study such as the present one which sought to evaluate the viability of self-help projects such as broiler chicken production with a view to assisting the farmers to make their enterprises viable and profitable.

Table 4.4 Occupations of some of the household members in the study area

Profession /occupation	Frequency	Percentage
Home worker	6	12.8
Educator	3	6.4
Hawker	1	2.1
Farmer	2	4.3
None	19	40.4
Labourer	5	10.6
Police	1	2.1
Mechanic	1	2.1
Driver	2	4.3
Engineer	2	4.3
Community worker	1	2.1

The highest percentage of respondents (40.4%) had no occupation or profession. That provided an opportunity for broiler projects to play a role as a livelihood strategy that would generate income for the household.

The success of any livelihood project depends on land tenure. The availability of land and having access to it helps household members to generate income using projects in agriculture. This improves their livelihood and reduces poverty.

Table 4.5 Purpose and sizes of land holdings owned by respondents

Legal status of land	Frequency	Percentage
Communal land	42	89.4
Communal and lease	5	10.6

The use of energy, especially electricity, to provide light in broiler production is very important. Since light enhances feed intake in broilers, the only period allowed for darkness is one hour per night. Nineteen percent of the respondents used electricity only as a source of energy (Table 4.5).

The highest percentage used electricity together with other energy sources for daily activities. That was done to reduce the electricity bill since most people did not earn enough monthly income to support their household's livelihood. This would mean household members providing less light to their broilers, which might affect their growth rate.

Table 4.6 Sources of energy and heating used for broiler rearing in the study area

Source	Frequency	Percentage
Electricity	9	19.1
Paraffin	1	2.1
Wood	5	10.6
Electricity and gas	2	4.3
Electricity and wood	2	4.3
Paraffin and wood	2	4.3
Electricity paraffin and wood	5	10.6

The availability of clean fresh water at all times for broilers is as important as the availability of food. Only forty percent of the households used water from the pipes in their yards (Table 4.7). This means it would be easier for them to fetch water for their broilers. Other members would have to walk a certain distance before finding water which might result in them not providing enough water to their broilers.

Table 4.7 Type of water facilities used by respondents in the study area

Water source	Frequency	Percentage
Pipe water on the yard	19	40.4
Pipe water on the dwelling	13	27.7
Tanks	5	10.6
Pipe water in dwelling and river	1	2.1

Livestock and crop farming are the major sources of food production and income in rural areas (Kunene and Fossey, 2006). Livestock are kept integrated with agricultural crops and some households also have permanent or temporary jobs in order to generate more income (Dorji and Gyeltshen, 2012). Although respondents kept other different types of livestock such as goats and cattle (Table 4.8), chickens are believed to be more viable in that they have a high turnover and can be sold without much decision making as is the case with large livestock which are used as status and wealth symbols and are therefore not easily sold, even in times of dire need. Being small, chickens can also be affordable to buyers when compared with goats which are priced much higher per unit because of their size.

Table 4.8 Types and purposes of livestock owned by respondents

Types of livestock	Frequency	Percentage
Cattle	2	4.3
Indigenous chickens	5	10.6
Broilers	6	12.8
Sheep	1	2.1
Indigenous and broilers	19	40.4
Cattle for cash	5	10.6
Sheep for consumption	1	2.1
Pigs for consumption	1	2.1
Purposes of producing		
Indigenous chickens consumption	3	6.4
Indigenous chickens for cash	3	6.4

Summer time is when the food was reported to be plenty (Table 4.9), and this is time for stokvel and most bonuses for workers. Food was also plenty at the beginning of any month since working people would have been paid their wages and the grants would have been received. In other seasons there is a food shortage. This indicates the need to generate income faster to cater for times when food is not available. Broiler production is appropriate for generating income for use in time of need.

Table 4.9 Availability of food in the households throughout the year

Is food always available	Frequency	Percentage
Yes	12	25.5
No	35	74.5
When is food plentiful?		
Summer	11	23.4
Throughout the year	3	6.4
Beginning of month	9	19.1
Summer & month end	3	6.4
December	10	21.3
Month end	3	6.4
Always plenty	1	2.1
End of the year	5	10.6

In the observe table, most of the households experience food shortages sometime during a year. In order to close the gab between food availability and its shortages, broiler production projects need to be funded in order to expand and provide employment to community members. This will be a giving back to community and will assist in gaining more protection for the safety of the project.

4.6 Conclusion

The situational analysis of broiler production revealed that broiler production was indeed an important livelihood strategy in the study area. There were more group managed broiler projects than individually managed broiler projects. This was because there was a belief that if famers work in groups and form cooperatives they will be funded by government institutions. So these groups were formed and since funding did not easily materialise, those without passion for poultry rearing left the group. This resulted in these groups being operated by few or one active member assisted by hi/her or their household members, in the cooperative name of the group which is no longer there. The two groups of projects were further divided into different

categories according to their production type as follows: raising day old chicks to marketing stage, buying matured chickens and selling them at higher price and raising day old chicks to marketing stage and also buying matured chickens and selling them at higher price.

The socio economic analysis showed that there was a wide range of household size and the majority of households were headed by males. Most members did not finish primary and high school, and as a result self-employed members and pensioners without occupation dominated. So, the broiler business was a livelihood strategy to ensure food security.

It can be concluded that the standard of management of small-scale poultry farmers making use of traditional broiler rearing is high. Broiler proper housing including proper feeding equipment is a challenge that needs to be addressed since most farmers are not using these. The use of other energy sources other than electricity and gas for heating is also a challenge.

Improving the broiler rearing skills of farmers becomes critical when they have to adopt new factors of production, expand their scale of operation or improved production practices. In such a situation, they can no longer depend on trial and error and require specialized training in broiler production. Improving their poultry rearing knowledge and skills will reduce the likelihood of poor broiler performance and augment the possibility of increased net farm income and farmer satisfaction.

4.7 References

Adongo J. (2006). Poverty alleviation in Rural Namibia through Improved Access to Financial Services Mariama Deen-Swarray. Nepru working paper 109: 1-41.

Dorji N, Gyeltshen T. (2012). Characteristics of family poultry production in Haa and Mongar district of Bhutan . Livestock Research for Rural Development 24 (9).
<http://www.lrrd.org/lrrd24/9/dorj24155.htm>

Kunene NW, Fossey, A. (2006). A survey on livestock production in some traditional areas of Northern KwaZulu-Natal in South Africa Livestock Research for Rural Development 18 (8).
<http://www.lrrd.org/lrrd18/8/kune18113.htm>.

Mlonzi MRS, Kakengi AVM, Minga UM, Mtambo AM, Olsen JE. (2003). Marketing of free range local chickens in Morogoro and Kilosa urban markets, Tanzania. Livestock Research for Rural Development 15 (2). <http://www.lrrd.org/lrrd15/2/mloz152.htm>.

Moreki JC, Dikeme R, Poroga B. (2010). The role of village poultry in food security and HIV/AIDS mitigation in Chobe District of Botswana. Livestock Research for Rural Development 22 (3). <http://www.lrrd.org/lrrd22/3/more22055.htm>.

CHAPTER 5: COMPARATIVE PROFITABILITY OF BROILER PROJECTS UNDER COMMERCIAL AND SUBSISTENCE PRODUCTION SYSTEMS IN PARTS OF UTHUNGULU DISTRICT IN KWAZULU-NATAL.

