THE IMPACT OF MICROCREDIT ON SMALLHOLDER LIVESTOCK PRODUCTION IN WA MUNICIPALITY: A CASE OF THE LIVESTOCK DEVELOPMENT PROJECT

BY

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DECLARATION

I hereby declare that this thesis is my own work produced from an independent research carried out under supervision and that, to the best of my knowledge; no part of it has been published or presented for the award of any other degree of the University, except where permissible references from other sources have been made and duly acknowledged.

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DEDICATION

I dedicate this work to my beloved mother, Mrs. Awusara Adama for all her sacrifices in bringing me up to this far, without whom I would have been nobody.

ABSTRACT

Though livestock production is widespread in almost every part of Ghana, its output is just about 8 percent of GDP compared to about 75 percent in many countries particularly the developed nations. It is estimated that US $100 million is used on the import of livestock and livestock products annually in Ghana. In an attempt to close the gap between demand and supply of livestock products in the country, MoFA granted credits to livestock farmers in Wa Municipality under the Livestock Development Project (LDP). Meanwhile, over the years, government microcredit schemes in Ghana suffered high rate of default and seems not to be making the desired impact. This study sets out to describe the nature of operation of the credit component of the LDP; assess how smallholder livestock farmers utilized the credit received; assess the impact of the microcredit on smallholder livestock production; and identify the challenges and constraints confronting smallholder livestock. The 'after only' research design was used because there was no base-line studies. Respondents were selected using stratified random sampling, simple random sampling and purposive sampling. Questionnaire and field observation were used to collect data which were analysed using both descriptive and inferential statistics. The findings show that: the credit in cash component of the project suffered a high default rate represented by 53.8 percent of the total amount expected from the recovery; 47.5 percent of the credit in cash beneficiaries diverted the credit either in part or in full from purchasing livestock into other activities; livestock production was constrained by high mortality rate, limited supply of feed, limited veterinary services and the type of livestock breed; and all the research hypotheses were significant at 10 percent significance level. In view of these findings, it was recommended that smallholder livestock farmers should be trained on fodder

preparation, veterinary training institutions should be expanded and all veterinarians should be directly employed by Government, monitoring should be extended to cover every aspect of future projects, and demonstration should be carried out in future projects. Generally, the LDP made a positive impact on smallholder livestock production in the Municipality despite some challenges it encountered.

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LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
DFID	Department for International Development
ASCAs	Accumulating Savings and Credit Associations
FAO	Food and Agriculture Organization
FNGOs	Financial Non-Governmental Organisations
GDP	Gross Domestic Product
IFAD	International Fund for Agriculture Development
ILRI	International Livestock Research Institute
LDP	Livestock Development Project
MASLOC	Microfinance and Small Loans Centre
MFIs	Microfinance Institutions
MoFA	Ministry of Food and Agriculture
MoFEP	Ministry of Finance and Economic Planning
NBSSI	National Board for Small-Scale Industries
NDPC	National Development Planning Commission
NARS	National Agricultural Research Systems
NRI	Natural Resource Institute
OLS	Ordinary Least Squares
PAMSCAD	Programme of Action to Mitigate the Social Cost of Adjustment
PNDCL	Provisional National Defense Council Law
PSIA	Poverty and Social Impact Assessment
ROSCAs	Rotating Savings and Credit Associations
SRID	Statistics, Research and Information Directorate
SSA	Sub-Sahara Africa
UNCDF	United Nations Capital Development Fund

US	United States
VIF	Variance Inflation Factor
WMA	Wa Municipal Assembly

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background to the Study

Livestock production currently accounts for about 30 percent of the gross value of agricultural production in Africa. Seventy percent of the rural poor in Africa own livestock, including pastoralists living in arid and semi-arid zones. Of these, over 200 million rely on their livestock for income (sales of milk, meat, skins) as well as draught power and fertilizer for crop farming. Apart from being a key means of making income for women and the landless, livestock also provide high-quality nutrition for families suffering from AIDS (Sere, 2004).

Livestock production is a major feature of Ghana's agriculture and contributes largely towards meeting food needs, providing draught power, manure to maintain soil fertility and structure, and cash income, particularly for farmers in the northern part of the country (Oppong-Anane, 2006). The livestock sector contributes in direct products about 7 percent of agricultural Gross Domestic Product (GDP), excluding manure and draught power that is provided to the crop sector [Statistics, Research and Information Directorate (SRID), 2001].

Ruminant livestock play a major role in the socio-cultural life of the farming communities as a partial determinant of wealth, payment of dowry, and act as a bank and insurance in times of difficulty. Sheep and goats are often slaughtered for various occasions and functions such as births, funeral and marriages (MoFA, 1990).

Cattle production is an integral part of the farming systems in northern Ghana, where 50 percent of farmers in the Upper West and Upper East regions use bullocks for

ploughing. Studies have shown that bullock-owning households cultivate 60 percent more land than those who do not (Republic of Ghana, 2001).

Livestock population is concentrated in the Guinea and Sudan Savannah vegetation zones of the three northern regions of Ghana, which combined, account for about 75 percent of the cattle population in Ghana. The relatively dry coastal savannah in the south accounts for about 15 percent. The remaining transitional and humid forest zones are sparsely populated with cattle because of the prevalence of tsetse flies, which transmit a killer disease, trypanosomiasis (Republic of Ghana, 2001). Although the majority of rural households keep some sort of livestock, livestock farming is adjunct to crop farming. Poultry predominates in the south, while cattle production is concentrated in the savannah zones. Small ruminants production is generally widespread throughout the country (MoFA, 1998).

Domestic production of livestock has increased slowly but steadily between 1991 and 2000. The production levels increased by 13 percent for cattle, 26 percent for sheep, 25 percent for goats and 21 percent for pigs. Offtake rate for cattle is about 11 percent, while sheep and goats is about 30 percent as compared with 8 percent and 25 percent respectively for cattle and sheep in purely pastoral systems of livestock production in Sub-Saharan Africa. In 2000, Ghana produced 20,000 tonnes of beef, 6,000 tonnes of goat meat, 7,000 tonnes of mutton, 9,000 tonnes of pork and 27,000 tonnes of milk. Animal skins and hides are processed in the country for the domestic and export markets. It is estimated that 2,000 tonnes of cattle hides and 1,000 tonnes each of goat and sheep skins are produced annually (Republic of Ghana, 2001).

Despite the country's vast resources of forage, its livestock resource base is modest with about 1.3 million cattle, 2.5 million sheep, 2.7 million goats, over 10 million poultry, including guinea fowl, and 0.37 million pigs. The per capita consumption of livestock products in Ghana is 1.08 kg for beef, 0.70 kg each of small ruminants and poultry meat, 0.49 kg of pig meat, 1.46 litres of milk and 18.9 eggs per year. These levels of consumption are only 6.7 percent of the averages for Africa and only 2 percent of the Food and Agriculture Organization (FAO) recommended levels (Republic of Ghana, 2001).

In the light of the above, the Government of Ghana through the Ministry of Food and Agriculture (MoFA) undertook a Livestock Development Project (LDP) in twenty-five districts located in seven regions, namely Upper East, Upper West, Northern, Ashanti, Brong-Ahafo, Greater Accra and Volta regions of Ghana. To improve the performance of local livestock breeds, smallholder livestock farmers were supplied with 2,584 livestock of various improved species in Northern, Upper-East, Upper-West, Brong-Ahafo, Ashanti and Volta Regions (MoFEP, 2010).

The project was jointly funded by the Government of Ghana, the African Development Bank and beneficiaries in the project areas. It was initially a six-year project (2002-2008) but was extended to December 2010. Credit-in-cash was a component of the LDP which was instituted to enable farmers access loans to undertake production, marketing or labour savings activities. Smallholder livestock farmers were granted loans for the improvement in livestock housing, purchasing of breeding stock, processing of milk or meat, kit and veterinary drugs etc. and are required to pay back the loan in kind, i.e. animals (MoFA, 2008). However, in 2010, the project shifted from granting credit-in-cash to credit-in-kind.

The goal of the project is to increase the supply of meat, animals and dairy products of domestic production from the current aggregate level of 30 percent to 80 percent by the year 2015; and contribute to the reduction of the incidence of poverty among farmers (who are also livestock keepers) from 59 percent to 30 percent by the year 2015 (MoFA, 2007). The specific objective of the project is to increase incomes of smallholder livestock and dairy farmers, processors, and traders in the project area (Republic of Ghana, 2001).

1.2 Problem Statement

Agriculture is widely considered to be more risky than industry or trade. Thus, it is not surprising that agricultural lending projects have had poor repayment performance [Consultative Group to Assist the Poor (CGAP), 2005].

Access to credit is one of the most important constraints in agricultural production in Ghana. The internal factors limiting credit access are lack of collateral security due to poor quality of farm assets, poor financial management, risky nature of farm production and inability of clients to prepare viable proposals. External factors include; high interest rates and perception of financial service providers about farming as being risky. Following the liberalization of the financial sector in the early 1990s, the share of agricultural credit in total bank lending initially fell from the mandatory 25 percent to 10 percent before recovering to 12 percent in 1998. The 25 percent mark could not be achieved in Ghana (MoFA, 2007).

According to the Government of Ghana (2002), livestock production in Ghana is low by all international standards. Though livestock production is widespread in almost every part of the country, its output is just about 8 percent of GDP compared to about

75 percent in many countries particularly the developed nations. The yield of livestock in Ghana is approximately 20 percent of that of exotic breed. It is estimated that US$100 million is used on the import of livestock and livestock products annually. This means, there is excess demand over the supply of livestock and livestock products in the country.

In an attempt to close the gap between demand and supply of livestock products in Ghana, MoFA has advanced credits to individuals and groups of smallholder livestock farmers in twenty-five districts in Ghana under the LDP which started in 2002. According to the Republic of Ghana (2001), the overall cost of the LDP was UA 22.07 million (GH¢19.87 million) with the credit component being UA 4.14 million (GH¢3.73 million).

Meanwhile, over the years, government microcredit schemes in Ghana suffered high rate of default and seems not to be making the desired impact. According to Quainoo (1997), government lunched a number of special credit schemes since 1989 at subsidized rates, reaching very few people and with extremely poor recovery rates. The Programme of Action to Mitigate the Social Cost of Adjustment (PAMSCAD), lunched in 1989, reached only some 1,200 clients and struggled to achieve an average 83 percent cumulative recovery by 1996. Four other programmes being administered by the National Board for Small-Scale Industries (NBSSI), none of them was able to achieve a 70 percent recovery rate (Steel and Andah, 2008).

Quite recently, officials of the Microfinance and Small Loan Center (MASLOC) were seeking the assistance of Ghana's Anti-graft Agency and the Serious Fraud Office (now Economic and Organized Crime Office) to help them recover more than

GH¢80 million owed it by defaulting beneficiaries (Shalom Radio, 2010). Management of MASLOC in the Volta Region has processed over 200 loan defaulters for court (Agbewode, 2011). Some of these customers default either because of their inability to manage the credit properly to expand their enterprises or they perceive the credit as gift from government, due to politicization. According to Steel and Andah (2008), these 'revolving funds' are steadily depleting, involve substantial costs to operate, and have negligible outreach as a result of the poor repayment. These culminate into low impact of these microcredit programmes.

This research therefore seeks to assess the impact of this microcredit on smallholder livestock production and identify the challenges and constraints confronting farmers in their production process in Wa Municipality in the Upper West Region.

1.3 Research Questions

- What is the nature of the operations of the credit component of the LDP?
- How did the smallholder livestock farmers utilized the credit received?
- What is the impact of the microcredit on the production activities of beneficiary smallholder livestock farmer?
- What challenges and constraints are confronting beneficiary smallholder farmers in their production process?

1.4 Research Objectives

The main objective of the study is to assess the impact of microcredit on smallholder livestock production; and identify the challenges and constraints confronting farmers in their production process.

The specific objectives of the study are to:

- describe the nature of operation of the credit component of the LDP;
- assess how smallholder livestock farmers utilized the credit received;
- assess the impact of the microcredit on smallholder livestock production; and
- identify the challenges and constraints confronting beneficiary smallholder livestock farmers in their production process.

1.5 Study Hypotheses

To guide the study to arrive at meaningful results, hypotheses were tested before and after the project to determine whether the LDP has made any impact on livestock production or otherwise. The hypotheses are as follows:

1. H_0: Before the LDP there was no significant relationship between livestock output and the inputs used in production.

   H_1: Before the LDP there was a significant relationship between livestock output and the inputs used in production.

2. H_0: After the LDP there was no significant relationship between livestock output and the inputs used in production.

   H_1: After the LDP there was a significant relationship between livestock output and the inputs used in production.

1.6 Relevance of the Study

This study creates a platform for MoFA to assess whether they are on course in achieving the goal of the project, i.e., increasing the supply of meat, animals and dairy products of domestic production from the current aggregate level of 30 percent to 80 percent by the year 2015; and contributing to the reduction of the incidence of poverty among farmers (who are also livestock keepers) from 59 percent to 30 percent by the year 2015 (MoFA, 2007).

The study also offers MoFA the opportunity to learn some lessons and improve upon the management of future projects through the successes, challenges and constraints associated with the LDP implementation which have been unearthed.

Finally, this research adds to the existing stock of literature on the subject microfinancing in Ghana, particularly in the Agricultural sector. The information would be useful to microcredit institutions who deal with smallholder farmers and other groups engaged in income generating activities in the Wa Municipality.

1.7 Scope and Justification for Selection of the Study area

Geographically, the research would be limited to Wa Municipality in the Upper West Region due to time and resource constraint. The study focused on how the credit granted to the smallholder livestock farmers in the Wa Municipality impacted on their production activities, and the challenges and constraints still faced by these farmers. The impact assessment was limited to the enterprise level which covered a period of ten years (2002-2012).

The LDP is being implemented in twenty-five districts in seven regions across the country. However, Wa Municipality is chosen for the study because the researcher had already made contact with the Wa Municipal livestock sub-sector office of MOFA since 2007 and some preliminary information regarding the project in the Municipality was gathered. Therefore, the researcher already has some basic knowledge regarding the project in the Municipality. Besides, since a contact had already been established with the office, data collection was relatively easy.

Quite apart from the above, the researcher hails from the Municipality and understood the local language very well. Therefore, difficulty in terms of language

barrier was not encountered during data collection. This enhanced data quality since no interpreter was used.

1.8 Organization of the Study Report

The research report was organized into five chapters. Chapter One contained the general introduction of the study which comprises of the background to the study, problem statement, research questions and objectives, relevance of the study, scope and justification of the study, organization of the study report and limitations of the study. Chapter Two delved into the review of relevant literature on microcredit/microfinance impact assessments and smallholder livestock production. Chapter Three presented a detail description of the study area and the research methodology that was employed for the study. Data analysis and discussion constituted chapter four; while chapter five is made up of the summary of findings, recommendations and conclusions.

1.9 Study Limitations

The major limitation of the study was the lack of base-line data which would have allowed easy assessment of the impact of the credit component of the LDP using the 'before' and 'after' approach. However, the researcher overcame this limitation by taking his time to probe into the situation before the project during data collection.

Also, during data collection, some respondents who defaulted in the credit repayment did not want to be interviewed because initially, they thought they would be asked to repay. However, the data collectors, led by the researcher, took time to explain and alleviate their fears which made them to participate in the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature relevant to the topic. Issues covered by the review include definition of concepts, origin of microcredit, evolution of microfinance sector in Ghana, theoretical and empirical evidence of some impact assessment results, overview of impact assessment methodologies, livestock production systems, the role of livestock, constraints to increasing livestock production and a conceptual framework of microcredit.

2.2 Definition of Concepts

2.2.1 Microcredit and Microfinance

Over time the word 'microcredit' has created misunderstanding and confusion among development practitioners, as a variety of other terms are commonly used in different countries, such as 'informal credit' and 'barefoot banks' by analogy to the Chinese 'barefoot doctors'(Bliss, 2005: 2).

The term 'microcredit' was first coined in the 1970s to indicate the provision of loans to the poor to establish income generating projects (Elahi and Rahman 2006, cited in Stewart *et al.*, 2010: 11). Microcredit is the name given to small loans made to poor people who are regarded as bad financial risks by conventional banks, as they have insufficient savings or assets to obtain a loan (Bliss, 2005: 2). According to Chowdhury and Jahangir (2004: 1), microcredit is essentially the dispersion of small collateral-free loans to jointly liable groups in order to foster income generation and poverty reduction through enhancing self-employment.

Despite the diversity of definitions the word microcredit generally means: small size loans, shorter repayment periods, flexible and easy to understand, regulations on loans, small scale activities based on local conditions and needs, clients are small entrepreneurs and low-income households, and loans used to generate income, develop enterprises and used by the community for social services such as health and education (Bliss, 2005: 2).