5.1 Introduction

Broiler projects are among the most common business projects in rural areas (Mengesha *et al*, 2008a). Profitability of broilers is highly feasible (Amos, 2006). This is because of the short production cycles which ensure quicker income. The income can also be made continuous by having overlapping production cycles or batches. Besides income the farmers also have a ready source of protein (Mandal *et al*, 2006). Broilers are relatively easy to produce and can be produced at smallholder level without the need of inputs like electricity. The manure from broiler production which is rich in nitrogen is usually used in vegetable gardens for the production of high value vegetables. Thus broiler production indirectly leads to improved diets. However the profitability of broilers is often reduced by various factors, among which are the high cost of feed since it is bought from distant companies (Gadzirayi *et al*, 2006) and mortality of the chickens. High mortality in summer, due to excessive heating without easy means of cooling, is a major constraint on production, especially in rural areas where there may be no electricity.

Poultry are kept throughout rural areas and constitute a significant portion of the animals kept by poorer households for consumption and marketing (Mengesha *et al*, 2008b). They have the particular advantage of being able to provide producers with regular significant cash income, and therefore fit in well with the increasing need for alternative sources of income for rural people (Simainga *et al*, 2011). Poultry production has been reported to be market driven, with limited support from the government. This was also noted in KwaMkhwanazi Traditional area since broiler farmers had no support from government at the time of study.

Poultry Production systems run the whole value chain range, from household flocks, through small-scale broiler or egg production to sophisticated production in specialized housing. The demand for poultry products in the rural areas is considerable and adequate to support local marketing enterprises. The Agricultural Research Council's Fowls for Africa programme is a

significant contributor to the drive to expand household poultry keeping in the rural areas in South Africa. It provides training, adapted genetic material, access to supplies, and health care (Hanekom, 1998).

Since farmers in KwaMkhwanazi Traditional area employed broiler production as part of their livelihood strategy in ensuring rural household livelihood, they use different feeding regimes in order to feed and raise their chickens in broiler production projects. In their subsistence broiler rearing without proper training on broiler production, they feed broilers mostly with starter and finisher pellets and when they are above seven weeks; some give their broilers crushed maize to cut on feed cost. The aim of this study was to compare the profitability of broiler production of commercially run broiler projects at the University of Zululand and the communally run broiler projects of rural farmers of KwaMkhwanazi Rural area. In addition a comparison of the profitability was also done between winter and summer after it had been observed that there were differences in mortality of broiler chicks in winter and in summer and it was postulated that this difference in mortality would impact on profitability.

5.2 Materials and methods

In the University of Zululand study a total of 400 broiler chicks were used for the experiment. In summer 200 day-old chicks were raised in two cages, each assigned 100 chicks. In winter 200 day-old chicks were also raised in two cages assigned 100 chicks each. Feed for the broilers were purchased from Meadow Feeds millers. The broilers were divided into two groups according to feeding regime. The first group was fed according to Meadow Feed's feeding recommendations and the second group was fed according to the modified feeding regime of the University of Zululand Poultry Unit programme.

For the individual and group managed broiler projects in KwaMkhwanazi traditional authority, feeding was according to the farmers' own choices. They were observed in their natural setting, which were the households, busy with their day to day farming activities. The records of the money spent on buying chicks, medication, and feed and also mortalities were recorded per each batch of chickens kept. The researcher assisted them with record keeping.

5.3 Results

The results indicate that for the University of Zululand controlled study there was higher profitability in winter than in summer. This is because of low mortalities in winter and high mortalities in summer.

The results of records from the communal poultry production projects in KwaMkhwanazi traditional authority showed that there was profitability for all the groups and individuals involved in the study (Table 5.1 and 5.2). But group profitability was questioned because for members to benefit they need to divide profit, which makes it too small for each member's livelihood security. For a group to make profit there must be a much higher number of chickens raised for income generation.

The results of the study on station (at UNIZULU) also showed that mortality was higher in summer than in winter. Of the 200 chicks bought for summer production, the mortality rate was 13 chicks, while in winter for 200 chicks bought the mortality rate was 5. In communal poultry, a group that bought 650 chicks in summer had a high mortality of 71 chicks but in winter for their 400 chicks mortality was only 5 chicks. The same occurred for an individual farmer in summer. 1650 chicks were bought and mortality was as high as 120 chicks but in winter mortality was as low as 7 chicks for 1200 chicks bought. Dead chickens were not taken to the laboratory for post-mortem in order to determine the cause of death. This was due to lack of information lack of access to such facilities. Thus there were no post mortem results.

The feed cost was very high in most of the projects. To reduce feed cost and make a bigger profit, some farmers bought matured broilers and fed them with feed meant for indigenous chickens, that is, crushed maize and sunflower seed only, or mixed it with broiler feed. The indigenous chickens feed is much cheaper than broiler feed. Although chicken fed only crushed maize and sunflower could put on more fat than protein muscle tissue, and maybe undesirable to nutritionists and dieticians, big fat chickens are actually preferred in rural areas at KwaMkhwanazi Traditional Authority.

Table 5. 1 Profitability analysis for broilers produced at UNIZULU Poultry unit and those produced by individual farmers raising day old chicks and or buying matured chickens in kwaMkhwanazi traditional authority in summer and in winter seasons.

Season	No of cycles	No of members	Project name	No of chicks bought	Mortality	No sold	Price/ chicken in Rands	Total income from chickens (in Rands)	Feed cost in (Total feed used) (in Rands)	Other costs in Rands	Total variable costs (in Rands)	Profit /loss (in Rands)
UNIZULU Raising Day old chicks												
1	1	1	UNIZULU	200	3	171	25	4275	1787	1 360	3 147	1 128
2	1	1	UNIZULU	200	5	195	25	4875	2014	760	2 774.54	2 100.46
Category B Individuals Raising Day -old Chicks												
1	3	1	Mdluli	1650	1 2 0	153 0	30	45900	15450	19 352	34 802	11 098.1
1	4	1	Nxumalo	500	3 1	469	35	16415	3552.8	3 008	6 560.76	9 854.24
2	3	1	Mdluli	1200	119 7	3	30	35790	10460	10 97	21 256.6	14 533.4
2	4	1	Nxumalo	400	8	392	35	13720	4344	5 382	9 726	7 176
Category C Individuals Raising Day- old Chicks and also buying matured chickens												
1	4	1	Skhakhane	250	1 8	232	30	6960	3988	2 776	7 664.48	11 025.5
Category F Individuals buying matured chickens and selling them at higher price												
1	3	1	Zwane	37	0	37	35	1295	105	120	225	1 070
1	5	1	Zisize	242	5	237	35	8295	700	6 324	7 024	1 271
2	1	1	Zwane	15	0	15	35	524	35	85	120	405
2	2	1	Zisize	100	0	100	38	3800	280	690	3 110	690

Codes: season1= summer, season 2 = winter

Table 5. 2 Profitability analysis for broilers produced at UNIZULU Poultry unit and those produced by groups of farmers raising day old chicks and or buying matured chickens in Kwa-Mkhwanazi traditional authority in summer and in winter seasons.