The concept of microcredit is known more by its approach than by monetary limits to the amount of loans. Most microcredit loans are dispensed through village or community-level self-help groups who agree to create a pressure on the individual borrower to perform as per contract (Kothari and Gupta, 1999: 1).

Microfinance, on the other hand, has been defined as the means by which poor people convert small sums of money into large lump sums (Rutherford 1999; cited in Mayoux, 2001: 5). Microfinance, according to Otero (1999: 8), is the provision of financial services to low-income poor and very poor self-employed people. These financial services, according to Ledgerwood (1999), generally include savings and credit but can also include other financial services such as insurance and payment services. Schreiner and Colombet (2001: 339) define microfinance as the attempt to improve access to small deposits and small loans for poor households neglected by banks. In articulating these views, Todaro and Smith (2006: 752) stated that microfinance is the supply of credit, saving vehicle, and other basic financial services made available to the poor and vulnerable people who might otherwise have no access to them or could borrow on highly unfavourable terms. Microfinance Institutions (MFIs) specialize in delivering these services, in various ways and according to their own institutional rules.

The term "microfinance" is much broader than microcredit. The main components of microfinance are: deposits, loans, payment services, money transfers, and insurance to poor and low-income households and their microenterprises in both rural and urban areas. Thus, microcredit is only a component of the broad spectrum of microfinancing.

Over the years, there has been a confusion regarding the difference between 'microcredit' and 'microfinance' and as a result these terms have been used interchangeably. However 'microcredit' and 'microfinance' are not identical concepts as microfinance includes access to a range of financial services and products, including credit, savings, money transfers, insurance and asset building mechanisms required by the unique and widely varying needs of poor people to enhance their ability to increase incomes and mitigate vulnerability in times of economic stress (Bliss, 2005: 3). While the words microcredit and microfinance are often used interchangeably, they have different resonances and are loosely attached to contrasting beliefs about the state of rural finance and the nature of poverty (de Aghion and Morduch, 2005: 14).

2.2.2 Smallholder

In many developing agricultural countries, almost one-third of the world's population depend on smallholder farming. As such, smallholder farming is important in terms of agriculture and food security. The term "smallholder" refers to their limited resource endowments relative to other farmers and therefore the definition of smallholders differs between countries and between agro-ecological zones. In Philippines, the Agriculture and Fisheries Modernization Act (RA 8435) of 1997 and the Magna Carta of Small Farmers (RA 7607) of 1993, defines smallholder as

"natural persons dependent on small-scale subsistence farming as their primary source of income". Conversely, the Land Bank of the Philippines also defines smallholder farmer as actual tillers of lands not over five hectares (Philippines Country Paper, n.d).

In Ghana, according to MoFA (2007: 4), agriculture is predominantly practised on smallholder, family-operated farms using rudimentary technology to produce about 80 percent of Ghana's total agricultural output and about 90 percent of the farm holdings are less than two hectares in size. Chamberlin (2007: 3) made a similar argument when he stated that built into the epithet "smallholder" is the connotation of limited land availability. Other connotations may sketch a broader view of "resource-poor" farmers: e.g. those with limited capital (including animals), fragmented holdings, and limited access to inputs. Chamberlin (2008: 4) also argued that the "smallholder" label is often an implied cognate for subsistence farmers. In other words, a largely low market orientation is part of the working definition of smallholder used in policy discussions. Recognizing that resource-poor livestock keepers are a very diverse group, Chipeta *et al.* (2003) noted that number of animals may be a misleading definition. Ghana's Poverty and Social Impact Analysis (PSIA) implicitly makes a similar argument for Ghanaian farmers, arguing that different resource and risk conditions better define smallholders than simple measures of landholdings. While quantitative precise definitions of smallholder are elusive, in looking across a variety of working definitions, key themes to consider are: holding size, wealth, market orientation and levels of vulnerability to risk (Chamberlin, 2007:3).

Using wealth rankings, the PSIA defines five categories of Ghanaian smallholders: large scale commercial farmers, small commercial farmers, semi-commercial farmers, non-poor complex diverse risk prone farmers, and poor complex diverse risk prone farmers (MoFA, 2007: 18; Chamberlin, 2007: 3). The latter three categories, according to Chamberlin (2007) are together said to constitute smallholder farmers.

2.2.3 Impact Assessment

Impact assessment is a management mechanism aimed at measuring the effects of projects on the intended beneficiaries. The rationale is to ascertain whether the resources invested produce the expected level of output and benefits as well as contribute to the mission of the organization that makes the investments. Indeed, for MFIs, impact assessment is important in enabling them to remain true to their mission of "working with poor people in their struggle against hunger, disease, exploitation and poverty" (Johnson and Rogaly, 1997).

An impact assessment is a study to identify changes that result from a program by employing methods to establish plausible association between changes experienced and participation in the programme. In reality, however, other factors intervene to influence the impacts (e.g., gender, role of enterprise income in the household, location of the enterprise). So it is necessary to pay attention to attribution and rule out plausible rival reasons about why the changes may have occurred.

Impact assessments compare changes in impact variables between two or more points in time. This can be accomplished through a longitudinal study consisting of a baseline and one or more follow-up studies using the same variables and measures. It

can be done by a one-time retrospective study that compares the present with a previous point in time in order to assess changes (Barnes and Sebstad, 2000).

Establishing impact essentially is making a case that the programme led to the observed or stated changes. This means that the changes are more likely to occur with program participation than without programme participation. It does not imply that the changes always occur from programme participation. Rather, it increases the probability that the changes will occur (Rossi and Freeman, 1989).

Until quite recently, impact assessment as a management process has been mainly associated with and driven by donor agencies. It is increasingly acknowledged, however, that donor interventions have higher potential of sustainability and growth if these processes are developed and managed with greater involvement of the target group (Afrane, 2002: 3).

2.3 The Origin of Microcredit

The roots of microfinance can be found in many places, but the best known story is that of Muhammad Yunus and the founding of Bangladesh's Grameen Bank (de Aghion and Morduch, 2005: 11).

In 1974, Professor Muhammad Yunus, then a professor of economics, in Bangladesh was moved by the plight of people when the country faced a famine. Yunus felt guilty teaching economics in a cool comfort of the classroom in this scenario (Kothari and Gupta, 1999: 2). He also observed that banks did not extend credit to the rural poor as they were not considered creditworthy. Therefore, the rural poor were forced to approach moneylenders who charged exorbitant interest rates (Kaneja, 2009: 2).

Yunus left the University campus and went to Jobra, a village in Chittagong of Bangladesh, to learn a new method of banking for the poor. That is where he tried the idea of tiny loans for self-employment of the poor, and thus, the idea of microcredit was born. It is from here that it took the shape of Grameen Bank, Bangladesh, and thereafter, has spread all over the world (Kothari and Gupta, 1999). By 1991 the Grameen bank had over one million members in Bangladesh, and by 2002 the number had swollen to 2.4 million. Today, replications exist in thirty countries, from East Timor to Bosnia (de Aghion and Morduch, 2005: 12).

The World Bank estimated that there are now over 7000 microfinance institutions, serving some 16 million poor people in developing countries. The total cash turnover of microfinance institutions world-wide is estimated at US$2.5 billion and the potential for new growth is outstanding. It is estimated that, worldwide, there are thirteen million microcredit borrowers, with US$7 billion in outstanding loans, and generating repayment rates of 97 percent. It has been growing at a rate of 30 percent annually (Kothari and Gupta, 1999).

2.3.1 The Evolution of Microfinance Sector in Ghana

Microfinance is not a new concept in Ghana. It has always been common practice for people to save and/or take small loans from individuals and groups within the context of self-help in order to engage in small retail businesses or farming ventures (Asiema and Osei, 2007: 3). Prior to formal banking systems in Ghana, many of the poor, mainly women, and those in rural communities relied heavily on informal banking services and the semi-formal savings and loans schemes (Aryettey and Ellen, 1996 cited in Egyir, 2010: 2).

Cooperatives, especially among cocoa farmers of the 1920s, engaged in thrift and credit. The mission of the informal microcredit organizations or microfinance services in Ghana was to provide social and economic support for the less advantaged, especially rural women and their families. The first cooperatives were formed in the 1920s. In 1946, the Gold Coast Cooperative Bank was established to serve particularly clients belonging to cocoa cooperative societies (Egyir, 2010: 2).

Evidence suggests that the first credit union in Africa was established in Northern Ghana (Jirapa in the Upper West Region) in 1955 by the Canadian Catholic missionaries that were there at the time. However, Susu, which is one of the current microfinance schemes in Ghana, is thought to have originated from Nigeria and spread to Ghana from the early 1900s. Over the years, the microfinance sector has thrived and evolved into its current state. Various financial sector policies and programmes such as the provision of subsidized credits, establishment of rural and community banks, the liberalization of the financial sector and the promulgation of PNDC Law 328 of 1991 allowed the establishment of different types of non-bank financial institutions, including savings and loans companies, finance houses, and credit unions etc. (Asiema and Osei, 2007)

Currently, there are three broad types of microfinance institutions operating in Ghana. These include:

- Formal suppliers of microfinance (i.e. rural and community banks, savings and loans companies, commercial banks)
- Semi-formal suppliers of microfinance (i.e. credit unions, financial non-governmental organizations (FNGOs), and cooperatives;

- Informal suppliers of microfinance [e.g. susu collectors and clubs, rotating and accumulating savings and credit associations (ROSCAs and ASCAs), traders, moneylenders and other individuals].

In terms of regulatory framework, rural and community banks are currently regulated under the Banking Act 2004 (Act 673), while the Savings and Loans Companies are regulated under the Non-Bank Financial Institutions Law 1993 (PNDCL 328). On the other hand, the regulatory framework for credit unions is still being developed to reflect their dual nature as cooperatives and financial institutions. The rest of the players such as FNGOs, ROSCAS, and ASCAs do not have explicit legal and regulatory frameworks, and are largely unregulated.

In terms of current policies and programmes that affect the Microfinance sub-sector, a number of on-going projects can be cited. These include – the Financial Sector Improvement Project, Financial Sector Strategic Plan, the Rural Financial Services Project, the United Nations Development Programme Microfinance Project, the Social Investment Fund, the Community Based Rural Development Programme, Rural Enterprise Project, and Agricultural Services Investment Project (Asiema and Osei, 2007).

2.4 Theoretical and Empirical Review of Impact Assessment Results

The impact of microfinance is not a simplistic debate on whether it is transformative or ruinous; it is much more complex. Thus, far literature reviews of empirical research on the impact of microfinance on the poor found controversial (and inconclusive) findings (Stewart *et al*, 2010: 14).

Proponents of microfinance argue that small loans to poor people could serve as a powerful tool for alleviating poverty (Khan and Rahaman, 2007). This is consistent with the United Nations Capital Development Fund's (UNCDF's) (2009) claim that microcredit for farmers provides a potent tool for expanding economic opportunities and reducing the vulnerabilities of the poor. Asiama and Osei (2007) noted that this is possible because microfinance helps the poor to meet their basic needs and therefore improve household income. Similarly, Khan and Rahaman (2007), Robinson (2001) and Otero (1999) arguing from a sociological perspective asserted that access to credit provides the poor with productive capital that helps to build up their sense of dignity, autonomy, and self-confidence, and hence are motivated to become participants in the rural economy. Likewise, Pronyk *et al.* (2007) argued that microcredit presents the poor with income, food, shelter, education and health and can therefore have immediate and long term consequences.

Gender activists also argue in favour of microfinance as a means of empowerment by supporting women's economic participation. Boyle (2009) claims that by supporting women's economic participation, microfinance helps to improve household well-being. In supporting this view, Cohen *et al.* (2002) also argued that microfinance is a valuable vehicle for empowering the poor. By supporting and encouraging women's economic participation, microfinance helps to empower women, thus promoting gender equity and improving household well-being.

Littlefield (2005) reports that the opportunities created by credit availability helps a lot of poor people to invest in their own businesses, educate their children, improve their healthcare and promote their overall well-being. This is supported by a study by Karlan and Zinman (2006) in South Africa where recipients of microcredit were

shown to be better off than non-beneficiaries. In another study by Khan and Rahaman (2007) in the Chittagong district in Bangladesh, recipients of microfinance facilities were reported to improve their livelihoods and moved out of poverty. More importantly, they found that microfinance recipients had empowered themselves and become very active participants in the economy. Further, using a regression model to examine the impact of microfinance, Priya (2006) found that there is significant positive relationship between credit recipients and income; the findings suggest that program participation led to a 10 percent increase in income. However, the UNCDF (2009) report suggests that though microcredit may be helpful in reducing poverty, it is never a panacea and that it is only one of such tools to reduce poverty or the vulnerabilities of the poor. Buckley (1997) and Rogaly (1996) have also noted that microfinance may not always be the best tool to help the poorest of the poor. A similar argument is made by Hashemi and Rosenberg (2006) who claim that microfinance does not reach the poorest in the community.

Roodman (2009) asserts that microcredit might actually leave people worse off, just as credit cards and mortgages have made people poorer in developed countries. Referring to the over-advertised benefits of microfinance, Ditcher (2006) claims that while the promise of microcredit is irresistible, the hope for poverty reduction impact of microcredit remains elusive. Karnani (2007) made a similar statement in his critique of microfinance programs and argued that though microcredit yields some non-economic benefits, it does not significantly alleviate poverty and that the promise of microfinance is less attractive than the reality. He explained that the best way to alleviate poverty is to create jobs and increase worker productivity but not through microcredit. This is because poor borrowers tend to take out conservative

loans that protect their subsistence, and rarely invest in new technology, fixed capital or the hiring of labour.

Afrane (2002) conducted an impact assessment studies on clients of Snapi Aba Trust (a microfinance institution) in Ghana and South Africa. A comparison of the impact situations in both countries revealed both positive and negative impact. The overall positive impacts were 56 percent for South Africa and 50 percent for Ghana, while the overall negative impacts were 7.6 percent and 3.3 percent respectively. This implies that although microfinance projects are expected to generate positive impacts, in some cases, such projects tend to have some adverse effects.

Similarly, an empirical examination of the impact of microfinance in four districts (Kwahu North, Manya Krobo, Yilo Krobo and West Akim) in the Eastern Region of Ghana by Nanor (2008) showed that microfinance had some positive impact on variables like expenditure on children education, household income and profits of small businesses of households. However, there was no evidence to show that poverty has reduced among beneficiary households of microfinance services.

A thorough review of fifteen publications on microfinance impact assessment in ten Sub-Saharan African countries by Stewart *et al.* (2010) showed mixed impact results. While some have negative impact, others have positive impact with varying degrees. The authors concluded that some people are made poorer and not richer by microfinance, particularly microcredit clients. However, there is some evidence that microfinance enables poor people to be better placed to deal with shocks, but this is not universal.

Empirically, Buckley (1997) studied microenterprises in three African countries (Kenya, Malawi and Ghana), and questioned whether the extensive donor interest in microenterprise finance really addresses the problem of micro-entrepreneurship or just offers a quick fix to the problem. The study's findings suggest that the fundamental problem is lack of infrastructure rather than the injection of capital. On the other hand, Chemin (2008) using a matching strategy to examine the impact of microfinance in Bangladesh reported a positive, but lower than previously thought effect on expenditure per capita and school enrollment for boys and girls. Khan *et al.* (2007) also assessed the impact of microcredit on livestock enterprise development in Abbottabad District in Bangladesh. The findings revealed that 33% of households who used the credit in accordance with the project objectives experienced increased in income which resulted in positive effect on their consumption as well as children education. On the contrary, 67 percent of households miss-utilised the credit and therefore no impact on their socioeconomic conditions could be identified.

In another study to examine the impact of microfinance on rural farmers in Malawi, Aguilar (2006) reported that farmers who borrow from microfinance institutions were not better off than those who did not borrow. Adams and Bartholomew (2010) also reported that microfinance had a marginal effect on both the economic and social well-being of maize farmers in Nkronza in the Brong-Ahafo Region of Ghana. This implies that credit alone cannot serve the farmers and take them out of poverty. As Parker and Peace (2001) have noted, it is only one of the many elements on a menu of possible interventions to generate income and possibly alleviate poverty. Ausburg (2008) argues that there is the need for a plus component (training in

financial management, marketing, managerial skills and market development) for microfinance to succeed.

The studies reviewed above indicate that impact assessment results are mixed in terms of positive and negative impacts. The promised benefits of microfinance are not always realized and many other factors including client characteristics, microfinance structure and functional arrangements may mediate the impact of microfinance. Thus, the effect of microfinance is context specific.

2.5 Overview of Impact Assessment Methodologies

Debates over the techniques used for impact assessment have centred on the application of quantitative or qualitative methods. Conventional approaches often give an unbalanced focus on quantitative and measurable indicators to the neglect of social and psychological issues that tend to be qualitative in nature. Recent methodological research papers have revealed that there are limitations to a purely quantitative approach as well as to a purely qualitative approach in social science research, be it impact evaluation, poverty assessment, and so forth (Howe and Eisenhart, 1989; Glewwe, 1990; Dudwick, 1995). Each approach has an appropriate time and place, but in most cases, both are required to address different aspects of a problem and to answer questions that other approaches cannot answer well or cannot answer at all (Car Valho and White, 1997).

2.5.1 Quantitative Methods

Quantitative or scientific methods analyse microfinance impact on intended beneficiaries by measuring quantifiable indicators in an experimental framework with the objective of achieving scientifically valid results. A rigorous scientific

analysis requires a relatively large, randomly selected sample of microfinance clients ('experimental group') to achieve a high degree of representativeness and a randomly selected 'control group' of non-clients to isolate external effects. Differences between observed changes in indicators in the client and control group can then be attributed to the impact of a microfinance intervention with a high degree of confidence. Scientific validity is enhanced through a longitudinal study design.

In practice, quantitative microfinance impact studies use large-scale sample surveys of clients and non-clients based on standardised questionnaires to assess impact on measurable indicators, such as household income or assets. Programme applicants who have not yet received a loan are frequently used as control group. Practical problems of quantitative impact analysis include fungibility and the potential mis-specification of causal relationships as a one-way process from intervention to impact (Hulme, 1999). For example, high pressure on clients to repay loans on time results in high repayment rates in the short-term, while it could force clients to sell assets in the longer-term, thus lowering future repayment probabilities. Impact models based on two-way causalities and econometric tools such as regression analysis can address these issues (Hulme, 1999). In addition, non-random selection of control groups can reduce data reliability due to a potential selection bias. Lastly, involvement of program staff in the data collection process can reduce data quality, as clients might try to please staff with the 'right' answers.

Benefits of quantitative microfinance impact research include a high degree of representativeness, data standardisation, and comparability as well as the ability to measure, attribute and 'prove' impact with a high degree of confidence. Donors have therefore encouraged this type of impact research in the past. Nevertheless pure

quantitative impact research is of limited use for MFIs, as it does not capture qualitative and complex causal impact processes. It is also very costly and time-consuming process and provides out-dated information by the time results are disseminated.

2.5.2 Qualitative methods

Qualitative approaches for microfinance impact analysis aim at understanding causal processes behind observed impact on the intended beneficiaries. They therefore lend themselves to impact studies with an improving objective. Qualitative impact analysis can be conducted with the help of open-ended questionnaires and interviews, focus groups, case studies and participatory methodologies. These methods frequently use less measurable socio-political and personal indicators to establish the impact of microfinance, such as empowerment, education or health (Hulme, 1997). Due to their limited scope for standardisation, qualitative impact studies are normally based on smaller, non-random samples (Barnes and Sebstad, 2000) and do not always use a control group. They credibly attribute impact on the basis of theoretic propositions for the analysed sample group, but do not achieve a scientifically valid degree of generalisation for the whole of the client population (Barnes and Sebstad, 2000).

Qualitative impact analysis is particularly beneficial for MFIs that aim at an in-depth understanding of impact processes, client perspectives and community dynamics, and require impact information relatively quickly. At the same time, the results of qualitative impact studies are of limited representativeness and difficult to verify. Nevertheless, qualitative methods have provided valuable insights on microfinance

impact in practice. Table 2.1 provides an overview of the main qualitative methods with their key features and strengths.

In recent years, participatory impact assessment methodologies have become increasingly popular in social science. They centre around the assumption that scientific objectivity is inadequate, as multiple realities exist based on various subjective perceptions. Participatory approaches in microfinance impact analysis advocate adopting the perspective of intended beneficiaries and involving them in the research process to develop their self-analysis skills. While theoretically intriguing, these methodologies are in practice still in their infancy.

However, due to limited staff and financial resources, microfinance practitioners have increasingly turned towards so-called 'middle-range' approaches which combine quantitative and qualitative elements of impact assessment at reasonable cost. These approaches aim to establish 'plausible association' of observed impact of a microfinance intervention based upon the principles of credibility, usefulness and cost effectiveness without achieving statistical validity. In addition, they estimate the direction rather than the amount of change in impact indicators that follows participation in a microfinance program (Barnes and Sebstad, 2000).

Table 2.1: Qualitative Impact Assessment Methods

Method	Key Features	Strengths
Rapid Appraisal	A range of tools and techniques developed originally as rapid rural appraisal (RRA). It involves the use of focus groups, semi-structured interview with key informants, case studies, participant observation and secondary sources.	• Ability to capture qualitative information • Ability to capture causal processes • Ability to capture diversity of perceptions • Ability to capture unexpected or negative impacts • Encourages participation • Potential to contribute to stakeholder capacity building • Probability of enhancing downward accountability
Participant Observation	Extended residence in a program community by field researchers using qualitative techniques and mini-scale sample surveys.	• Ability to understand complex processes (e.g institution buiding) • Ability to capture qualitative information • Ability to capture diversity of perceptions • Ability to elicit the views of women & disadvantaged groups • Ability to capture unexpected or negative impacts
Case Studies	Detailed studies of a specific unit (a group, locality, organization) involving open-ended questioning and the preparation of 'histories'.	• Ability to capture qualitative information • Ability to elicit the views of women & disadvantaged groups • Ability to capture unexpected or negative impacts
Participatory Learning and Action	The preparation by the intended beneficiaries of a programme of timelines, impact flow charts, village and resource maps, well-being and wealth ranking, seasonal diagrams, problem ranking and institutional assessments through group processes assisted by a facilitator.	• Ability to capture qualitative information • Ability to capture causal processes • Ability to capture diversity of perceptions • Ability to capture unexpected or negative impacts • Encourages participation • Potential to contribute to stakeholder capacity building • Probability of enhancing downward accountability

Source: Adapted from Hulme (1997)

2.6 Livestock Production Systems

Livestock production systems differ widely in scale and intensity across the World and reflect differences in available resources (i.e. land, feed, water), socio-economics and tradition (Scollan *et al.,* 2010: 11). FAO (2009) classified livestock production systems into grazing (both extensive and intensive), mixed farming systems (irrigated and rainfed) and industrial systems (or "landless systems").

The grazing system accounts for 26 percent of the earth's ice-free land mass (Steinfeld *et al.,* 2006) and typically use land that is unsuitable for cropping (i.e., semi-arid and arid areas) (Scollan *et al.,* 2010: 11). As noted by Pitesky *et al.* (2009), such areas include land cleared from rainforest contributing to soil erosion and further deforestation. Intensive grazing systems found at temperate areas are supported by the production of higher quality forages and carry higher animal numbers.

Mixed farming systems are those in which arable and livestock production are joint activities on farm and are defined by FAO (2009) as those systems in which dry matter consumption by animals comes from arable by-products or where more than 10 percent of total value of production comes from non-livestock farming. They include both "rainfed mixed farming system" and "irrigated mixed farming system".

Industrial systems are defined as those in which less than ten per cent of the dry matter consumption is farm produced and include for example intensive beef cattle, pig and poultry feed on cereal grain and industrial by-products purchased outside the farm. These systems account for approximately 75 percent, 40 percent and 65 percent of poultry meat, pig meat and eggs respectively (Scollan *et al.*, 2010: 12).

On the basis of primary purpose, urban livestock production systems can be classified as subsistent or commercial. The primary purpose of subsistent production system is to meet family needs, and involves little or no commercial exchanges. Many urban families indeed keep a few chickens, two to three sheep or goats for occasional consumption. Little or no investment is made into the feeding or health care of the animals. The animals scavenge for a large part of their required feed, but are supplemented with household kitchen wastes, as and when available. Performance is therefore poor and mortality is high. For commercial production system, the primary purpose is to raise enough animals for sale, and secondarily for occasional home consumption. Depending on the size of the enterprise, such commercial concerns are either smallholder or large-scale enterprises (Smith and Olaloku, 1998).

The main distinguishing feature of smallholder and large-scale enterprise is the involvement unremunerated and remunerated family labour respectively. A typical smallholder commercially oriented urban small ruminant production system in Ghana was described by Baah (1994). Following a diagnostic survey of small ruminant production in two cities - Kumasi and Effiduasi - in the Ashanti region of Ghana, the author indicated that several households kept either sheep or goat or a combination of both species, with flock sizes ranging from one to fifteen per household. According to the study, the majority of respondents (62 percent) kept goats for commercial exploitation.

A popular system of management of this smallholder commercial system was by confinement in the backyard, particularly for households close to city centres. Producers fed their animals with a variety of feeds, some of which were purchased.

Other financial inputs went into prophylactic health care against common major diseases through vaccination and anthelmintic treatments. Labour was required mainly for feed procurement and distribution, as well as animal house sanitation, and was provided by family members. Producers marketed their animals mainly at the farm gate directly to consumers or to middle men (Smith and Olaloku, 1998).

For large-scale commercial production, the distinguishing feature is the use of remunerated family labour; or production is completely commercial with little or no family input except at management level. The units are usually situated at the outskirts of towns and cities, where land is available for growing fodder, which constitutes the main feed source, supplemented with purchased concentrates. When run as private concerns, the required inputs in the form of improved genotypes, adequate nutrition, effective health coverage and management are supplied, making the system potentially economic when supported by good pricing policies and effective infrastructural support systems (Smith and Olaloku, 1998).

A study conducted in Pakistan by Afzal (1997) revealed that there are four main systems of production of cattle and buffaloes in Pakistan. These include rural subsistence smallholder production system, rural market oriented smallholder production system, rural commercial dairy farming system and peri-urban commercial dairy farming system.

Under the rural subsistence smallholder production system which is most common in Pakistan, milk is produced for the family at minimal cost. Grazing provides most of the feed requirements of animals (Afizal, 1997). Similarly, the Department for International Development (DFID) (2002) indicated that livestock kept for mainly

subsistence purposes often encountered scavenging and foraging supplemented with household waste. Some roughages and a small quantity of concentrate are given only to milking animals. Afzal (1997) noted that more than ninety per cent of the milk produced under this production system is used for family consumption. This traditional system makes heavy demand on family labour.

2.7 The Role of Livestock

Livestock significantly contribute to agricultural GDP in Africa. It is estimated that livestock-derived food items (meat, milk and eggs) alone contributed about 30 percent to agricultural GDP in 2003. This estimate does not include non-food livestock products such as draught power and manure, which enhance productivity of crop production, nor does it take into account intangible livestock contributions to rural communities through risk mitigation and wealth accumulation. About 10 percent of the human population of Sub-Saharan Africa is primarily dependent on livestock, while another 58 percent at least partially depend on livestock. In 1999, livestock were estimated to account for 53 percent of the agricultural capital stock in Sub-Saharan Africa (SSA), with land accounting for a further 42 percent (Oxford Policy Management, 2003). In Ghana, the rate of growth in the production of various livestock species has remained relatively unchanged and contributed only 2 percent to GDP in 2010 (Government of Ghana, 2011).

Livestock production can contribute to poverty reduction in various ways. It can increase food supply, serve as a source of income and a means for capital accumulation, generate employment and supply inputs and services for crop production. Further, non-market exchanges of livestock represent an important factor for social integration (Faye, 2001 cited in Otte and Knips 2005). Livestock contribute

significantly to food supply and nutrition. Animals are a major source of food, particularly of high-quality protein, minerals, vitamins and micro-nutrients for the majority of African people. It is estimated that meat, milk and eggs provide about one-fifth of the protein in African diets. Animals also make indirect contributions to human nutrition and play a major role in improving food security in Africa because cash incomes obtained from the sale of animals are regularly used to buy non-livestock food items and inputs for farming (FAO, 2006).

Livestock also contribute to the stability of the incomes of farm households as they act as a cash buffer (small stock), a capital reserve (large animals) and as a hedge against inflation. The increase in weight of livestock over time and its reproductive capacity allow farmers gradually and continually to accumulate assets. Raising livestock is also often found to be more profitable than saving money in a bank (if at all available) as net annual returns from livestock are higher than interest rates (Slingerland, 2000).

In mixed farming systems, livestock reduce risks resulting from seasonal crop failures as they add to the diversification of production and income sources. Livestock play a critical role in the process of agricultural intensification through the provision of draught power and manure. While draught animal use is declining worldwide, this trend does not hold for SSA. Especially in areas where mixed crop-livestock farming is practised, increased use of animal traction can help intensification and contribute to higher output (Sansoucy *et al.,* 1995). Crop-livestock integration allows for efficient recycling of crop residues and by-products as animal feed and the use of animal manure as crop fertilizer. Livestock farming, especially in the case of dairying, also generates employment (Otte and Knips, 2005).

Apart from their important role for the poor in rural areas, livestock have become increasingly important to the livelihoods of the urban poor. The urban poor engage in livestock keeping as a response to limited alternative livelihood options and food insecurity though it is usually not their main occupation [Natural Resource Institute (NRI), 2002 cited in Otte and Knips, 2005: 4].

2.8 Constraints to Increased Livestock Production and Productivity

A variety of constraints impact negatively on livestock production and productivity and therefore stifled the sector's growth. These constraints can basically be classified into two categories: technical constraints; and policy and institutional constraints.

2.8.1 Technical constraints

Technical constraints in livestock production include feed supply, animal health and animal genetics.

Feed supply is a major constraint in livestock production. According to Rhule *et al.* (2008), the major constraint in pig production in Ghana is inadequacy of feeding arising from unpredictable availability and high cost of cereals. Smith and Olaloku (1998) asserted that seasonal quantitative and qualitative feed shortage is perhaps the major constraint to improved production and productivity of peri-urban dairy enterprises; and farmers usually cite it as a priority problem to be tackled by research. According to FAO (2006), feed supply constraint is more acutely felt in the drier regions, where the quantity of forage is often insufficient for the livestock, and where the availability of feed is subject to pronounced seasonal patterns. In wetter regions, the problem is more of a qualitative than of a quantitative nature; forages often being of poor quality, with low energy and protein contents. In both the drier

and wetter regions, the feed shortages and nutrient deficiencies are more acute in the dry season. However, not all agro-ecological zones are affected in the same manner.

Animal diseases continue to constrain livestock productivity and agricultural development. It has been estimated that in SSA animal diseases result in annual losses in excess of US$4 billion, which represent about one-fourth of the total value of animal production. The impact of animal diseases stems from direct losses due to mortality and its indirect effects through slow growth, low fertility and decreased work output that result from morbidity (FAO, 2006). According to the International Livestock Research Institute (ILRI) (2002), the diseases with the highest impact on smallholder livestock keepers in Sub-Saharan Africa are ecto and endo-parasites, respiratory complexes, newcastle disease, trypanosomosis, contagious bovine pleuro-pneumonia (CBPP), Rift Valley Fever (RVF), and tick-borne diseases such as heartwater and theileriosis.

Low genetic potential is also a serious constraint especially for milk production. However, the introduction and use of imported stock in breed substitution and crossbreeding programmes with the aim of achieving a more rapid increase in milk and meat productivity has not always yielded the expected results. In tropical countries, indigenous breeds are often more disease resistant, heat tolerant and have the ability to efficiently utilize poor quality feed. Therefore, genetic sources of resistance or tolerance to diseases and pests and adaptation to harsh climates need to be both preserved and combined with the capacity to generate higher meat and/or milk outputs (FAO, 2006).

2.8.2 Policy and institutional constraints

According to the World Bank (1981), government policies play a crucial role in livestock development. They not only affect the economic environment, but also directly affect production, marketing, consumption and external trade in livestock products. Policy issues that may constrain or promote the dairy industry performances include: foreign exchange, dairy import, and commodity price policies.

Over the past decades, National Agricultural Research Systems (NARS) have increasingly experienced budgetary constraints. The result of these budgetary constraints can be seen as NARS are not generating sufficient new technology to promote agricultural and livestock development, and links with extension services are limited. Budgetary and institutional constraints hamper the provision of effective extension services. Extension agencies have been, and still are, more responsive to government bureaucracies than to the needs of the farmers.

Government-operated veterinary services have shown their limitations in providing comprehensive animal health services needed for livestock development, mostly because of issues related to under-funding. This has led to weak implementation of programmes for disease surveillance and vaccine production, and control measures for epidemic diseases are inadequate. The weak implementation capacities of many government livestock services in Africa have been compounded by decentralisation of veterinary services in a number of countries without adequate provision for the co-ordination of the control of major infectious diseases (FAO, 2006).