Category A groups Raising Day -old Chicks												
Season	No of cycles	No of members	Project name	No of chicks bought	Mortality	No sold	Price/ chicken in Rands	Total income from chickens (in Rands)	Feed cost in (Total feed used) (in Rands)	Other costs in Rands	Total variable costs (in Rands)	Profit /loss (in Rands)
1	3	50	Masibambisan	250	2	248	30	7440	3384.2	1615	4999.22	2440.78
1	3	6	Vukuphile	200	7	193	30	5790	2526.8	971.3	3498.14	2291.86
1	3	15	Nathisikhona	405	24	381	30	11430	3658.2	1530	5188.15	6241.85
1	6	60	Ntuthuko	650	71	579	30	17370	2519.3	2900	5418.3	11950.7
1	3	11	Vukuphile	450	14	436	30	13080	2896.3	2006	4902.29	8177.71
1	1	7	Nathisikhona	100	6	94	24	2256	967	409	1376	880
2	4	50	Ntuthuko	400	5	395	30	11850	9186	2548	11734	116
2	3	6	Vukuphile	131	0	131	35	4585	864	540.5	323.5	4261.5
2	2	15	Nathisikhona	325	9	316	30	9480	2656.2	1611	4267.24	5212.76
2	1	60	Ntuthuko	100	5	95	35	3325	1086	505	1591	1734
2	4	11	Izaza	600	7	593	30	17790	3988.5	2776	6764.48	11025.5
UNIZULU Raising Day old chicks												
1	1	1	UNIZULU	200	13	171	25	4275	1787	1360	3147	1128
2	1	1	UNIZULU	200	5	195	25	4875	2014	760	2774.54	2100.46
Category D Groups Raising Day- old Chicks and also buying matured chickens												
1	8	9	Buhlebemvel	250	18	232	35	6960	605.9	5306	5911.9	1893.1
1	0	15	Sinakhokonke	0	0	0	0	0	0	0	0	0
2	5	11	Sinakhokonke	2500	16	232	30	69780	20850	14160	35010	34770
2	1	9	Buhlebemvel	20	5	15	35	525	35	460	495	30
Category E Buying matured chickens and selling at higher price												
1	6	5	Senzokwethu	326	2	325	30	9720	2774	6438	9212	508
1	5	11	Siyazama	65	0	165	30	5775	625	4030	4655	1120
2	5	5	Senzokwethu	120	0	120	35	4200	360	3507	3867	333
2	1	11	Siyazam	40	0	40	30	1200	66	88	151	1424

Codes: season1= summer, season 2 = winter

5.4 Discussion

Raising chickens is an important contribution to rural farmers' livelihoods and requires low capital (Chege *et al*, 2015). The production of poultry, especially broilers, is generally considered to be profitable (Meena *et al*, 2012). Profit in broilers is affected by feed cost, since the feed is too expensive and substituting it with locally available food resources is preferred, but balancing nutrients is a challenge. Reducing the feed cost is one way that farmers can increase profitability in broiler production. This can be achieved by using local cheap, readily available agricultural residues and by- products as alternative feed ingredients in poultry production (Nortey, 2015). The main cause of the high price of poultry feed is that in most developing countries cereals are grown for human consumption and the surplus is used for animal feeding, thus animals compete with humans for food and feed, resulting in the high cost of feed as well as cost of poultry production (Nortey *et al*, 2015). The cost of feed in South Africa has increased due to several factors, among them drought, which have greatly reduced the output of grain crops. Grain crops (maize, soya bean, sunflower) are the major component of poultry feed. In South Africa, low levels of profitability in broiler production have been attributed to high maize prices coupled with non-increasing poultry meat prices (Kleyn, 2003). High cost of feed ingredients including maize is a threat to small-scale broiler production projects Nkukwana (2014).

The results of the study on broiler production that was conducted at University of Zululand showed that broilers were profitable both in summer and in winter for both diets. However, at the University of Zululand the profitability was reduced in summer due to higher mortality of the chickens. This is suggested to be due to high heat since no artificial cooling system was provided. In community poultry production, individual broiler farmers also reported profits. It was not clear how much the profit would improve the livelihood of the individual farmer or household members. Although the results indicate that groups raising day old broilers were making profit, these cooperative groups had many members, some up to 50, such that the profitability per member would be reduced. In most groups the actual number of members working was lower than the number stated on their co- operative certificates. For a group of broiler farmers to make profit they may need to raise a very large number of chickens depending

on the number of group members. In order to raise more broilers in a profitable manner, there is need for a complete broiler production business closer to farmers. This will help farmers to consider broiler production as a business that will grow and feed their households and future generations. So there is a need for an abattoir, packing house, hatchery, breeders, feed silos, poultry remedy stall, etc., to ensure a sustainable broiler business. This will also lead to broiler meat value adding thus increasing job opportunities. This would cost a significant amount of money and require more commitment from farmers.

The costs included in this study did not include labour charges for most groups; as a result the profitability of the projects was overstated. The labour is provided by household members, including elders and children. The same system was observed by Mengesha *et al.*, (2008), namely that the management of poultry in rural areas is provided by women and children.

Besides feed costs, mortality (the death of chickens before reaching marketing or selling stage) is one factor that also reduces profitability. The results of the current study showed that there was higher mortality in summer than in winter. This is because summer temperatures are high, resulting in the sudden death of broilers (Stephen, 2013). In general, mortality should not be more than five percent. If higher than this, profitability will be highly affected because the higher the mortality, the lower the profit in broiler production. The material used to build broiler houses includes corrugated iron used for roofs and sometimes as walls. This also contributed to increasing heat, resulting in high mortality rates in summer. Most small scale broiler producers do not follow vaccination program, especially against Gumboro and New castle diseases, resulting in high mortalities. High mortality is also the result of unhygienic living conditions in broiler houses which harbour bacteria and viruses. Disinfecting and proper cleaning is impossible in some broiler houses due to poor housing. A shortage of broiler houses results in continuous use without resting a cleaned house for the required time before new day old chickens arrive. Provision of vaccination and good management practices would reduce mortality.

5.5 Conclusion

The results from this study show that there was profitability for all the groups involved in the study. However this reported profitability was questionable as it did not factor the labour cost for family and group members. The results also showed that mortality of broilers was higher in summer than in winter and this affected the profitability of broiler production. It is also concluded that a good farmer has to realistically plan his/her farm operations in view of his or her ability, experience and resources. When plans are effectively carried out, significantly better broiler growth is obtained at lower cost of production.

5.6 References

Amos, TT. (2006). Analysis of Backyard Poultry Production in Ondo State, Nigeria. *International Journal of Poultry Science* 5 (3): 247 – 250.

Chege HW, Kemboi DC, Bebora LC, Maingi N, Mbuthia PG, Nyaga PN, Njagi LW, Githinji J. (2015). Studies on seasonal prevalence of ecto- and endo-parasites in indigenous chicken of Mbeere Subcounty, Kenya. *Livestock Research for Rural Development* 27 (6). <http://www.lrrd.org/lrrd27/6/cheg27113.htm>.

Gadzirayi CT, Mutandwa E, Chihiya J, Mlambo R. (2006). A comparative economic analysis of mash and pelleted feed in broiler production under deep litter housing system. *International Journal of Poultry Science* 5(7): 629-631.

Hanekom D. (1998) Agricultural policy in South Africa, A discussion document Minister for Agriculture and Land Affairs, National Department of Agriculture, Pretoria.

Kleyn R. (2003). Cost effective broiler nutrition through improved formulation. PESFEED. Available at: http://www.spesfeed.co.za/cost_effective_broiler_nutrition.htm

Mandal MK, Khandekar N, Khandekar P. (2006). Backyard poultry farming in Bareilly district of Uttar Pradesh, India: an analysis. *Livestock Research for Rural Development* 18 (7). <http://www.lrrd.org/lrrd18/7/mand18101.htm>.

Meena KC, Singh B, Shivhare MK. (2012). Nutritional and Livelihood Security through Backyard Poultry for small and landless labours . *Current Opinion in Agriculture* 1(1): 24-26.

Mengesha (b) M, Berhan T, Tadelle D. (2008). Socio- economic contribution and labour allocation of village chicken production of Jamma District, South Wollo, Ethiopia. *Livestock Research for Rural Development* 20 (10). <http://www.lrrd.org/lrrd20/10/meng20160.htm>.