Most livestock production is constrained by market access, both for inputs and outputs, being mainly restricted to local and informal markets. Access to the larger

national, regional and international markets is limited because of poor infrastructure and increasing technical requirements (FAO, 2006). In developing countries, most livestock produced by smallholder pastoralists and farmers are marketed by private entrepreneurs who, operating as a marketing chain, collect, regroup and distribute the livestock and livestock products to terminal markets (ILRI, 2003). Although the marketing chain is well known, the economic and institutional barriers to livestock marketing (transportation costs, quality standards, inadequate and uncoordinated livestock market information systems) limit livestock-sector development, with a consequent negative impact on the welfare of the large population of smallholder producers and others who depend on the sector for their livelihoods. Philip *et al.* (2009), reported that livestock marketing and processing constraints in Nigeria include poor packaging facilities for products in the value chains, lack of cold storage facilities in abattoirs at wholesale and retail markets, and absence of standards for meat and other livestock and poultry products. Smith and Olaloku (1998), admitted that inadequate infrastructure such as poor feeder roads, unreliable power supply, inefficient cooling and processing capacity can discourage production or result in economic losses. According to Shapiro *et al.* (1992), these factors that constitute formidable constraints to distribution and marketing, could discourage production because of the perishability of milk (in dairy market). The absence of functioning marketing facilities and conservation and processing infrastructure is a major constraint to livestock sector development.

In addition to the above, livestock departments are often limited by weak policy making, sector planning and implementation capacities, resulting from inadequate human resources, lack of accurate and detailed statistical information, and poor

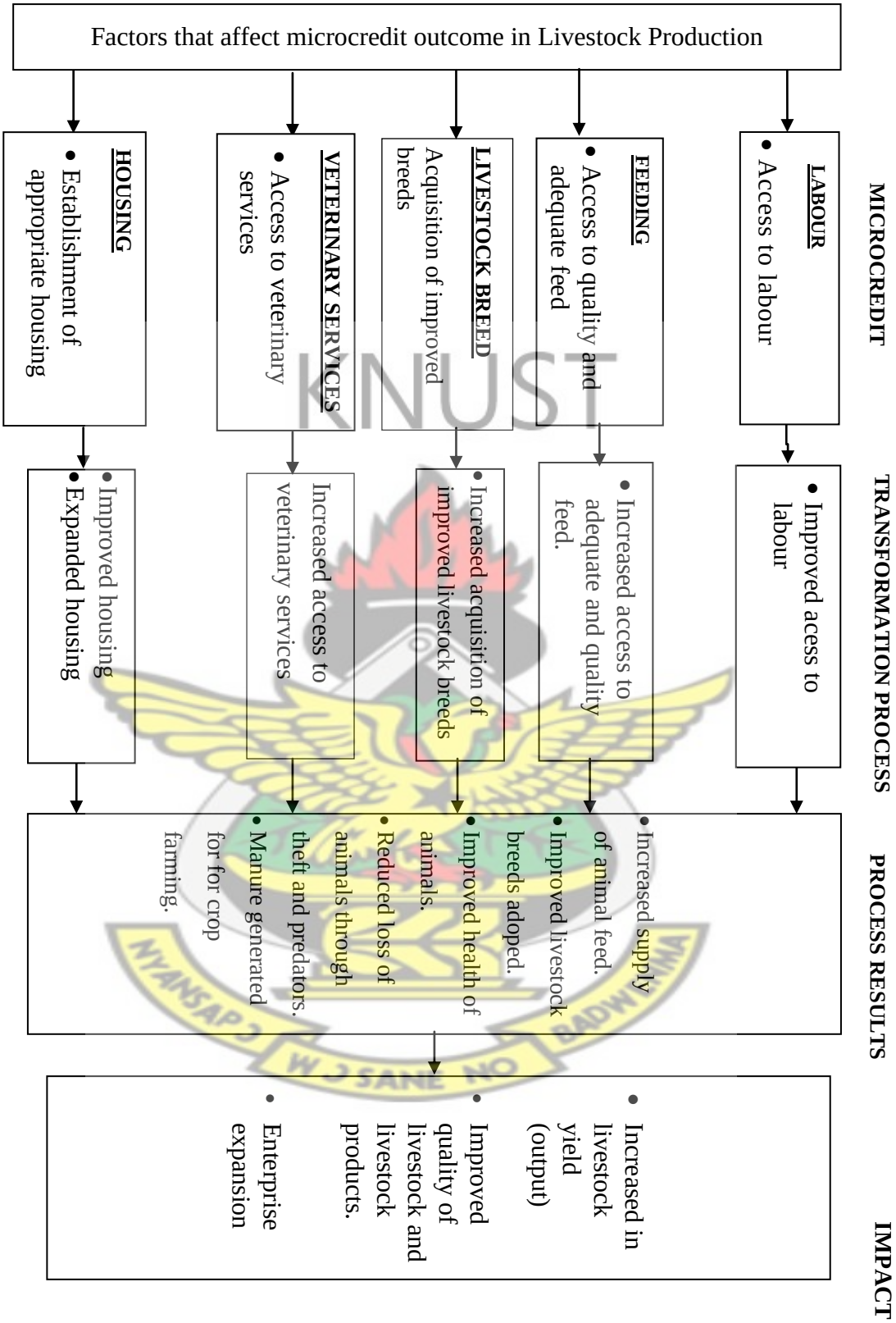
negotiating powers. Besides, although technological problems are relatively well understood, there is a lack of institutional capacity to apply appropriate solutions because institutional linkages between research institutions, extension services and veterinary services are extremely weak in many instances, resulting in poor design and delivery of programmes (FAO, 2006).

2.9 Conceptual Framework of Microcredit

A conceptual framework was applied to examine the evolving relationship and impact between microcredit and livestock production (See Figure 2.1). The conceptual framework explains factors that could influence microcredit outcome in livestock production. These factors include: feeding, veterinary services, labour, housing and the type of livestock breed. Access to microcredit could support smallholder livestock farmers to improve upon their delivery on these factors.

From Figure 2.1, microcredit could support smallholder farmers to increase their access to labour especially, hired labour to undertake activities such as supplying feed to animals, herding, cleaning of pen etc. It would also enable farmers to afford the cost of veterinary services especially when the animals are sick. Besides, microcredit support would allow smallholder farmers to supply their livestock adequate and quality feed which would ensure the growth and development of the livestock. Moreover, the credit would help farmers to purchase improved livestock breeds which relatively grow faster than the local breeds; and also improved upon the size and quality of housing. These would eventually lead to enterprise expansion, increased output and improve quality of livestock and livestock products in Wa Municipality.

Figure 2.1: Conceptual framework of Microcredit



Source: Author's Construct (2012).

CHAPTER THREE

PROFILE OF THE STUDY AREA AND RESEARCH METHODOLOGY

3.1 Introduction

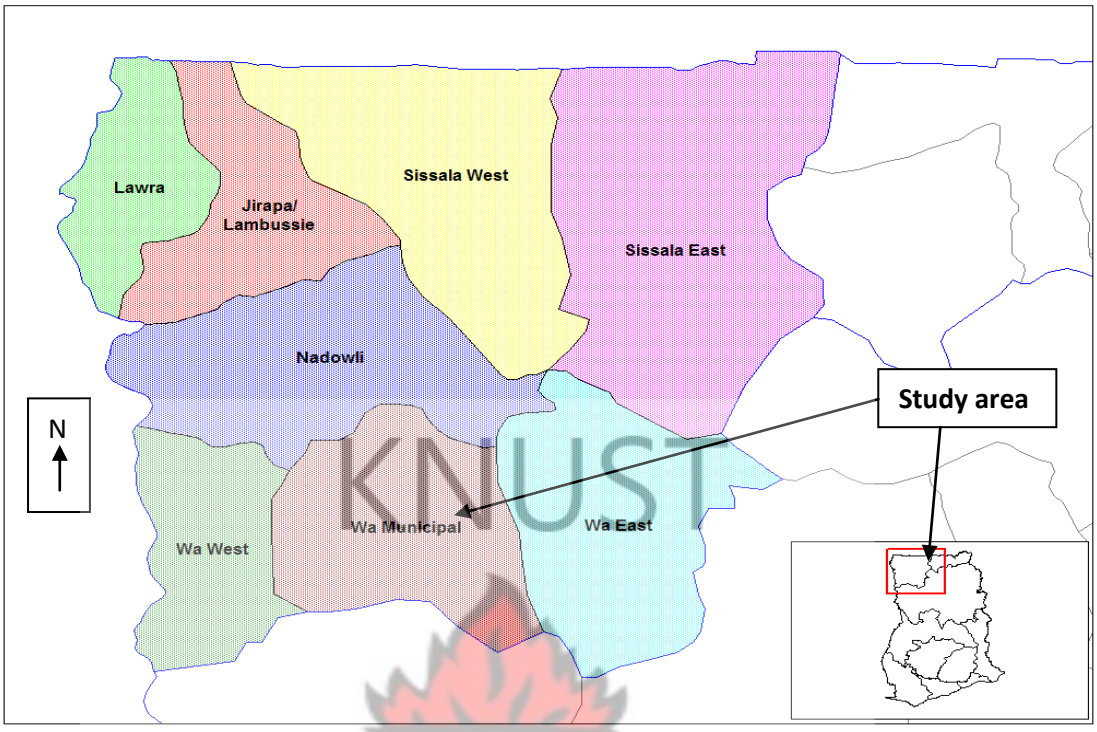
This chapter presents the profile of the study area and the research methodology which was used to conduct the research. The key issues discussed in this chapter include the physical and socio-economic characteristics of the study area, research design, sampling techniques, study variables, data collection, and techniques of data analysis and presentation.

3.2 Profile of the Study Area

3.2.1 Location and Size

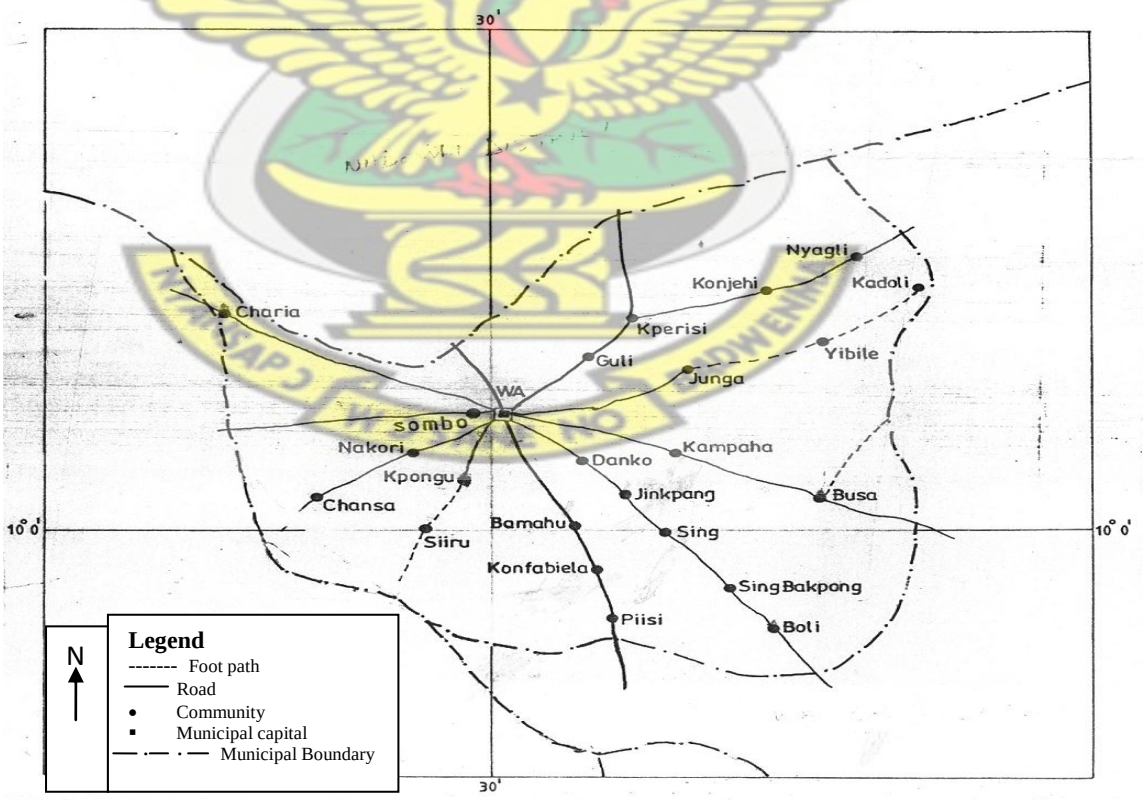
The Wa Municipality is one of the nine District/Municipal Assemblies in the Upper West Region of Ghana. The Municipality shares administrative boundaries with Nadowli District to the North; Wa East District to the East and South; and Wa West District to the West and South. It lies within latitudes $1^{o}40^{/}$ N to $2^{o}45^{/}$ N and longitudes $9^{o}32^{/}$ W to $10^{o}20^{/}$ W. The Municipality has a total land area of approximately 234.74 kilometres square, which represent about 6.4 percent of the total land area of the Upper West Region [Wa Municipal Assembly (WMA), 2010].

Figure 3.1: Study Area in Regional and National Context



Source: Rarelibra (2006)

Figure 3.2: Map of Wa Municipality



Source: Cajetan *et al.* (2006).

3.2.2 Population

According to Ghana Statistical Service (2012), the Wa Municipality has a total population of 107,214 which comprises of 49.4 percent males and 50.7 percent females. Considering the total population and the total land area of the Municipality, its population density is 457 persons per square kilometre.

3.2.3 Climate and Vegetation

The Wa Municipality is found in the dry equatorial continental climate. The area is characterized by long windy and hot dry season which is usually followed by a short and stormy wet season. The dry season usually spanned from November to April. The North-East Trade winds from the Sahara desert usually blow over the area between November and February. The hot season which usually occurs between March and April, records high temperatures between forty and forty-five degrees Celsius with high incidence of cerebral meningitis.

The wet season also last averagely between April and October annually, with an annual mean rainfall between 840 millimetres and 1400 millimetres which is sparsely and poorly distributed over the months. The rainfall pattern is generally erratic and marked by spells of long droughts and heavy downpours and floods which generally affect agricultural productivity.

The Municipality is also located in the interior wooded savannah vegetation which is characterised by predominantly short trees and shrubs. These vegetation and climate region are very conducive for livestock production due to the abundance of pasture and non-availability of tsetse flies which is a major constraint to cattle production in the forest regions in Ghana. (WMA, 2010).

3.2.4 Economic Structure

The economy of the Wa Municipality is dominated by agriculture followed by commerce and industry. Other key sectors of the economy are transport, tourism, communication and energy. Peoples' sources of income for livelihood depend on the economic activities they undertake, the diversity and technology used. Comparatively, the diversity of the economy of the Municipality is very limited and dominated by agriculture, which is equally not diversified.

Social overhead capital, which supplies services (power, transport, storage, communication, education) that are indispensable to modern industry are under developed. The under development of this capital base is a constraint or bottleneck to economic growth and development in the Municipality (WMA, 2010).

3.2.4.1 The Agricultural Sector

Wa Municipality is the commercial hub of the Upper West Region. This notwithstanding, agriculture is the main economic activity in the Municipality as it remains the single largest contributor to the local economy and employs about 70 percent of the active population.

The Wa Municipality is endowed with various species of livestock and poultry. Large and small ruminants (cattle, sheep and goats) and poultry (ducks, fowls, guinea fowls and turkeys) are reared not on commercial basis but as complementary to crop production in all communities. Pig production is also seriously undertaken among the non-Muslims. They are mainly kept on the free range system with its attendant losses such as theft, disease infections such as new castle, anthrax, pneumonia, etc. See Table 3.1 for the livestock population statistics.

The livestock industry contributes significantly to the food security of the Municipality and the entire region. It also serves the hospitality industry and southern market as some people are engaged in livestock trading as full-time employment (WMA, 2010).

Table 3.1: Livestock Population (2006 – 2009)

Livestock	2006	2007	2008	2009
Cattle	6,378	6,696	7,100	13,781
Goats	4,909	5,154	15,455	14,138
Sheep	3,146	3,303	9,568	12,552
Pigs	819	859	3,418	1,931
Poultry	362,998	400,204	-	-

Source: Municipal Agricultural Development Unit (n.d), cited in WMA (2010)

3.3 Research Methodology

3.3.1 Research Design

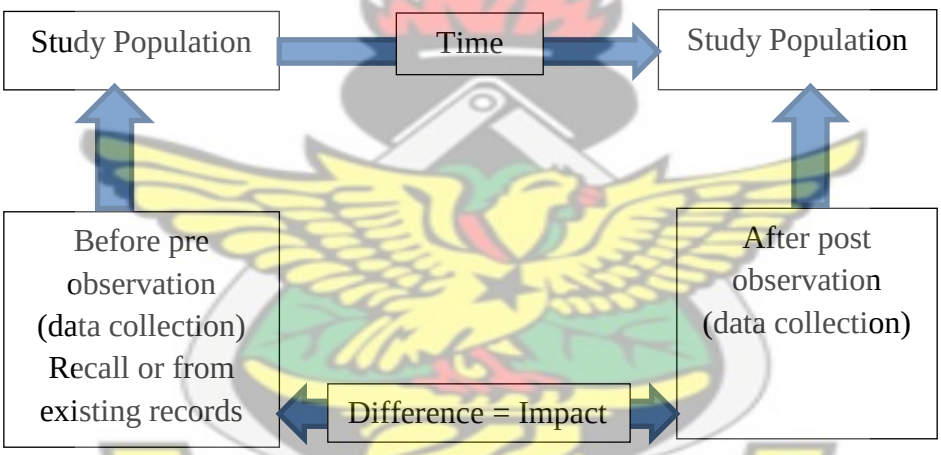
A research design is of extreme importance as improper design could lead to misleading results (Opoku, 2005). A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. It is the conceptual structure within which research is conducted; and constitutes the blueprint for the collection, measurement and analysis of data (Kothari, 2004: 31).

The after only research design was adopted for this study since no base-line studies was conducted. According to Kumar (1996:90), in an after-only design the researcher knows that a population is being, or has been exposed to an intervention and wishes to study its impact on the population. In this design, information on base-line (pre-test or before observation) is usually 'constructed' on the basis of respondents' recall of the situation before the intervention, or from information available in existing

records. The change in the dependent variable is measured by the difference between the 'before' (base-line) and 'after' observations (see Figure 3.3).

One of the major problems of this design is that some of the changes in the dependent variable may be attributable to the difference in the way the two sets of data were compiled. Another problem with this design is that it measures total change, including change attributable to extraneous variables; hence, it cannot identify the net effect of an intervention (Kumar, 1996). However, these problems were addressed by the use of multiple linear regression models.

Figure 3.3: 'After Only' Research Design



Source: Adapted from Kumar (1996)

However, this design is widely used in impact assessment studies. In real life, many programmes operate without the benefit of a planned evaluation of the programme at the planning stage, in which case it is just not possible to follow strictly the sequence – collection of base-line information, implementation of the programme, and then programme evaluation. An evaluator therefore has no choice but to use this design (Kumar, 1996).

According to Afrane (2002), the use of a control group in impact assessment requires surveying people who are not beneficiaries of the scheme and experiences from similar studies indicate that the cooperation of such people could not be guaranteed. In view of the foregoing limitations, the results of this study must therefore be interpreted within the context of the general strengths and weaknesses of the 'after-only' methodology.

3.3.2 Sampling

3.3.2.1 Sample Frame and Sample Size Determination

The complete list of all credit beneficiary smallholder livestock farmers of the Livestock Development Project was obtained from the office of the livestock sub-sector of MoFA in the Wa Municipality. This formed the sample frame for the study.

The statistical method was used to determine the sample size of the study at a significance level of 0.10. According to Ahuja (2001:187), an acceptable error level traditionally is up to ± 0.05 or ± 0.10 (i.e., 5 or 10 percentage point). The formula and the determination of the sample size are shown below:

$$n = \frac{N}{1+N(e)^2};$$

Where: n = sample size; N= sample frame; and e = error or significance level (Yamane, 1970 cited in Ahuja, 2001:186). In this study, N = 265 (i.e., total number of clients on the microcredit scheme) and e = 0.10 (i.e., significance level chosen).

Therefore, $n = \frac{265}{1+265(0.10)^2} = \frac{265}{3.65} = 72.6027 \approx 73$. Hence the sample size for the study was seventy-three (73) beneficiaries of the LDP.

3.3.2.2 Sampling Techniques

Both probability and non-probability sampling techniques were used to select units of inquiry for the study. Since the sample frame is not homogenous in terms of the type of credit received, stratified random sampling was used to classify the population into two homogenous strata – those who benefited from credit in cash and those who benefited from credit in kind. Samples were therefore drawn from each stratum proportionally – forty credit in cash beneficiaries representing 55 percent of the total sample (seventy-three) and thirty-three credit in kind beneficiaries representing 36 percent of the total sample.

Simple random sampling was used to select respondents from each stratum using the lottery method since the list of all beneficiaries was available. Beneficiaries who were selected but could not be found were replaced through the same process. The use of the stratified and simple random sampling ensured randomness, fair distribution, reliable and representativeness of the sample.

Purposive sampling was used to select the officer in-charge of the Livestock Development Project in the Wa Municipality. This is because she was directly involved in the implementation of the project and has adequate knowledge about the nature of its operation.

3.3.3 Study Variables

Kreuger and Neuman (2006) explained that a variable is a concept that varies. They stated that a variable may take on two or more values which are its attributes. Kothari (2004: 33) defined a variable as a concept which can take on different quantitative values. According to Babbie (2007), variables are the logical groupings of attributes.

This was re-echoed by Miller and Brewer (2003) as they conceived the idea that variables help in moving a research from a conceptual to an empirical level, employing the variables as key elements of the research problem. The variables employed for this study are outlined in the Table 3.2.

Table 3.2: Study Variables and Data Requirement

Variables	Data Requirement	Source of Data
Microcredit scheme	• Criteria for selecting beneficiaries • Credit disbursement • Credit repayment • Monitoring system • Challenges	Project Officer
Labour	• Source of labour • Cost of labour • Challenges	Project beneficiaries
Housing	• Availability of pen • Cost of pen • Challenges	Project beneficiaries
Veterinary services	• Source of veterinary service • Cost of veterinary service • Challenges	Project beneficiaries
Feeding	• Source of feed • Adequacy of feed • Cost of feeding • Challenges	Project beneficiaries
Livestock breeds	• Source of breeds • Types of breeds • Challenges	Project beneficiaries
Livestock population	• Type of livestock • Number of livestock	Project beneficiaries

Source: Author's Construct (2012)

3.3.4 Data Collection

3.3.4.1 Sources of Data

This study used both primary and secondary sources of data. According to Kothari (2004: 95), primary data refers to data which have been collected afresh and for the first time, and thus happen to be original in character. Secondary data on the other hand are those which have already been collected by someone else and have already been passed through the statistical process.

Primary data was collected from smallholder livestock farmers who received credit (both in cash and in kind) under the LDP in Wa Municipality. Secondary data sources include loan disbursement and recovery report, the project monitoring report, and published and unpublished works from journal articles, reports and working papers which were extensively reviewed.

3.3.4.2 Techniques of Data Collection

The instruments used for the collection of primary data are questionnaire and field observation. A questionnaire is a set open and/or closed questions a standardised format that participants complete by themselves. Occasionally, however, questionnaires can be completed by a researcher in the company of a participant (Carey, 2009: 124). As a method for data collection, the questionnaire is an efficient way to collect statistically quantifiable information (Twumasi, 2001: 54). In this research, the questionnaires were used to collect both quantitative and qualitative data from individual smallholder livestock farmers and the officers in charge of the LDP. The questionnaire consists of both open-ended and close-ended questions in order to allow respondents to express their views on certain issues. They were

administered to the farmers through personal interviews due to the fact that there is high level of illiteracy among farmers in the country in general.

Three Agriculture Extension Agents were recruited and trained as research assistants who help in the data collection due to time constraint on the part of the researcher. However, they were closely monitored by the researcher to ensure that they did the right thing. The data were collected between 1st April 2012 and 8th April 2012.

Field observation as a qualitative data collection tool was also used to complement the questionnaire. It was used for objective assessment of on-site situations such as livestock housing, livestock population, breeds and their physical conditions etc.

3.3.5 Techniques of Data Analysis and Presentation

Both qualitative and quantitative techniques were employed in the data analyses. Data obtained from the field were processed (edited, coded and tabulated or graphed) through the use of computer software programmes (Statistical Package for the Social Scientists version 16.0 and Microsoft Excel 2010).

Descriptive statistics such as mean, standard deviation and percentages were applied in the data analysis; and inferential statistics (multiple regression analysis with F-test) was used to test the research hypotheses. Presentation of data was done with the aid of tables and charts for easy comprehension.

3.3.6 Models Specification

To examine the impact of microcredit on smallholder livestock production, two multiple linear regression models which were estimated using the Ordinary Least Squares (OLS) method were used to complement the descriptive analyses. Multiple

linear regression is a statistical technique used to evaluate and establish a quantitative relationship between a dependent and independent (explanatory) variables. In this study, the two models were used to examine the relationship between livestock yield (output) and the inputs required before the LDP and after the LDP. Thus, the first model examined the relationship between livestock output and the required inputs before the project; and the second model examined the relationship between livestock output and the required inputs after the project.

The general form of the first model is given as follows:

$Y = f(LB, FD, VS, D)$……(1)

Where:

Y = Livestock population (proxy for livestock output), i.e., the dependent variable

LB = Hired labour

FD = Feeding

VS = Veterinary Services

D = Dummy for availability of pen: D= 1 available and D= 0 not available.

The population regression function stochastic version is as follows:

$Y = \beta_0 + \beta_1 LB + \beta_2 FD + \beta_3 VS + \beta_4 D + \varepsilon$……(1.1)

Where all variables are as previously defined except:

β_0 = Constant

β_1- β_4 = model parameters

ε = Error term

Using the OLS method to estimate the population parameters, the sample regression function becomes:

$Y = b_0 + b_1 LB + b_2 FD + b_3 VS + b_4 D + e$……(1.2)

Where:

b_0 = constant

b_1-b_4 = coefficients of the independent variables

e = error term

The second model in its general form is also given as:

Y = f(NL, D, LB, D1, FD, VS)…..……(2)

Where:

Y = Livestock population (proxy for livestock output), i.e., the dependent variable.

NL = Number of livestock bought/received at the beginning of the project.

D = Dummy for type of livestock breed: D= 1 for exotic breed and D= 0 for local breed.

LB = Hired labour

D1 = Dummy for availability of pen: D= 1 available and D= 0 not available.

FD = Feeding

VS = Veterinary Services

The population regression function, stochastic version is as follows:

$Y = \beta_0 + \beta_1 NL + \beta_2 D + \beta_3 LB + \beta_4 D1 + \beta_5 FD + \beta_6 VS + \varepsilon$……(2.1)

Where all variables are as previously defined except:

β_0 = Constant

β_1- β_6 = model parameters

ε = Error term

Using the OLS method to estimate the population parameters, the sample regression function becomes:

$Y = b_0 + b_1 FD + b_2 H + b_3 VS + b_4 LB + b_5 D + b_6 D1 + e$……(2.2)

Where:

b_0 = constant

b_1-b_4 = coefficients of the independent variables

e = error term

Feeding is a very important input in livestock production and is therefore expected to have a positive relationship with the dependent variable. Adequacy and quality of feeding determines the growth, weight and reproduction of livestock. Access to credit to acquire adequate and quality feed will increase the output of smallholder livestock farmers.

Housing for the livestock is also expected to have a positive relationship with livestock yield as lack of housing exposes the animals to risk such as theft and contraction of diseases from other animals.

Access to veterinary services which promotes the health of livestock through the treatment and prevention of the outbreak of diseases among livestock is expected to impact positively on the output of smallholder livestock farmers.

Labour is an important production factor in an enterprise and is therefore expected to have a positive impact on output. Labour in the livestock industry is usually required for serving livestock feed, cleaning of pen, and in some cases guiding the livestock during grazing. However, supply of labour for livestock production in the study area is mostly from the family. Therefore, it would therefore not be surprising if labour turnout to have a neutral effect on the output of smallholder livestock farmers in the study area.

Also, the type of livestock breeds is expected to determine the output of farmers as exotic livestock breeds often grow, mature and reproduce faster than the local breeds. Since farmers are mandated to raise exotic livestock breeds under the Livestock Development Project, this variable is expected to have a positive impact on the dependent variable.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 Introduction

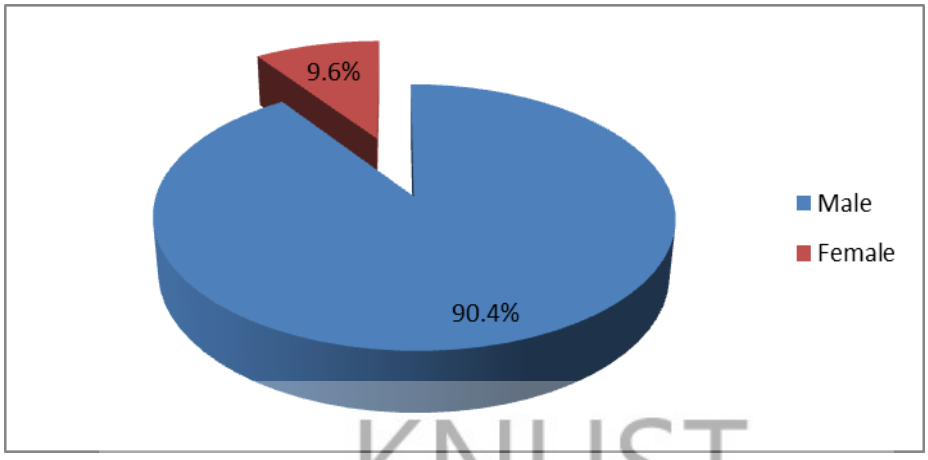
This chapter presents the analysis and discussion of the data collected from the field. It encompasses the background characteristics of respondents, the nature of operation of the credit component of the LDP, descriptive and inferential analysis of the impact of the microcredit on livestock production inputs such as labour, housing, feeding, veterinary services etc. before and after the LDP.

4.2 Background Characteristics of Respondents

4.2.1 Age and Gender Composition

Among a sample of seventy-three respondents who were randomly selected for the study, they were being dominated by males who constituted 90.4 percent and the females were only 9.6 percent as shown by Figure 4.1. However, this is as a result of the fact that female participation in the LDP was generally low as compared with their male counterparts. Out of a total of 265 beneficiaries of the project in the Wa Municipality, only 15 percent were females while 85 percent were males. This skewness in favour of males to a greater extent defeats the objective of poverty reduction because women constitute a greater proportion of the poor and vulnerable groups of people in society. Therefore, any effort towards poverty reduction should give women greater priority.

Figure 4.1: Gender Structure



Source: Field Survey, 2012.

Also, all respondents were above 24 years of age with majority fallen within four age cohorts which include 35-39, 45-49, 55-59 and 65+ which recorded 27.4 percent, 15.1 percent, 11 percent and 13.7 percent respectively. It is also obvious that majority of the respondents were within the active population which constitutes the labour force. This is a good indication for the livestock industry in terms of labour supply.

Table 4.1: Age Distribution of Respondents

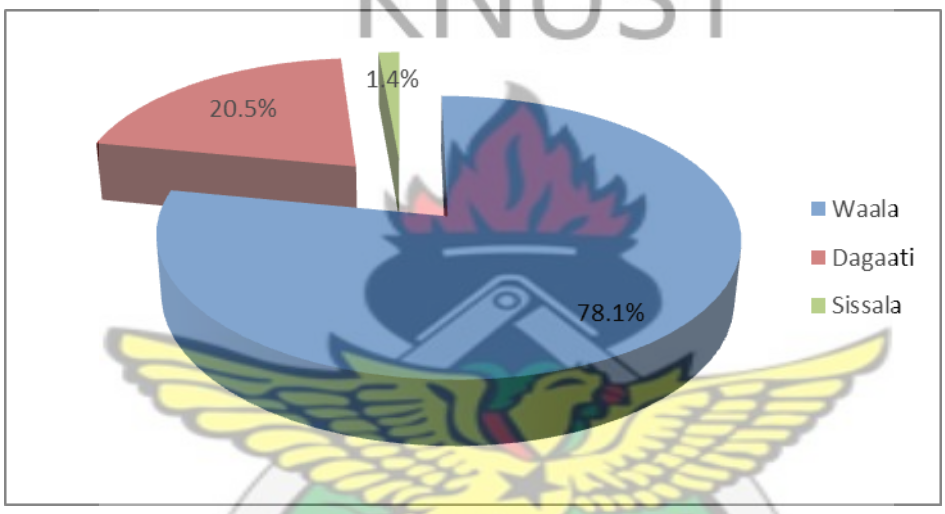
Age Cohort	Frequency	Percent
25-29	3	4.1
30-34	5	6.8
35-39	20	27.4
40-44	6	8.2
45-49	11	15.1
50-54	5	6.8
55-59	8	11.0
60-64	5	6.8
65+	10	13.7
Total	**73**	**100.0**

Source: Field Survey, 2012.