Mengesha M, Berhan T, Tadelle D. (2008). Village chicken characteristics and their seasonal production situation in Jamma District, South Wollo, Ethiopia Livestock Research for Rural Development 20 (8). <http://www.lrrd.org/lrrd20/8/meng20128.htm>.

Nkukwana (2014). Poultry Production for Food Security: The South African erspective. Agricultural Research Council, Animal production Institute. Pretoria.

Nortey TN, Kpogo DV, Kpogo AL, Naazie1 A, Oddoye EOK. (2015). Cocoa pod husk is a potential feed ingredient in laying hen diets. Livestock Research for Rural Development 27 (6). <http://www.lrrd.org/lrrd27/6/nort27119.htm>.

Simainga SJC, Moreki BF, Sakuya N. (2011). Socioeconomic study of family poultry in Mongu and Kalabo Districts of Zambia. Livestock Research for Rural Development 23 (2). <http://www.lrrd.org/lrrd23/2/sima23031.htm>.

Stephen RC. (2013). Sudden Death Syndrome of broiler Chickens BSc, BVSc, M Med Vet Department of Population Health, College of Veterinary Medicine. University of Georgia Biosecurity.

CHAPTER 6: COMPARATIVE PERFORMANCE OF A STANDARD AND A MODIFIED FEEDING REGIME ON THE PERFORMANCE OF BROILERS FED COMMERCIAL DIETS AT THE UNIVERSITY OF ZULULAND POULTRY UNIT

6.1 Introduction

The on station experiment was conducted in order to compare in the performance of broilers fed on a standard and modified feeding regimes of commercial diets. In the study area it was broiler farmers were feeding a range of regimes. The on- station experiment was conducted so that the results would be shown to broiler farmers to exposed to cost effective farming. Poultry production (mostly broiler) is one of the recommended ways of improving the livelihoods of rural populations (Dinka *et al*, 2010). Increased productivity in broiler production results in improved livelihoods (Mburu, 2012). When increasing the number of broilers kept for profit purposes it is important to consider gender and labour sharing issues (Muchenje *et al*, 2000). In the past poultry production was not practiced for income generation, rather it was used as a means of knowing time, as a gift, for bartering and as food (Amos, 2006). Modern broiler enterprises are characterised by mass production with a high turnover of capital (Cevger and Yalcin, 2002). In KwaZulu-Natal province, poultry keeping is practised in conjunction with other livelihood strategies. The production of poultry is important for providing food and cash income for rural households (Tung and Rasmusen, 2005). Chickens have little or limited religious connotations and are widely accepted as food for human consumption (Aganga *et al*, 2004). Gue`ye, (2001) as cited in Swatson *et al*, (2001) suggested that food security, economic, and cultural considerations are the reasons for keeping chickens. Broilers are chickens raised for their fast growth. Broilers are good converters of feed to meat over a short period of time (Amos, 2006). They have very short life cycles as they are sold for meat at the age of six weeks and are small in size compared to most other livestock (Haoua *et al*, 2015). Broilers are mostly kept in specific broiler houses. They require regular care and proper feeding for the entire life cycle. When feed meets the nutritional requirements of the chicken, the chicken will have a rapid growth over a short time (Watkins *et al*, 2006).

Most of the production cost involved in raising broilers is attributed to feed costs (Nyoupayou, 1990 cited in Gadzirayi *et al*, 2006). This is because broilers are mostly fed specific commercial diets. This commercial feed is the greatest cost in broiler production. When feeding broilers, it is important to feed them with balanced nutrients so that the chickens will not be undernourished or overfed. The primary diet parameters to be balanced are proteins and energy. Energy needs are met with poultry fat (Kidd, 2000). The cost of feed in Southern Africa have has been rising due to several factors, among them drought, which have greatly reduced grain crops output. Grain crops (maize, soyabean, sunflower) are the major component of poultry feed. In South Africa, low levels of profitability in broiler production have been attributed to high maize prices coupled with non-increasing poultry meat prices (Kleyn, 2003).

To reduce production costs in the small scale, farmers use different strategies (Rohaeni, 2015), among them the modification of commercial feed through the addition of crushed maize or the omission of certain recommended feeds. For example, some farmers omit grower and post-finisher feed and only give starter for the first two weeks and then finisher until maturity. It was therefore necessary to evaluate the effect of this modification on the growth rate of the chickens, as well as the effect on the profitability of the broiler production enterprise as a whole. The objective of the study was to compare the performance (weight gain versus feed intake) of broilers fed commercial diets in standard and modified regimes.

6.2 Materials and methods

The experiment was conducted in summer and in winter at the University of Zululand poultry unit. The University is situated in the city of UMhlatuze (incorporating Empangeni and Richards Bay). The average maximum daily summer temperature is 26 °C and the minimum daily summer temperature is 17°C. The rainfall ranges from 113 – 317mm per annum. The winters are mild to warm, the temperatures on average are over 20 °C, and the probability of rain is low. In summer, the temperatures often rise above 30°C. The area experiences high humidity conditions. The temperatures recorded in the chicken cages in the current study are shown in figures 6.1 to 6.4.

A total of 400 broiler chicks were used in the experiment. In winter, 200 day-old chicks were raised in two cages assigned 100 chicks each. In summer, 200 day-old chicks were also raised in two cages, each assigned 100 chicks. Feed for the broiler was purchased from Meadow Feeds millers. The first group (Diet 1) was fed according to Meadow Feeds' feeding recommendations and the second group (Diet 2) was fed according to the University of Zululand poultry unit programme (Table 6.1). The dietary composition of feed fed to broilers from day 1 to 42 was according to Meadow Feeds (Table 6.2).

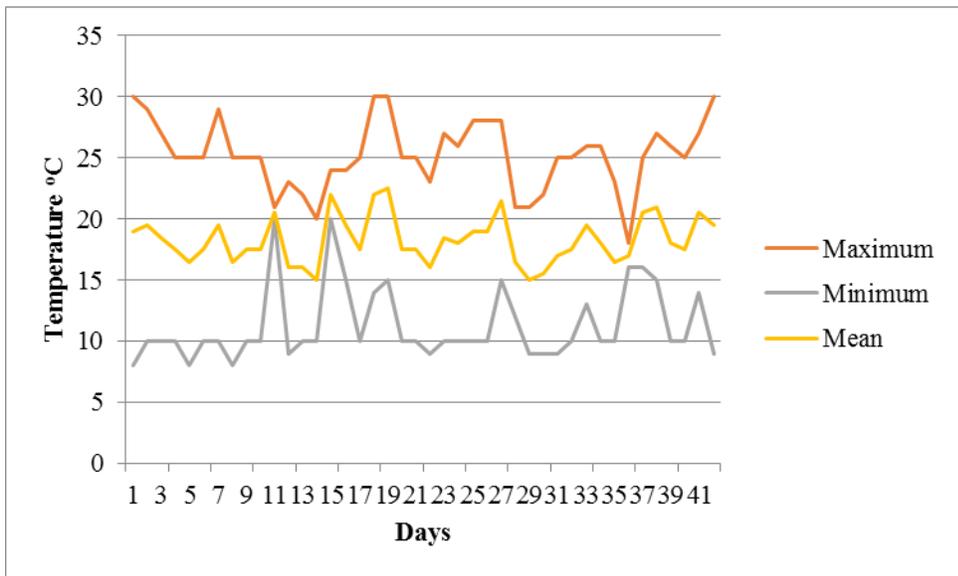


Figure 6.1 Temperatures recorded in the cage housing chickens fed diet 1 during the winter period