4.2.2 Ethnicity

In terms of ethnicity, three ethnic groups were identified among respondents which include Waala, Dagaati and Sissala. Waala was the dominant ethnic group among them with 78.1 percent and Dagaati was next with 20.5 percent. The Sissala only constituted 1.4 percent which is the least among them as illustrated in Figure 4.2. The Waala dominates in the Municipality because they are the indigenes.

Figure 4.2: Ethnicity

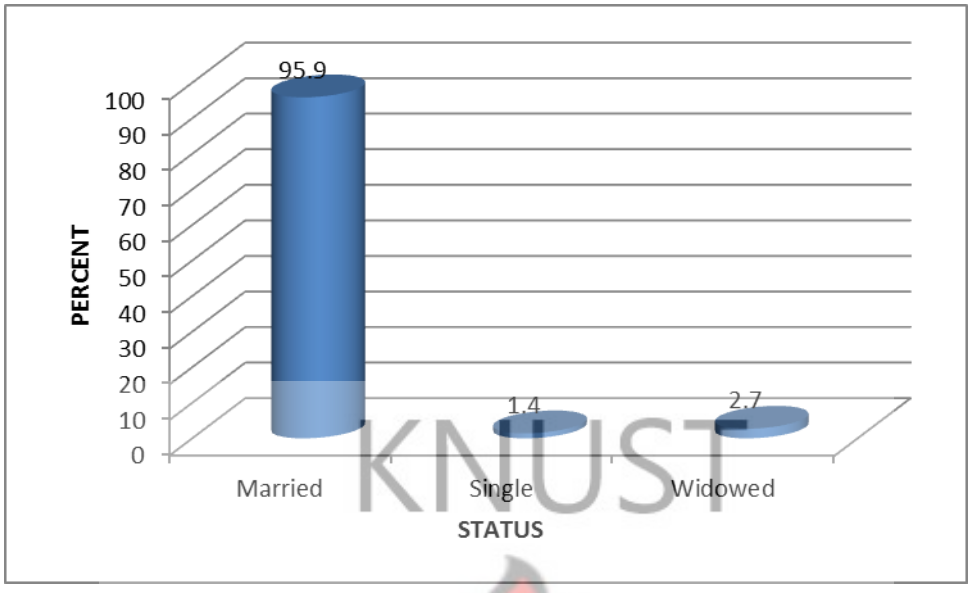


Source: Field Survey, 2012.

4.2.3 Marital Status

The majority of the respondents (95.9) were found to be married, while only 2.7 percent and 1.4 percent were widowed and single respectively as depicted by Figure 4.3. All those who were widowed were females. This can be attributed to the fact that most adult males in the Municipality can marry more than one wife because they are Muslims, hence hardly ever stayed as widowers. The females can marry one man at a time and are vulnerable to being a widow after the death of the husband.

Figure 4.3: Marital Status



Source: Field Survey, 2012.

4.2.4 Educational Level

Access to education is still one of the major problems in the Municipality. As much as 56.2 percent of the respondents did not go to school at all while 6.8 percent only ended at the primary school level. Respondents who obtained Middle school/J.H.S education constituted 11 percent and those who attained SHS/Technical school education constituted 8.2 percent. Whilst a small proportion (4.1 percent) of respondents had post-secondary/nursing education, a significant proportion of 13.7 percent were found to have tertiary education. However, majority of those with tertiary education were retired public servants.

Basic education is very necessary in the livestock industry as it would help farmers carry out certain activities effectively on their own such as mixing of concentrates, preparation of fodder banks or forages, deworming of animals among others.

Table 4.2: Educational Level of Respondents

Educational Level	Frequency	Percent
No Schooling	41	56.2
Primary	5	6.8
Middle School/J.H.S	8	11.0
S.H.S/Technical School	6	8.2
Post-Secondary/Nursing	3	4.1
Tertiary	10	13.7
Total	**73**	**100.0**

Source: Field Survey, 2012.

4.2.5 Occupational Distribution

The major occupations of the respondents include farming, trading, public service, artisanry, food proceeding and formal private sector employment. Among these, farming was the dominant as 68.5 percent of respondents were engaged in it while 5.5 percent and 2.7 percent were engaged in public service and formal private sector employment respectively. Those engaged in trading, artisanry and food processing were 9.6 percent, 5.5 percent and 1.4 percent respectively. Also, 6.8 percent of the respondents were pensioners. However, all those engaged in the above economic activities as their major occupations except farming, also undertook farming as a secondary economic activity.

Table 4.3: Major Occupation of Respondents

Occupation	Frequency	Percent
Farming	50	68.5
Public Servant	4	5.5
Trading	7	9.6
Artisan	4	5.5
Food Processing	1	1.4
Formal Private Sector Worker	2	2.7
Pensioner	5	6.8
Total	**73**	**100.0**

Source: Field Survey, 2012.

4.2.6 Religious Affiliation

Respondents were found to belonged to the two main religions in Ghana, namely Christianity and Islam. The majority of respondents were found to practice Islam as they constituted 80.8 percent while 19.2 percent practice Christianity.

Figure 4.4: Religious Affiliation of Respondents

Source: Field Survey, 2012.

4.2.7 Household Size

The field data revealed that a large proportion of respondents which represents 49.3 percent have household size of 5-9 persons followed by 26 percent of respondents

who have household size of 10-14 persons. Also, small proportions of respondents representing 6.8 percent, 8.2 percent and 9.6 percent have household sizes of 1-4, 15-19 and 20+ persons respectively as presented in Table 4.5. These large family sizes serve as source of labour for livestock production and other economic activities.

Table 4.4: Household Size

Size	Frequency	Percent
1-4	5	6.8
5-9	36	49.3
10-14	19	26.0
15-19	6	8.2
20+	7	9.6
Total	**73**	**100.0**

Source: Field Survey, 2012.

4.3 Nature of Operations of the LDP

4.3.1 Brief History of the LDP

The implementation of the LDP in the Wa Municipality started in 2002 with the credit in cash component which saw the advancement of loans to groups of smallholder farmers to undertake livestock production, specifically small ruminants. The disbursement of the loans to farmers started in 2005 through the Agricultural Development Bank.

In 2010, as part of the project plans, the project shifted from credit in cash to credit in kind. With the credit in kind, sheep were distributed among the beneficiary smallholder livestock farmers instead of given them cash to buy the animals.

4.3.2 Criteria for the Selection of Beneficiary Farmers

The selection of the project beneficiaries was based on a certain criteria which consist of the following:

i. The interest of the farmer in livestock production which should be expressed through tendering an application which should be done in a group;

ii. Possession of a pen by the farmer to house the animals;

iii. The ability of the farmer to feed the animals adequately;

iv. The ability of the farmer to provide health care to the animals (veterinary services); and

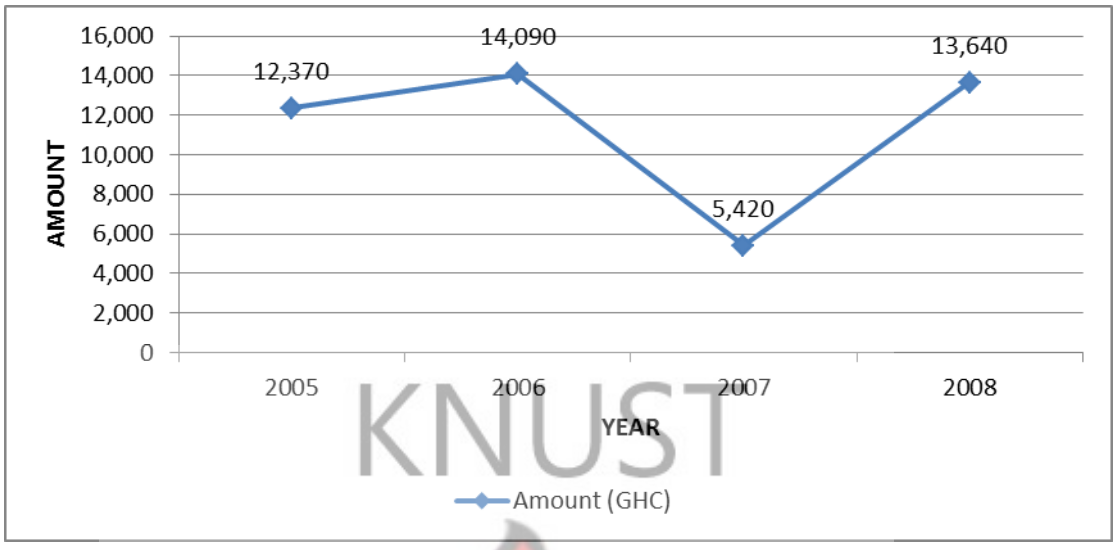
v. The ability of the farmer to repay the loan.

4.3.3 Credit Disbursement and Recovery

A total amount of GH¢45,520.00 was disbursed between 2005 and 2008 to 145 farmers under the LDP. The beneficiaries were given only one year grace period to repay the loans at an interest rate of 15 percent per annum which is lower as compared with commercial banks whose interest rates, according to Bank of Ghana (2007, cited in SRID, 2011) for the agricultural sector from 2005 to 2010 ranged from 26 percent to 32.8 percent per annum. A one year grace period seems not to be adequate enough for the livestock to multiply in numbers to enable the beneficiary smallholder livestock farmers to repay the loans.

The farmers were made to form groups with membership ranging from five to fifteen. The groups were used as social collateral for the loans because if a group member default in repayment, the rest of the group members would be held responsible for the repayment. This is a major characteristic of many microcredit schemes. The trend of the loan disbursement is being depicted by Figure 4.5.

Figure 4.5: Trend of Loan Disbursement (2005 – 2008)



Source: Agricultural Development Bank (2008)

From the figure above, the disbursement fluctuated over the period (2005-2008) with the highest disbursement being in 2006 with an amount of GH¢14,090.00 representing 31 percent of the total disbursement whilst the lowest disbursement occurred in 2007 with an amount of GH¢5,420.00 representing 12 percent. Also, in 2008 an amount of GH¢13,640.00 was disbursed and in 2005 GH¢12,370.00 was disbursed. These represent 30 percent and 27 percent of the total disbursement respectively.

The amount received by each group varied because it depends on the amount the group applied for. However, farmers within the same group received the same amount. The average amount of credit received by each farmer was GH¢313.93.

In 2010, the second phase of the project shifted from credit in cash to credit in kind which saw the distribution of sheep of improved breeds to smallholder livestock farmers. Under this phase of the project, a total of 1,191 sheep was distributed to 120 farmers between 2010 and 2011 which were to be repaid after a grace period of two

years, unlike their credit in cash counterparts who were given only one year. In addition, the credit in kind beneficiaries would not pay any interest because they would repay with the number of animals they were given. These show unfair treatments to the credit in cash beneficiaries. Each farmer received ten sheep and was expected to repay with ten sheep after the grace period (two years). Unlike the credit in cash which was disbursed to the smallholder livestock farmers in groups, the credit in kind was given on individual basis.

Recovery for the credit in kind had not yet started at the time of the data collection because the grace period was yet to elapse in June 2012. With regards to the credit in cash, the recovery was generally poor. Out of a total amount of GH¢52,348.00 expected from the recovery, only GH¢24,180.00 which represent 46.2 percent was recovered whilst an amount of GH¢28,168.00 representing 53.8 percent remained outstanding. Some respondents attributed their inability to repay the credit to high mortality among the livestock. According to the Municipal animal production officer, this high default rate was the main challenge which faced the project implementation. However, this high rate of default was not surprising because it has been a major trait of government credit schemes in Ghana over the years. For instance, Steel and Andah (2008) reported that among four other programmes being administered by NBSSI, none of them was able to achieve a 70 percent recovery rate. Quite recently, Shalom Radio (2010) also reported that officials of MASLOC were seeking the assistance of Ghana's Anti-graft Agency and the Serious Fraud Office (now Economic and Organized Crime Office) to help them recover more than GH¢80 million owed it by defaulting beneficiaries.

However, from the field survey, it appeared no conscious effort has been made by MoFA to recover the money because many respondents indicated that they were not contacted by the project officials to repay.

4.3.4 Monitoring System

According to the Wa Municipal Animal Production officer who is in-charge of the LDP, the project had a monitoring team within the Municipality that undertook monthly monitoring of the project. However, it appeared the monitoring covered only the credit in kind beneficiaries. This is because during an interaction with some of the Agriculture Extension Agents (AEAs) in the Municipality, they indicated that they were part of the monitoring team. But they also admitted that they did not even know those farmers who received the credit in cash. This was further confirmed by the monitoring report which covered only the credit in kind beneficiaries. The non-monitoring of the credit in cash beneficiaries is probably one of the contributory factors to the high rate of default among the credit in cash beneficiaries.

4.4 Credit Utilization

The credit in cash beneficiaries of the LDP were required to use the loans to purchase any livestock specie of their choice for rearing. Livestock species that were purchased by beneficiaries include goats, sheep and pigs. The majority of the respondents (74 percent) were engaged in sheep production, followed by 15.1 percent who were engaged in goat production whilst only 11 percent engaged in pig production.

Table 4.5: Type of Animals Bought/Received

Type	Frequency	Percent
Goats	11	15.1
Sheep	54	74.0
Pigs	8	11.0
Total	**73**	**100.0**

Source: Field Survey, 2012.

Among the credit in cash beneficiaries, 40 percent of them used their credit to buy three to four animals, 35 percent bought five to six animals, while 12.5 percent and 2.5 percent bought one to two and nine to ten animals respectively (see Table 4.6). Comparing them with the credit in kind beneficiaries, one could say that the credit in kind beneficiaries were better off than the credit in cash beneficiaries in terms of the number of animals received or bought since all the credit in kind beneficiaries received ten animals each. However, it was revealed that 47.5 percent of the credit in cash beneficiaries diverted the credit either in part or in full while only 52.5 percent claimed they used all the credit to buy the animals. Activities on which the diverted credit was spent on include crop farming, purchasing of drugs and/or payment for animals' vaccination, rehabilitation of an old pen or construction of a new pen, payment of children school fees and resolution of other family problems. This created their inability to buy many animals but rather have to buy just a few.

Table 4.6: Number of Animals Bought

Number	Frequency	Percent
1-2	5	12.5
3-4	16	40.0
5-6	14	35.0
7-8	4	10.0
9-10	1	2.5
Total	**40**	**100.0**

Source: Field Survey, 2012.

With regards to the type of livestock breeds, all respondents who received credit in cash representing 55 percent admitted that they bought local/indigenous breeds while those who received credit in kind (45 percent) were given improved breed. The non-patronage of improved livestock breed by credit in cash beneficiaries was in contradiction with the project aim of promoting the adoption of improved livestock breeds among smallholder livestock farmers.

4.5 Descriptive Analysis of the LDP Impact on Livestock Production

4.5.1 Livestock Population

The LDP aimed at increasing the supply of meat and dairy products which cannot be achieved without increase in the livestock population. Assessment of the livestock population using the before and after approach, shows that there has not been significant increase in livestock numbers of the project beneficiaries. Before the project, 16.4 percent of respondents did not have any animal, but this has been reduced to 5.5 percent currently and those who had 1-5 animals before the project also reduced from 35.6 percent to 12.3 percent. The number of respondents who had 6-10 animals before the project remains unchanged after the project; and those who had 11-15 animals increased by 11percent after the project. Also, the number of respondents who had higher livestock numbers before the project increased modestly as those who had 16-20 animals, 21-25 animals and 30+ animals increased by 6.8 percent, 8.2 percent and 6.8 percent respectively. However, those who had 26-30 animals increased slightly by 1.3 percent as shown in Table 4.7.

Table 4.7: Livestock Ownership of Respondents before and after the Project

No. of Animals	Before		After		
	Frequency	**Percent**	**Frequency**	**Percent**	**% Change**
None	12	16.4	4	5.5	-10.9
1-5	26	35.6	9	12.3	-23.3
6-10	14	19.2	14	19.2	0.0
11-15	10	13.7	18	24.7	11.0
16-20	4	5.5	9	12.3	6.8
21-25	6	8.2	12	16.4	8.2
26-30	1	1.4	2	2.7	1.3
Above 30	-	-	5	6.8	6.8
Total	**73**	**100.0**	**73**	**100.0**	

Source: Field Survey, 2012.

The slight increase in the general population of the livestock was attributed by respondents largely to high mortality rate and other factors such as theft. From the field and the project monitoring report (for credit in kind), the mortality was caused by diseases such as worm infestation, heartwater, diarrhoea, pneumonia and Pest des Petits Ruminants (PPR). According to ILRI (2002), the diseases with the highest impact on smallholder livestock keepers in Sub-Saharan Africa are ecto and endo-parasites, respiratory complexes, newcastle disease, trypanosomosis, Contagious Bovine Pleuro-Pneumonia (CBPP), Rift Valley Fever (RVF), and tick-borne diseases such as heartwater and theileriosis. Other causes cited by respondents and the monitoring report include stress, dystocia, eating of polythene, accident, food poisoning and miscarriage. Among these other causes of mortality, all respondents who benefited from the credit in kind (representing 45 percent) cited dystocia as the major cause which seems to be a peculiar trait of that kind of livestock breed. Theft was also cited by 37 percent of respondents who lost at most ten animals each through it. However, some of the farmers also consumed some of the animals either

by using them to perform a ceremony and/or rite or by selling them. From the field, 32.5 percent of the respondents sold at most fifteen animals each whilst 25.5 percent also used at most four animals each to perform a ceremony and/or rite.

4.5.2 Labour

Labour is a very important factor of production in every enterprise and livestock production is not an exception. The before and after analysis of the sources of labour for production by smallholder livestock farmers are presented in Table 4.8. Before the project, the main source of labour for smallholder livestock farmers was their owned labour and their families as indicated by 74 percent of respondent which increased slightly to 78.1 percent after the project. Before the project, 11 percent of respondents were using their owned labour only, 1.4 percent was using hired labour only, and 5.5 percent was using both family and hired labour. But after the project, 9.6 percent was using their owned labour only, 1.4 percent was still using hired labour only and 2.7 percent was using both family and hired labour. These show marginal reductions because farmers were gradually shifting from these sources in favour of using their owned and family labour. Also, 8.2 percent of respondents did not source labour at all before and after the project because they had no livestock.

Table 4.8: Sources of Labour before and after the Project

	Before		After	
Number of Animals	**Frequency**	**Percent**	**Frequency**	**Percent**
Owned Labour only	8	11.0	7	9.6
Hired labour only	1	1.4	1	1.4
Family and hired labour	4	5.5	2	2.7
Owned and family labour	54	74.0	57	78.1
Not applicable	6	8.2	6	8.2
Total	**73**	**100.0**	**73**	**100.0**

Source: Field Survey, 2012.

Respondents who used hired labour cost between GH¢20.00 and GH¢60.00 per month. The low patronage of hired labour does not come as a surprise because agriculture in general is often undertaken for subsistence and largely depended on the family as the main source of labour. In describing a popular system of management of smallholder commercial livestock production system, Smith and Olaloku (1998) stated that labour was required mainly for feed procurement and distribution, as well as animal house sanitation, and was provided by family members.

4.5.3 Livestock Housing (Pen)

Availability of pen was one of the criteria for selecting the project beneficiaries. However, field data indicates that before the project, 17.8 percent of respondents did not have pens while majority of respondents (82.2 percent) had pens as indicated by Table 4.9. This means that the above criterion was not fully complied with.

Table 4.9: Existence of Pen before Receipt of Credit

	Frequency	Percent
Yes	60	82.2
No	13	17.8
Total	**73**	**100.0**

Source: Field Survey, 2012.

Among those who had animals before the project, majority of them (72 percent) used to confine them partially (i.e. they open them to go out during the whole day and return to the pen in the evening), 16.2 percent confined them completely (i.e. they housed them for 24 hours) and 11.8 percent do not confine them at all (i.e. they allow them to roam for 24 hours on their own). However, after the project, the partial confinement reduced very marginally from 72 percent to 71.4 percent; "free range" reduced from 11.8 percent to 2.9 percent; whilst complete confinement increased significantly from 16.2 percent to 25.7 percent. The significant reduction in the

practice of the "free range" system which is associated with losses and the marginal reduction in the practice of partial confinement, which all translated into significant increase in the practice of complete confinement, indicate a positive impact of the project on livestock confinement among the sampled smallholder livestock farmers under the LDP.

Table 4.10: Mode of Confinement before and after the Project

	Before		After	
Confinement Mode	**Frequency**	**Percent**	**Frequency**	**Percent**
Complete confinement	11	16.2	18	25.7
Partial confinement	49	72.0	50	71.4
No confinement/free range	8	11.8	2	2.9
Total	**68**	**100.0**	**70**	**100.0**

Source: Field Survey, 2012.

After the implementation of the project took off, 61.6 percent of respondents undertook rehabilitation of their pens in order to put them in good condition whilst 15.1 percent built new pens because they did not have pens before the project started. In terms of pen rehabilitation, 26.7 percent of respondents spent GH¢50.00 - GH¢99.99 on the rehabilitation, followed by 20 percent who also spent GH¢100.00 - GH¢149.99. Those who spent below GH¢50.00 constituted 15.6 percent while those who spent quite higher amounts (GH¢300.00 - GH¢349.99 and GH¢400.00+) only constituted 1.4 percent each. Also, 17.8 percent and 11.1 percent spent GH¢150.00 - GH¢199.99 and GH¢200.00 - GH¢249.99 respectively (refer to Table 4.11). For those who put up new pens, they spent GH¢50.00 - GH¢500.00 depending on the size and the kind of construction materials used.

These rehabilitations and putting up of new pens might not have happened had the project not been implemented. This is because having a pen was even a pre-condition

for selecting the project beneficiaries. Therefore, it was incumbent on those who did not have pens to put up new ones and those whose pens were not in good condition to rehabilitate them. This is why some of the project beneficiaries who received credit in cash used part of the money to construct or rehabilitate their pens.

Table 4.11: Cost of Pen Rehabilitation

Cost	Frequency	Percent
Less than GH¢50.00	7	15.6
GH¢50.00 - GH¢99.99	12	26.7
GH¢100.00 - GH¢149.99	9	20.0
GH¢150.00 - GH¢199.99	8	17.8
GH¢200.00 - GH¢249.99	5	11.1
GH¢300.00 - GH¢349.99	2	4.4
GH¢400.00 and above	2	4.4
Total	**45**	**100.0**

Source: Field Survey, 2012.

4.5.4 Feeding

Feeding is a very important input in livestock production because the animals cannot survive without feed. As a result, before the project, 80.8 percent of respondents used to supply their animals with feed, which increased to 97.3 percent after the project. Also, 19.2 percent of respondents used not to feed their animals before the project because they were either practicing the 'free range' system or they did not have animals. But after the project, this reduced significantly to only 2.7 percent.

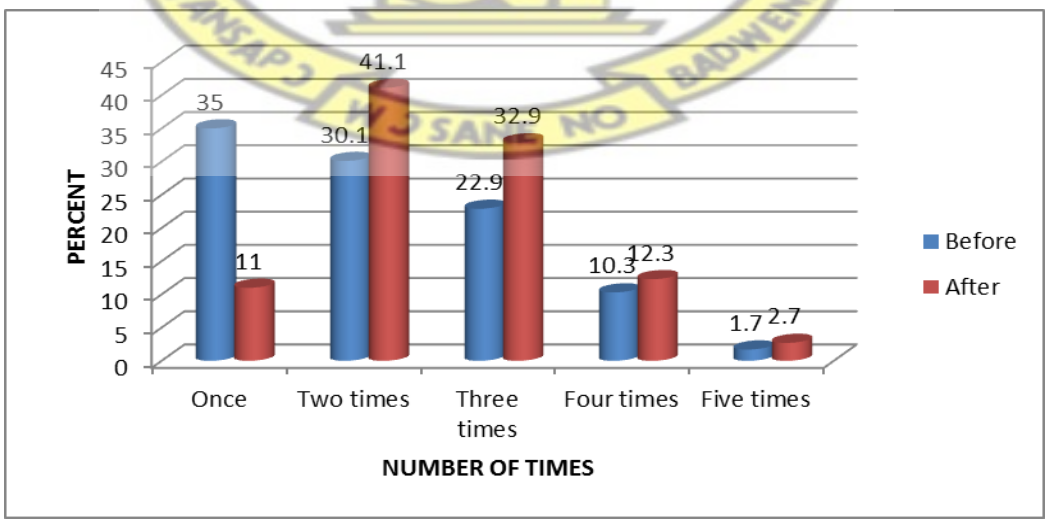
Table 4.12: Livestock Feeding before and after the Project

Response	Before		After	
	Frequency	**Percent**	**Frequency**	**Percent**
Yes	59	80.8	71	97.3
No	14	19.2	2	2.7
Total	**73**	**100.0**	**73**	**100.0**

Source: Field Survey, 2012.

The farmers usually get this feed through various sources including kitchen waste, leaves from the bush, farm produce and purchasing as Smith and Olaloku (1998) stated that 'producers fed their animals with a variety of feeds, some of which were purchased'. These sources remained unchanged before and after the project. Feeding was usually done by farmers who practiced complete or partial confinement. For those who practiced partial confinement, it was usually done as a supplement to what the animals themselves are able to get and feed on during the day. Therefore, in most cases the animals are fed only in the evening. Before the project, 35 percent of respondents used to feed their animals once a day, but this reduced to only 11 percent after the project. Also, before the project, 30.1 percent and 22.9 percent of respondents used to feed the animals two and three times per day respectively. However, these increased significantly to 41.1 percent and 32.9 percent respectively after the project. Again, a small proportion of the respondents representing 10.3 percent and 1.7 percent who used to feed their animals four and five times a day respectively before the project, increased marginally to 11 percent and 2.7 percent respectively as shown by Figure 4.6.

Figure 4.6: Number of Times Animals are Fed per Day



Source: Field Survey, 2012.

Over the period, there was a slight increase in expenditure on livestock feeding among the project beneficiaries who have been purchasing feed. First, there was a reduction in the number of farmers who used not to buy feed from 43.8 percent before the project to 24.7 percent after the project. The general trend was that the number of farmers who used to spend less on feeding per month before the project reduced after the project while those who used to spend more on feeding per month increased. While 6.8 percent and 13.7 percent of respondents used to spend less than GH¢10.00 and GH¢10.00-GH¢19.99 respectively on feeding per month before the project, after the project the number of farmers reduced to 4.1 percent and 9.6 percent respectively. Also, while only 4.1 percent, 9.6 percent and 1.4 percent of respondents used to spend GH¢40.00-GH¢49.99, GH¢50.00-GH¢59.99 and GH¢70.00+ respectively on feeding before the project, these increased to 13.7 percent, 12.3 percent and 12.3 percent respectively after the project (see Table 4.13).

Generally, the expenditure on feeding was usually incurred during the dry season when there is no pasture for the animals to graze except those farmers who were practicing complete confinement. Hence, feeding of animals during the dry season has been on supplementary basis. Besides, smallholder livestock farmers were raising these animals for subsistence purpose and therefore would not invest much on feeding as portrayed by the general expenditure on feeding. In describing a subsistent production system, Smith and Olaloku (1998) asserted that "little or no investment is made into the feeding or health care of the animals. The animals scavenge for a large part of their required feed, but are supplemented with household kitchen wastes, as and when available".

Table 4.13: Cost of Feeding per Month before and after the Project

Amount	Before		After	
	Frequency	Percent	Frequency	Percent
None	32	43.8	18	24.7
Less than GH¢10.00	10	6.8	3	4.1
GH¢10.00 - GH¢19.99	5	13.7	7	9.6
GH¢20.00 - GH¢29.99	7	9.6	9	12.3
GH¢30.00 - GH¢39.99	7	9.6	6	8.2
GH¢40.00 - GH¢49.99	3	4.1	10	13.7
GH¢50.00 - GH¢59.99	7	9.6	9	12.3
GH¢60.00 - GH¢69.99	1	1.4	2	2.7
GH¢70.00 and above	1	1.4	9	12.3
Total	**73**	**100.0**	**73**	**100.0**

Source: Field Survey, 2012.

4.5.5 Veterinary Services

One of the factors that determine the health of livestock is access to veterinary services. Before the project, 79.5 percent of respondents used to vaccinate their animals, this increased to 97.3 percent after the project; while 9.6 percent who used not to vaccinate their animals before the project reduced to only 2.7 percent after the project. Generally, the number of respondents who were accessing veterinary services increased from 89.2 percent before the project to 97.3 percent after the project. However, this issue of accessing veterinary services was not applicable to 11 percent of respondents before the project because they did not have animals.

Table 4.14: Vaccination of Livestock before and after the Project

Response	Before		After	
	Frequency	**Percent**	**Frequency**	**Percent**
Yes	58	79.5	71	97.3
No	7	9.6	2	2.7
Not applicable	8	11.0	-	-
Total	**73**	**100.0**	**73**	**100.0**

Source: Field Survey, 2012.

In terms of the type or source of veterinary services accessed by farmers, before the project, 39.7 percent of respondents used to access government or public veterinary services only; while 17.8 percent used to access only private veterinary services. Also, 20.5 percent of respondents used to access both public and private veterinary services. Besides, 2.7 percent of respondents used not to access any kind of veterinary services though they had animals; and this issue was not applicable to 19.2 percent of respondents because they had no animals before the project. On the other hand, after the project, 49.3 percent and 24.7 percent of respondents were accessing public and private veterinary services respectively which show slight improvement over those before the project. Also, the number of respondents who were accessing both public and private veterinary services increased marginally from 20.5 percent to 21.9 percent; while those who did not access veterinary services at all also increased marginally from 2.7 percent to 4.1 percent after the project.

Table 4.15: Sources of Veterinary Services Accessed by Smallholder Farmers

	Before		After	
Source of Service	**Frequency**	**Percent**	**Frequency**	**Percent**
Public veterinary services only	29	39.7	36	49.3
Private veterinary services only	13	17.8	18	24.7
Public & private veterinary	15	20.5	16	21.9
None	2	2.7	3	4.1
Not applicable	14	19.2	-	-
Total	**73**	**100.0**	**73**	**100.0**

Source: Field Survey, 2012.

According to respondents, the cost of vaccination per animal ranged from GH¢0.20 to GH¢1.00 for public veterinary services whilst that of private veterinary services ranges from GH¢1.50 to GH¢3.00 depending on the kind of disease. For example, if an animal is vaccinated and dewormed by MoFA veterinary officers, they charge GH¢1.00; but if it is only vaccination they charged either GH¢0.20 or GH¢0.50 depending on the disease. The public veterinary services were lower in terms of cost than the private veterinary services because it is subsidised by government. However, farmers sometimes resort to private veterinary services because of limited number of government veterinary officers in the Wa Municipality.

The total cost of vaccination which depends on the number of animals involved and the amount charged per animal ranges from less than GH¢10.00 to GH¢39.99. Before the project, 45.2 percent of respondents used to vaccinate their animals at a total cost of less than GH¢10.00. But the number of respondents reduced slightly to 37.2 percent after the project. Also, before the project, 20.6 percent, 6.9 percent and 4.1 percent of respondents used to vaccinate their animals at a total cost of GH¢10.00-GH¢19.99, GH¢20.00-GH¢29.00 and GH¢30.00-GH¢39.99 respectively. After the project, the number of respondents increased slightly to 24.7 percent, 15.1

percent and 18.2 percent respectively. Besides, the number of respondents who used not to vaccinate their animals at all reduced significantly from 23.3 percent before the project to 4.1 percent after the project as depicted by Table 4.16. It is therefore evident from the above analysis that the LDP made a slight positive impact on livestock vaccination among smallholder livestock farmers in the Wa Municipality.

Table 4.16: Total Cost of Livestock Vaccination before and after the Project

	Before		After	
Cost of Vaccination	**Frequency**	**Percent**	**Frequency**	**Percent**
Less than GH¢10.00	33	45.2	27	37.2
GH¢10.00 - GH¢19.99	15	20.6	18	24.7
GH¢20.00 - GH¢29.99	5	6.9	11	15.1
GH¢30.00 - GH¢39.99	3	4.1	14	18.2
None	17	23.3	3	4.1
Total	**73**	**100.0**	**73**	**100.0**

Source: Field Survey, 2012.

4.6 Challenges and Constraints Confronting Smallholder Livestock Farmers

During interactions with smallholder livestock farmers in the field, they outlined several challenges and constraints confronting them in the areas of housing, feeding, and access to veterinary services.

In terms of housing, many respondents explained that their pens were not in good condition because they leaks whenever it rains, which affects the health of the animals. Most of these pens were built with local materials. Some respondents also indicated that their pens were too small and therefore the animals were usually crowded which could also affect the health of the animals because there would not be enough ventilation. Other respondents said their pens collapsed during the rainy

season. All respondents expressed their desire to reconstruct the pens and roofed them with zinc; however they were constrained by lack of funds.