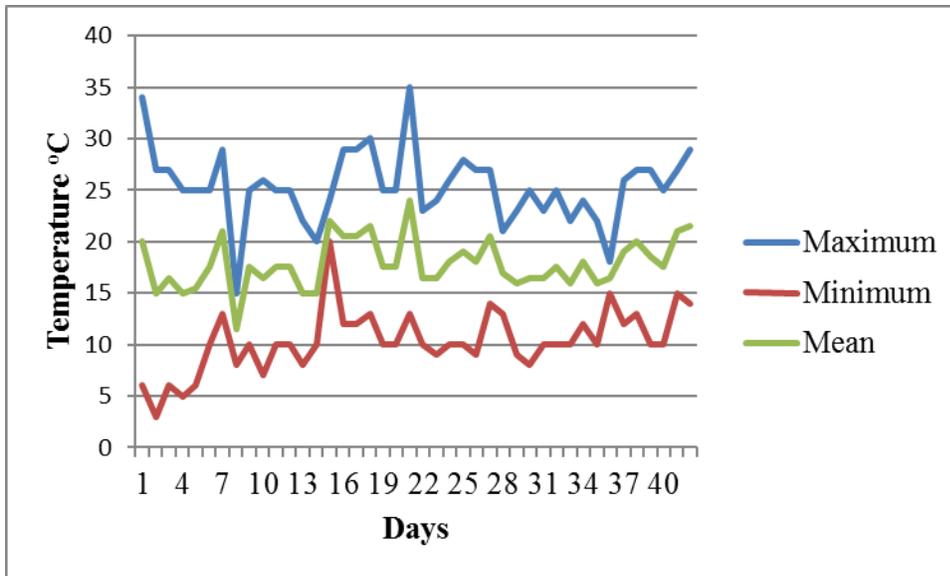


Figure 6.2 Temperatures recorded in the cage housing chickens fed diet 2 during the winter period

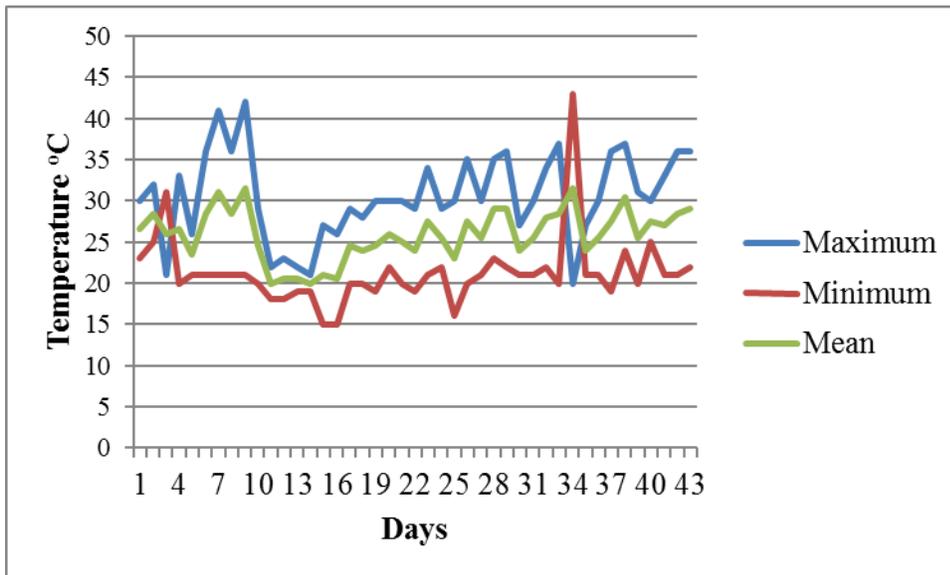


Figure 6.3 Temperatures recorded in the cage housing chickens fed diet 1 during the summer period

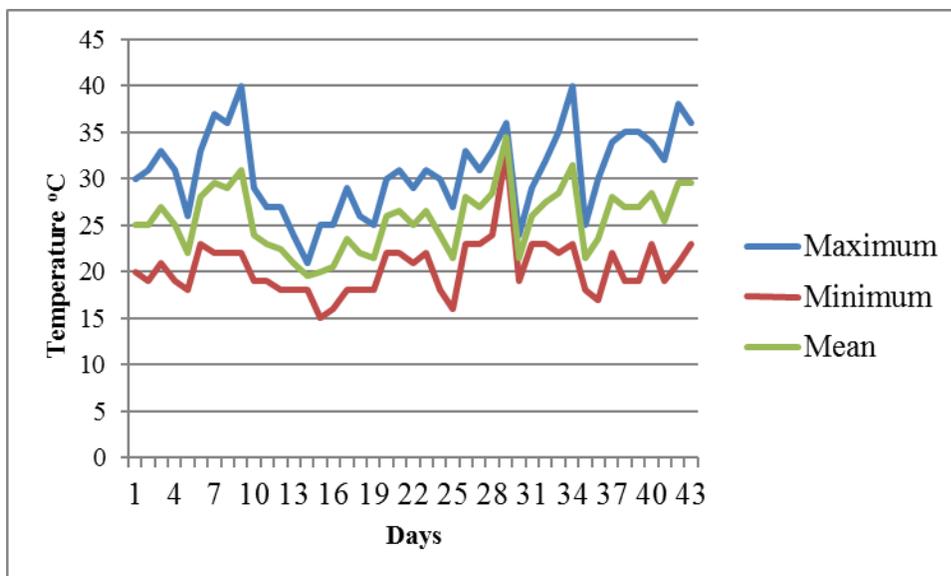


Figure 6.4 Temperatures recorded in the cage housing chickens fed diet 2 during the summer period

Table 6. 1 A comparison of the recommended Meadow feeds and the modified University of Zululand feeding programme for broiler chickens

Feeding period (day)	Meadow feeds (recommended commercial diet)	UNIZULU Poultry unit (modified diet of feeds bought from Meadow feeds)
	Diet 1	Diet 2
1-16	Starter Crumble	Starter Crumble
17-30	Grower Pellets	Finisher Pellets
31-38	Finisher Pellets	Finisher Pellets
39-42	Post Finisher	Finisher Pellets

Table 6. 2 Chemical composition (label values) of commercial broiler feeds bought from Meadow Feeds used in the study

Nutrient	Units	Max/Max	Starter	Grower	Finisher	Post finisher
Protein	g/kg	Min	200.0	180.0	160.0	160.0
Fat	g/kg	Min	25.0	25.0	25.0	25.0
Energy	MJ/g	Min	12.8	13.0	13.2	13.2
Fibre	g/kg	Max	50.0	60.0	70.0	70.0
Moisture	g/kg	Max	120.0	120.0	120.0	120.0
Calcium	g/kg	Min	8.0	8.0	6.0	6.0
Calcium	g/kg	Max	12.0	12.0	12.0	12.0
Phosphorus	g/kg	Min	6.0	5.0	5.0	5.0
Lysine	g/kg	Min	12.0	10.0	9.0	9.0
Poulcox (a.i monensin sodium)	g/kg		-	-	5	-
Surmax	g/kg		-	-	1	-

The performance variable that was measured and recorded was weight gain. Broilers were fed *ad libitum* from the first day to day 42. Water was readily available throughout the experimental period of 6 weeks. The feed intake was recorded on a daily basis for each phase of feeding for the period of 42 days. On arrival chicks were given a stress pack for 4 days. Vaccination was done using ND Lasota at 10 days and Gumbora at 21 days. Feed was weighed before being fed to chicks. Left over feed was weighed in order to calculate the daily feed intake. Chicks were weighed on arrival, after seven days and when they changed to a new type of feed. The chickens were weighed in groups of ten in each cage, throughout the experiment. Temperature was recorded on a daily basis.

All data were recorded on broiler data sheets. Statistical analysis was conducted using SPSS version 13. An analysis of variance was used to compare the effect of season, diet and the interaction of diet and season on weight gain and feed consumed.

6.3 Results

There was no significant ($p>0.05$) difference in weight of chicks based on the feed consumed between the two diets (Table 6.3). However there was a significant difference in the feed consumed between the two seasons ($p<0.05$).

Table 6. 3 A comparison of the amount of broiler feed recommended (Meadow feeds) and the modified (UNIZULU) consumed between winter and summer season

	Feed consumed (kg/chick)	
	Meadow feeds	UNIZULU feed
Summer	0.68 ± 0.13 ^a	0.70 ± 0.13 ^a
Winter	1.07 ± 0.24 ^b	1.12 ± 0.23 ^b

^{a,b} Means values with different superscripts within the same column are significantly different at ($p<0.05$). Values are mean± standard error.

Average Daily Gain and Feed Conversion Ratio increased with the increase in age of the chickens in Diet 1 and Diet 2 (Figure 6.5 and 6.6). Both feed conversion ratio and average daily gain were higher with diet 2. However, these differences were not statistically significant ($p>0.05$).

Table 6. 4 Comparative weight gain of broilers fed a standard (Meadow feeds) diet and modified (UNIZULU) diet in winter and summer seasons. Values are mean± standard error.

	Weight gain (kg/chick)	
	Meadow feeds	UNIZULU feed
Summer	1.11 ± 0.27	1.15 ± 0.28
Winter	1.07 ± 0.27	1.05 ± 0.26

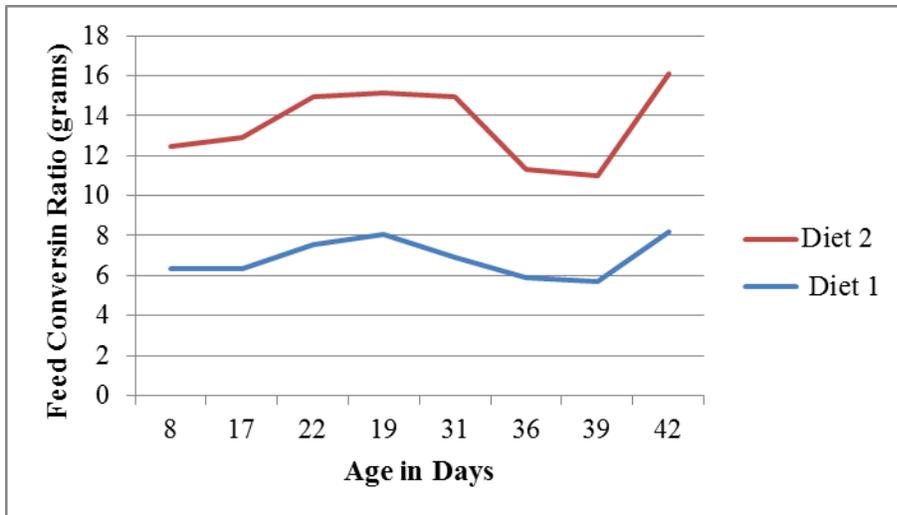


Figure 6.5 Feed conversion efficiency of broiler chickens fed recommended diet by Meadow feed company (Diet 1) and the modified diet (Diet 2) which is used at UNIZULU Poultry Unit.

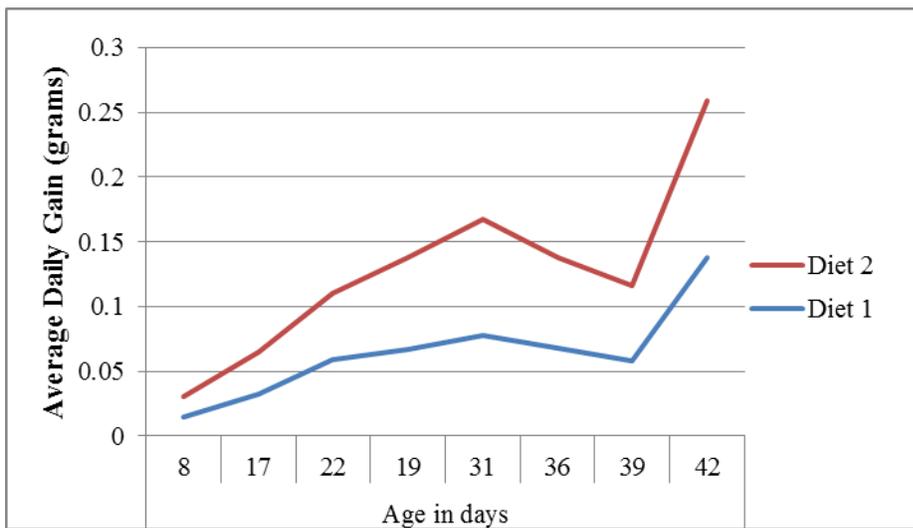


Figure 6.6 Average daily gain of broiler chickens fed recommended diet by Meadow feed company (Diet 1) and the modified diet (Diet 2) which is used at UNIZULU Poultry Unit.

6.4 Discussion

This study showed that feed consumed in winter and summer seasons yielded significantly different ($p < 0.05$) results, which indicates that the feed provided different levels of nutrients. The present study indicated that more feed was consumed in winter than in summer. In spite of the higher feed intake in winter, the weight gain between the two seasons was not different, suggesting that some of the feed taken during winter was not utilised for growth. The possibility is that this feed was used for maintenance of body temperature. In general, winter was colder when compared to summer seasons which are expected to be hotter (see Tables 6.1 to 6.4). This could have been because in summer it was hot and as a result the chickens ate less. In winter it was cold so the chickens ate more in order to warm their bodies, and for maintenance and to grow. There was no air conditioning provided during the production period. Feed consumed in summer between the two diets was the same and the feed consumed in winter between the two cages was the same. Previous research by Olanrewaju *et al.*, (2010), has also reported that as ambient temperature was increased from low (15.6 °C) to high (26.7 °C) and feed intake decreased significantly ($p < 0.05$). The University of Kentucky Agriculture Manual (UKAG) (2014), states that broilers eat more in a cool environment but much of the feed is used to maintain body temperature. In high temperatures they eat less but the feed which is also less efficiently converted. The reason given for this being so is that the cooling mechanisms, such as panting, that are used by birds require energy in the same way as warming does. This is known as a thermogenic effect. As explained by Olanrewaju *et al.* (2010), for the broilers to restore a normal body temperature they reduce feed intake so as to reduce the thermogenic effect, thereby reducing their feed intake in hot environments. Thus for profitable production, growers need to operate at the optimum temperature which is neither high nor low. This is very difficult under smallholder conditions where there is no ventilation that can be precisely controlled.

That the feed conversion ratio for diet 2 was higher (almost always double) than for diet 1 suggested that the modified diet 2 (UNIZULU) was more efficiently utilized by the broilers than the recommended Meadow feed diets. Diet 2 would therefore have been more cost effective as the chickens could be given less of the feed. The average daily gain was also higher for diet 2 throughout the growth period. The feed composition of the finisher and post finisher indicates

that they are basically the same in terms of nutritional composition but differ markedly in that the finisher has the additives poulcox, monensin sodium and surmax. According to Elanco Animal Health, 2015, Poulcox has the effect of improving feed conversion efficiency and mass gain of broilers. This perhaps explains why broilers fed diet 2 which consisted of finisher from day 17 to day 42 performed much better in terms of weight gain and feed conversion efficiency compared with those fed the different components of the recommended diet.

A careful examination of the graphs for feed conversion ratio (Figure 6.5) and daily gain (Figure 6.6) shows that there were sudden sharp changes in the plotted curves, although the curve for diet 2 was consistently above that of diet 1 and the trend of the diet curves was similar for the two graphs. These suggest that there may have been some external shock during the management of the broilers or there were some errors of measurement. It is difficult to explain these sudden changes but important to note that the changes were similar for the two diets.

6.5 Conclusions

This experiment showed that the modified diet resulted in higher feed conversion efficiency and higher growth performance of broilers compared with the recommended standard diet. Also, more feed was consumed in the cold season (winter) than in the hot summer season irrespective of the type of diet. It will be interesting to explore changes in muscle/ protein tissue growth and body fat. It is possible that the weight gain of birds fed the modified dietary regimes could be due to fat deposition than protein tissue growth. Future work could explore the aspect of weight gain/growth of bird fed the modified diet.

6.6 References

Aganga AA, Omphile UJ, Malope P, Chabanga CH, Motsamai GM, Motsumi LG. (2000). Traditional poultry production and commercial broiler for small holder farmers in Botswana. *Livestock Research for Rural Development* 12 (4).

<http://www.lrrd.org/lrrd12/4/Agal24a.htm>.

Amos TT. (2006). Analysis of backyard poultry production in Ondo State, Nigeria *International Journal of Poultry Science* 5(3): 247-250

Dinka H, Chala R, Dawo, Leta S, Bekana E. (2010). Socio economic importance and management of village chicken production in rift valley of Oromia, Ethiopia. *Livestock Research for Rural Development* 22 (11). <http://www.lrrd.org/lrrd22/11/dink22203.htm>.

Elanco Animal Health. (2015).

<http://www.elanco.co.za/products-services/poultry/surmax.aspx>. Accessed on 23/10/2015.

Gadzirayi CT, Mutandwa E, Chihya J, Mlambo R. (2006). A comparative economic analysis of mash and pelleted feed in broiler production under deep litter housing system. *International Journal of Poultry Science* 5 (7): 629-631.

Gue`ye EF. (2001). Marketing of family poultry products in Africa to be improved. *World Poultry* 5 (17): 12-16.

Haoua MT, Keambou CT, Poutougnigni MY, Manjeli Y. (2015). Characterisation of indigenous chicken production systems in the Sudano-sahelian zone of Cameroon *Livestock Research for Rural Development* 27 (2). <http://www.lrrd.org/lrrd27/2/haou27030.html>.

Kleyn R. (2003) Cost effective broiler nutrition through improved formulation. PESFEED. Available at: http://www.spesfeed.co.za/cost_effective_broiler_nutrition.ht.

Mburu S, Zaibet F, Ndiwa N. (2012). The role of working animals in the livelihoods of rural communities in West Africa. *Livestock Research for Rural Development* 24 (9). <http://www.lrrd.org/lrrd24/9/mbur24156.htm>.

Muchenje V, Manzini MM, Sibanda S, Makuza M. (2000). Socio-economic and biological issues to consider in smallholder poultry development and research in Southern Africa in the new millennium A paper presented at the regional conference on animal agriculture and crisis mitigation in livestock dependent systems in Southern Africa, 30 October to 1 November 2000 at Malawi Institute of Management, Lilongwe, Malawi. pp 134 – 144.

Nortey TN, Kpogo DV, Kpogo AL, Naazie1 A, Oddoye EOK. (2015). Cocoa pod husk with enzyme supplementation is a potential feed ingredient in broiler diets *Livestock Research for Rural Development* 27 (5). <http://www.lrrd.org/lrrd27/5/nort27087.html>.

Nortey TN, Kpogo DV, Kpogo A L, Naazie1 A, Oddoye2 E.OK. (2015). Cocoa pod husk is a potential feed ingredient in laying hen diets. *Livestock Research for Rural Development* 27 (6). <http://www.lrrd.org/lrrd27/5/nort27087.html>.

Nyoupayou JND. (1990). Country report of Small Rural International on Rural Poultry Production. Thessalonik, Greece.

Olanwareju HA, Purswell JL, Collier SD, Branton, SL. (2010). Effect of ambient temperature light intensity on growth performance and carcass characteristics of heavy broiler chickens at 56 days of age *International Journal of Poultry Science* 9(8): 720 – 725.

Rohaeni ES. (2015). The effects of the protein level from soybean meal and poultry meat meal on the growth of broiler chickens. *Livestock Research for Rural Development* 27 (5). <http://www.lrrd.org/lrrd27/5/roha27084.html>.

Swatson HK, Nsahlai IV, Byebwa B. (2001). The status of smallholder poultry production in the Alfred District of KwaZulu-Natal, South Africa: Priorities for intervention. Livestock community and environment. Proceedings of the 10th conference of the Associations for Tropical Veterinary Medicine, Copenhagen, Denmark, 2001. 5pp.

Tung DX, Rasmussen S. (2005). Production function analysis for smallholder semi-subsistence and semi-commercial poultry production systems in three agro-ecological regions in Northern provinces of Vietnam. Livestock Research for Rural Development 17 (6).<http://www.lrrd.org/lrrd17/6/tung17069.htm>.

University of Kentucky Agriculture. (2014). Poultry production manual. Chapter 6. www2.ca.uky.edu/poultryprofitability.

Watkins SE, Jones FT, Dustan C and Wooley JE. (2006). Raising broiler and Turkey for competition, University of Arkansas, Division of Agriculture Cooperative Extension Service, USA.

CHAPTER 7 GENERAL CONCLUSIONS AND RECOMMENDATIONS

The situational analysis of broiler production revealed that broiler production was indeed an important livelihood strategy in KwaMkhwanazi Traditional area. There were more group-managed broiler projects than individually managed broiler projects. The above two groups of projects were further divided into different categories according to their production type as follows: raising day old chicks to marketing stage, buying matured chickens and selling them at higher price, raising day old chicks to marketing stage, and also buying matured chickens and selling them at higher price. The economic analysis study indicated that in general broiler production was profitable. The results from the community show that there was profitability for all the groups involved in the study. However this reported profitability was questionable as it did not factor in the labour costs for family and group members. This is because members were not paid for working on broiler projects. As a result the reported profitability for a family or group did not necessarily translate into good earnings for members. The results also showed that mortality of broilers was higher in summer than in winter season and this would have affected the profitability of broiler production. The feed comparison study showed that the modified diet that is feeding only on starter and finisher led to higher feed conversion efficiency and higher growth performance of broilers compared with the recommended diet. The main recommendation from this study is that the effect of dietary modifications needs to be explored further and an economic analysis of the modification performed. Modifying the poultry diet by substituting part of the diet without reducing the growth performance of broilers would be beneficial to farmers as it reduces feed costs and increases profit margins.

Nutrients requirements decline with broiler age. Classically a starter, grower, finisher and post finisher diets are part of the feeding program. These diets are fed in an attempt to match bird's nutrients requirements to diet on offer. The greater the number of feeds a bird receives, the closer the producer can feed the broilers to their requirements. However, the amount of feeds tends to be limited by economic and logistical factors.

In light of the above it is clear that the objectives of the study were met since the situation of poultry projects, the socio economic status of project participants, as well as the profitability and performance of broilers fed on different regimes, was conducted and analysed.

APPENDIX

Household Survey Interview Schedule

DEPARTMENT OF AGRICULTURE, FACULTY OF SCIENCE, UNIVERSITY OF
ZULULAND

**For Households Participating in Broiler Production Projects in Kwa- Mkhwanazi
Traditional Area.**

To The Respondent:

I am a student from University of Zululand. I am conducting a study on broiler production in KwaMkhwanazi Traditional Area. For this reason I am collecting information on groups and individual broiler production projects. The main aim of this study is to find out how small-scale poultry production projects contribute to socio-economic improvement of rural household livelihood security.

I would like to reassure you that there are no wrong or right answers, all what we discuss will be kept confidentially and no names of respondents will be given to anyone under any circumstances, including the government. Only the information itself will be used but not the names. I request you to sign this informed consent form if you agree to be interviewed.

Informed Consent

Respondents Name:.....

I understand the information about the study and have understood the explanation of it given to me verbally. I understand what will be required of me if I take part.

I agree to take this part.

Signature/Mark:.....

Date:.....

Interviewers Name:.....

Section 1: General Information

Name of interviewee:.....
 Name of Project:.....
 Municipality:.....Ward Number.....
 Sub ward Name:.....*Induna's name*.....
 Starting Timer:.....Finishing time:.....

Section 2: Socio Economic Status of Households Participating In Poultry Production Projects

Household Member' Composition Table (Start with household head)

N o 2. 1	Name of househo ld Membe r 2.2	2.3 Relations hip to household head	Se x 2. 4	Ag e 2.5	Marit al status 2.6	Educati on I level 2.7	Worki ng status 2.8	Participat ing in Project 2.9	Prof/occupat ion 2.10

Use the codes for the household composition below.

Codes for Households' Composition Table

2.3 Relationship to household	2.4 Sex	2.5 Age	2.6 Marital status	2.7 Education level	2.8 Working status	2.9 Project member	2.10 Profession/Occ upation
1.Mother	1.Male	1.0-14	1.Single	1.Never to school	1.Schooli ng	1.Yes	1.Home workers
2.Father	2.Femal e	2.15-20	2.Married	2.Primary school unfinished	2.Self employe d	2.No	2.Educator
3.Grandmother		2.21-35	3.Divorce d	3.Primary school finished	3.Emplo yed		3.Nurse
4.Grandfather		2.60- above	4.Separete d	4.Secondary .Unfinished	4.Unemp loyed		4.Clerk
5.Maternal Uncle			5.Widowe d	5.Secondary finished	5. Pensione r		5.Hawker
6.Paternal Uncle			6.Living together	6.Tertiary unfinished			6.Farmer
7.Maternal Aunt				7.Tertiary finished			7.None
8.Other (Specify)				8. ABET			8.Labouer
				9.Grade R			9.Cleaner
				10 Creche			10.Security
							11.Manager

Section 3: Unemployment and Employment or income information.

3.1 Unemployment information

3.1.1 Who is unemployed	3.1.2 Gender 1. Male 2. Female	3.1.3 Reason(s) for unemployment
1.		
2.		
3.		
4.		
5.		

3.2 Employment information (Use the codes for amount earned below)

3.2.1 Who is employed	3.2.2 Where employed	3.3.3 Amount earned per month (R) (Use codes below)
1.		
2.		
3.		
4.		
5.		

Table for amount earned per month

Codes	Amount
01	Less than R100
02	R100 to R350
03	R351 to R500
04	R501 to R1000
05	R1001 to R1500
06	R1501 to R2000
07	R2001 to R2500
08	R2501 to R3000
09	R3001 to R3500

3.3 Other income sources (Use the codes for amount earned above)

Codes	Income	3.3.1 Number of people	3.3.2 Amount gained per month
01	How many people get state old age pension?		
02	How many people get state sick pension?		
03	How many people get disability grant?		
04	How many people get state child grant?		
05	How many people get state orphanage grant?		
06	How many children get child maintenance by biological parents?		
07	How many relatives contribute to the household?		
08	How many people get pension from previous employment?		
09	How many people get money from selling in the community on in town?		
10	Other(specify)		

3.4 Decision-making

Who is the main decision-maker in the household regarding how much money is to be used on what?

Code	Main decision-maker	Tick where appropriate
01	Household head	
02	Mother	
03	Father	
04	Household members together	
05	Other (specify)	

Section 4: Land use as opposed to ownership

4.1 How much land do you have? (Estimate ha)

Code	Hectares of land	Tick where appropriate
01	Less than 1 ha	
02	1 ha	
03	2 ha	
04	3 ha	
05	4 ha	
06	5 ha	
07	More than 5 ha	

4.2 What is land currently used for?

Code	Purpose of using land	Tick where appropriate
01	Residence for household only	
02	Residence for household and tenants	
03	Mixed, residence and plant production	
04	Mixed, residence and animal production	
05	Other (specify)	

4.3 What is legal status of your land?

Code	Legal status of land	Tick where appropriate
01	Communal land	
02	PTO	
03	Lease/rent/to let	
04	Other (specify)	

Section 5: Sources of energy, water and sanitation

5.1 What are the main sources of energy in your household?

Code	Sources of energy	Tick where appropriate
01	Electricity	
02	Gas	
03	Paraffin	
04	Wood	
05	Coal	
06	Other (specify)	

5.2 What type of water does your household use?

Code	Water source	Tick where appropriate
01	Piped water in dwelling	
02	Piped water on the yard	
03	Tanks	
04	River	
05	Borehole	
06	Spring	
07	Other (specify)	

5.3 What type of toilet does house hold use?

Code	Type of toilet	Tick where appropriate
01	Pit	
02	Forest	
03	Flushed	
04	Other (specify)	

Section 6: Access to agricultural land

6.1 What type of crops do you grow and why do you grow them?

Code	Type of crop	Purpose for production 1. Consumption 2. Cash)	Amount per month
01	Maize		
02	Sweet potatoes		
03	Potatoes		
04	Amadumbe		
05	Cabbage		
06	Beans		
07	Sugar cane		
08	Onions		
09	Other (specify)		

6.2 What type of livestock are available in your household?

Code	Type of livestock	Purpose for production 1. Consumption 1. Cash	Tick where appropriate
01	Cattle		
02	Goats		
03	Sheep		
04	Pigs		
05	Indigenous chickens		
06	Broilers		
07	Layers		
08	Ducks		
09	Other (specify)		

6.3 How do you use money obtained from selling livestock and crops?

Code	Money used for	Tick where appropriate
01	Buying food	
02	Buying clothes	
03	Paying school fees	
04	Building houses	
05	Other (specify)	

Section 7: Type of housing

Code	Type of house	Number of housing units
01	Mud rondavel	
02	Blocks rondavel	
03	Stones rondavel	
04	Iqhugwane	
05	Plastered mud house	
06	Plastered blocks house	
07	Plastered stones house	
08	Stones and mud house	
09	Stones and cement house	
10	Other (specify)	

Section 8: Household asset

Which assets are available in your household?

Code	Type of asset	Tick where appropriate
01	Radio	
02	Hi-fi system	
03	DVD player	
04	Video player	
05	Home theater	
06	Television	
07	Fridge (gas)	
08	Fridge (electrical)	
09	Stove (coal)	
10	Stove (electrical)	
11	Stove (gas)	
12	Sofas	
13	Kitchen units	
14	Cell phones	
15	Landline phones	
16	Microwave	
17	Dining room suite	
18	Wall unit/ Room divider	
19	Bicycle	
20	Car	
21	Other (specify)	

Section 9: Household participation in community groups

9.1 In which community groups do members of this household belong?

Code	Community	How many belong
01	Stokvel/Saving club	
02	Communal poultry club	
03	Communal garden club	
04	Water committee	
05	Farmer club	
06	Women's Club	
07	Burial society	
08	Community Development Committee	
09	Other (specify)	

Section 10: Food Security

10.1 Is the food always available in your household throughout a year? (Y/N).....

10.2 When is food plenty?.....

10.3 When is the food scarce?.....