With regard to feeding, respondents admitted that they were unable to buy enough feed for the animals due to inadequate funds and increasing prices of the feed. Besides, there is usually scarcity of leaves and pasture during the dry season due to rampant bush burning. These make adequate feeding of the animals during the dry season very difficult. According to FAO (2006), feed supply constraint is more acutely felt in the drier regions, where the quantity of forage is often insufficient for the livestock, and where the availability of feed is subject to pronounced seasonal patterns.

With respect to veterinary services, respondents lamented their limited access to veterinary services due to limited number of government (MoFA) veterinary officers in the Wa Municipality. According to the Municipal Veterinary Officer, there are only six veterinary officers in the Municipality, meanwhile they required not less than ten veterinary officers. This is further compounded by logistical constraint facing the veterinary unit. As a result, whenever an animal or animals are sick and farmers called on the veterinary officers, they either do not usually get their response or they respond very late when the animal or animals are dead because they are usually engaged somewhere. Some respondents even cited instances where they hired vehicles and carry their sick animals from the village to the veterinary office in order to secure treatment. In some cases, this effort could not still save the animal from death. In addition, respondents complained of the high cost of veterinary services particularly the private veterinary services which they sometimes resort to as a result of the limited access to public veterinary services. According to FAO (2006),

Government-operated veterinary services have shown their limitations in providing comprehensive animal health services needed for livestock development, mostly because of issues related to under-funding. This has led to weak implementation of programmes for disease surveillance and vaccine production, and control measures for epidemic diseases are inadequate.

4.7 Inferential Analysis of the LDP Impact on Livestock Production

4.7.1 Hypothesis Testing for the Significance of Regression Models

4.7.1.1 Test of Hypothesis 1

This study seeks to assess the impact of microcredit on smallholder livestock production in Wa Municipality using the 'after only' impact assessment approach which is almost the same as the 'before' and 'after' approach. Therefore, two hypotheses were tested – one before the project, and the other after the project –using multiple linear regression models. Before the project, it was hypothesised that:

H_0: Before the LDP no significant relationship exited between livestock population (output) and the inputs used in production. i.e., H_0: $b_1 = b_2 = b_3 = b_4 = 0$

H_1: Before the LDP a significant relationship exited between livestock population and the inputs used in production. i.e., H_0: at least one $b_i \neq 0$.

The *F*-test was used to test the hypothesis at a significance level of 0.10 to evaluate the overall significance of the model or to determine whether the independent variables have a joint significant effect on the dependent variable.

In using the *F*-test, when the calculated *F*-value ($F_{cal.}$) is greater than the critical value of *F* ($F_{crit.}$), we fail to accept the null hypothesis (H_0). Equivalently, when alpha (α=0.10) is greater than the *p*-value, we fail to accept H_0.

The summary of the regression statistics is presented below.

Table 4.17: Summary Statistics of Regression Model 1

R	R^2	Adjusted R^2	F	P-Value	Std. Error
.726[a]	.527	.499	18.924	.000[a]	1.0833

Source: Field Survey, 2012.

From Table 4.17, $F_{cal.}$ = 18.924 and from the F-table in appendix E, the critical value, $F_{(4, 68)}$ = 2.04 at a significance level of 0.10. This implies that $F_{cal.} > F_{crit.}$ Also, the significance level chosen for the test (α=0.10) is greater than the P-value (0.000). Since $F_{cal.} > F_{crit.}$ and $\alpha > P$, we fail to accept H_0 and therefore conclude that there is enough evidence to support the claim that a significant relationship existed between livestock population (output) and the inputs used in their production before the LDP.

How well the estimated multiple linear regression model fits the data can be measured by the coefficient of multiple determination (R^2) whose value lies between 0 and 1 (or 0 and 100 if quoted as a percentage). The closer its value to 1 or 100, the better the estimated multiple linear regression model fits into the sample data (Bradley, 2007). The R^2 shows the percentage of variations of the dependent variable which is described by common influence of the independent variables which are involved in the model (Djordjevic, 2002). However, the adjusted R^2 is said to be an unbiased estimate of the R^2 because it takes into account the fact that when the sample size (n) and the number of predictors (k) are approximately equal, the value of R may be artificially high, due to sampling error rather than a true relationship among the variables (Bluman, 2001).

The regression statistics from Table 4.17 shows that the adjusted coefficient of determination (adjusted R^2) is 0.499. This means that 49.9 percent of the variability

in the livestock population before the LDP is jointly explained by pen availability, cost of hired labour, vaccination cost, and cost of feeding through the model. The remaining 50.1 percent can be attributed to other factors. The value of the adjusted R^2 indicates that the model is not very good though there is a significant relationship. However, the multiple *R* for the relationship between the set of independent variables that best predict the dependent variable is 0.726, which would be characterised as strong using the rule of thumb that a correlation less than or equal to 0.20 is characterized as very weak; greater than 0.20 and less than or equal to 0.40 is weak; greater than 0.40 and less than or equal to 0.60 is moderate; greater than 0.60 and less than or equal to 0.80 is strong; and greater than 0.80 is very strong.

To further determine how good and effective a multiple linear regression model is; some assumptions need to be checked to see whether they have been satisfied. First is the normality assumption, which states that errors are normally distributed with zero mean and standard deviation of one (1). To check this assumption, the normal probability plot of the residuals is used. If the residual plot approximates along a diagonal straight line, then the normality assumption is satisfied. In this model, the residuals plot can be somehow adjudged to be normally distributed; and therefore, the normality assumption is satisfied (refer to Figure A1 in appendix C).

Also, the independence assumption states that the explanatory variables are independent of each other – hence the name "independent variables". When this assumption is violated, then there is multicollinearity. The phenomenon of multicollinearity exists when there is a strong correlation between two or more predictors in a multiple linear regression model (Hair *et al.*, 1992). The case of multicollinearity exists in linear regression models when there is more than one

predictor variable. Multicollinearity is detected by the variance inflation factor (VIF) scores and the tolerance values of the independent variables (Brown, 1991). An acceptable threshold level of a VIF is to be less than 10 and a tolerance value greater than 0.10 (Myers, 1990; Hair *et al.*, 1992). The collineality statistics for the first multiple linear regression model are presented in Table 4.18.

Table 4.18: Collineality Statistics of Predictors for Regression Model 1

Predictors	**Collineality Statistics**	
	Tolerance	**VIF**
Hired labour cost per month before LDP	.981	1.090
Cost of Feeding per month before LDP	.771	1.297
Total Vaccination cost before the LDP	.828	1.208
Availability of Pen before the LDP	.807	1.239

a. Dependent Variable: Current Livestock Population.

From Table 4.18, all the VIF values are greater than 10 and the tolerance values are also greater than 0.10. This implies that there is no multicollinearity in the model. See Table A3 in appendix C for tolerance and VIF values.

4.7.1.1.1 Test of Significance of the Individual Regression Coefficients

In order to determine whether given variables should be included or excluded from the model, you need to test the individual regression coefficients. This can be done using the t-statistics or the *P*-values.

Using the *P*-values, if *P*-value of the coefficient of a predictor variable is greater than the significance level (0.10), it means that variable has significant contribution in the model. Otherwise, the variable is considered as having insignificant contribution in the model. The coefficients of the first multiple linear regression model (before the LDP) are displayed in Table 4.19.

Table 4.19: Coefficients of Regression Model 1

Predictors	Unstandardized Coefficients		Standardized Coefficients		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	1.066	.0245		4.356	.000
Hired labour cost per month before LDP	.384	.109	.307	3.521	.001
Cost of Feeding per month before LDP	-.079	.064	-.117	-1.231	.223
Total Vaccination cost before the LDP	.507	.077	.607	6.620	.000
Availability of Pen before the LDP	-.821	.369	-.207	-2.225	.029

a. Dependent Variable: Livestock Population before LDP

The regression results above indicate that only cost of livestock feeding has no significant contribution in the model (*P*-value = 0.223, α = 0.10, beta = -0.117). Therefore, this variable should be excluded from the model. The insignificance of cost of feeding can be explained by the fact that before the project, majority of the smallholder livestock farmers were practicing partial confinement and non-confinements systems of livestock keeping that allowed the animals to scavenge for feed during the day.

On the other hand, vaccination cost, cost of hired labour and pen availability have significant contribution in the model since their *P*-values are less than 0.10. However, all the coefficients (beta) of the predictor variables are positive except pen availability and cost of feeding. For those with positive coefficients, it means they have direct relationship with the dependent variable (livestock population), whilst those with negative coefficients have indirect relationship with livestock population. This means that pen availability and cost of feeding were hindrance to livestock production in Wa Municipality before the LDP.

4.7.1.2 Test of Hypothesis 2

The second hypothesis of the study is stated as follows:

H_0: After the LDP no significant relationship exists between the livestock population (output) and the inputs used in the production. i.e., H_0: $b_0 = b_1 = b_2 = b_3 = b_4 = b_5 = b_6 = 0$

H_i: After the LDP a significant relationship exists between livestock population and the inputs used in production. i.e., H_0: at least one $b_i \neq 0$.

The *F*-test was used to test the hypothesis at a significance level of 0.10 to determine whether the independent variables have a joint significant effect on the dependent variable.

When the calculated *F*-value ($F_{cal.}$) is greater than the critical value of *F* ($F_{crit.}$), we fail to accept the null hypothesis (H_0). Equivalently, when alpha (α) is greater than the *p*-value, we fail to accept H_0. The summary regression statistics are presented in Table 4.20.

Table 4.20: Summary Statistics of Regression Model 2

R	R^2	**Adjusted R^2**	***F***	***P*-Value**	**Std. Error**
.813[a]	.662	.631	21.501	.000[a]	1.1046

Source: Field Survey, 2012.

At a significance level of 0.10, the critical value of *F* from the *F*-table in appendix E is 1.87 (i.e., $F_{(6, 66)} = 1.87$). Comparing this with the calculated *F*-value (21.501) from the table above, *F*-calculated is greater than *F*-critical ($F_{cal} = 21.501 > F_{crit.} = 1.87$). Alternatively, the *P*-value (0.000^a) is less than the significance level chosen for the test ($\alpha = 0.10$). Thus, $P = 0.000^a < \alpha = 0.10$. Therefore, we fail to accept H_0 and conclude that there is enough evidence to support the claim that the explanatory variables are

jointly significant at $\alpha = 0.10$. This implies that cost of feeding, cost of housing, cost of hired labour, type of livestock breed and vaccination cost have significant impact on livestock population which is used as a proxy measure of livestock output.

From the Table 4.18, $R^2 = 0.631$. This means that 63.1 percent of the variation in the livestock population after the LDP is jointly explained the initial number of animals bought/received, the type of livestock breed, current cost of hired labour, current cost of feeding, pen availability and current cost of vaccination; the remaining 36.9 percent can be attributed to other factors. This means the model is a significant fit to the sample data. The multiple *R* for the relationship between the set of independent variables that best predict the dependent variable is 0.813, which would be characterised as strong using the rule of thumb that a correlation less than or equal to 0.20 is characterized as very weak; greater than 0.20 and less than or equal to 0.40 is weak; greater than 0.40 and less than or equal to 0.60 is moderate; greater than 0.60 and less than or equal to 0.80 is strong; and greater than 0.80 is very strong.

Besides, a close look at Figure A2 in appendix D revealed that the model has satisfied both the normality assumption since the residual plots approximate along the diagonal straight line. Also, from Table 4.21, the independence assumptions is also satisfied because all the tolerance values are greater than 0.10 and the VIF values are greater than 10 which implies non-existence of multicollineality. Therefore, the multiple linear regression model after the LDP is a very good one.

Table 4.21: Collineality Statistics of Predictors for Regression Model 2

Predictors	Collineality Statistics	
	Tolerance	VIF
Number of Animals Bought/Received	.694	1.440
Type of Livestock Breed	.952	1.050
Current cost of hired labour per month	.934	1.070
Availability of Pen after the LDP	.899	1.113
Current cost of Feeding per month	.793	1.261
Current total Vaccination cost	.641	1.560

a. Dependent Variable: Current Livestock Population

4.7.1.2.1 Testing the Significance of the Individual Regression Coefficients

Using the *P*-values to test the significance of the individual regression coefficients, if *P*-value of the coefficient of a predictor variable is greater than the significance level (0.10), it means that variable has significant contribution in the model. Otherwise, the variable is considered as having insignificant contribution in the model. The coefficients of the predictors of the second regression model (model after the LDP) are shown in Table 4.22.

Table 4.22: Coefficients of Regression Model 2

Predictors	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1.032	.591		1.747	.085
Number of Animals Bought/Received	-.060	.109	-.047	-.550	.584
Type of Livestock Breed	-.177	.413	-.032	-.429	.669
Current cost of hired labour per month	.245	.084	.216	2.922	.005
Availability of Pen after the LDP	.053	.077	.051	.680	.499
Current cost of Feeding per month	.112	.053	.169	2.103	.039
Current total Vaccination cost	.539	.068	.710	7.938	.000

Dependent Variable: Livestock Population after LDP

From Table 4.22, pen availability, type of livestock breed and the initial number of livestock bought/received by the respondents have no significant contribution in the model because their *P*-values are all greater than 0.10. Type of livestock breed is insignificant as a result of the fact that a greater proportion of the respondents bought local livestock breed instead of improved breeds. The initial number of livestock bought/received is also insignificant because some of the credit in cash beneficiaries diverted the credit either partially or fully. Therefore, they bought either very few animals or none. Besides, pen availability is insignificant probably because of the high mortality among the animals. The above variables which are insignificant in the model should therefore be excluded from the model.

On the other hand, vaccination cost, cost of hired labour and cost of feeding have significant contribution in the model since their *P*-values are less than 0.10.

Furthermore, the coefficients (beta) of four predictor variables which include cost of hired labour, cost of feeding, cost of vaccination and pen availability are positive. This implies that they have direct relationships with the livestock output. On the contrary, number of livestock bought/received by farmers at the beginning of the project and the type of livestock breed they bought/received have negative coefficients which imply inverse relationships with the current livestock population. Thus, they were hindering the progress of the LDP in Wa Municipality and therefore need to be addressed.

4.7.1.3 Comparison of the before and after Regression Models

The regression models 1 and 2 for the before and after the LDP respectively were both significant at 90 percent confidence level. They also satisfied the normality and

independence assumptions of regression analysis. However, some differences also exist between the models. In the first model, three out of four independent variables were significant, whilst in the second model three out of six independent variables were significant. Besides, the adjusted R^2 of the first model was 49.9 percent which is lower as compared with the second model whose adjusted R^2 = 63.1 percent, representing 13.5 percent increase from the first model. This implies that the second model is more powerful in explaining the variation in the livestock output (dependent variable) than the first model though both models are significant.

It is evident from the above analysis that the LDP generally made a positive impact on the productive activities of beneficiary smallholder farmers in Wa Municipality. However, the impact can be described as being relatively moderate considering the percentage change in the predictive power of the regression model after the project. Similar impact assessment results have been reported by some researchers. Chemin (2008) examined the impact of microfinance in Bangladesh and reported a positive, but lower than previously thought effect on expenditure per capita and school enrollment for boys and girls. Khan *et al.* (2007) also assessed the impact of microcredit on livestock enterprise development in Abbottabad District in Bangladesh; and the findings revealed that 33% of households experienced a positive effect on their consumption as well as children education. Similarly, an empirical examination of the impact of microfinance in four districts in the Eastern region of Ghana by Nanor (2008) showed that microfinance had some positive impact on variables like expenditure on children education, household income and profits of small businesses of households.

CHAPTER FIVE

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

This chapter presents a highlight of the major findings emanating from the study with respect to the research objectives. It also presents recommendations based on the findings which would help improve the management of future projects. The chapter ends with conclusions of the study.

5.2 Summary of Findings

5.2.1 Nature of Operation of the LDP

The credit in cash beneficiaries were given a grace period of only one year to repay the credit whilst their credit in kind counterparts were given two years. This shows unfair treatment of the credit in kind beneficiaries.

Recovery for the credit in kind had not yet started at the time of the data collection because the grace period elapsed in June 2012. With regards to credit in cash, the recovery was generally poor. Out of a total amount of GH¢52,348.00 expected from the recover, only GH¢24,180.00 which represent 46.2 percent have been recovered; whilst an amount of GH¢28,168.00 representing 53.8 percent remained outstanding. This high default rate was the main challenge which faced the project implementation. However, this high rate of default was not surprising because it has been a major trait of government credit schemes in Ghana over the years. But it appeared no conscious effort has been made by MoFA to recover the money because according to many of the respondents, they had not been contacted by the project officials to repay.

The project had a monitoring team within the Municipality which conduct monthly monitoring. However, it appeared the monitoring covered only farmers who received credit in kind because the project monitoring report covered only the credit in kind beneficiaries. The non-monitoring of the credit in cash beneficiaries is probably one of the contributory factors to the high rate of default among the credit in cash beneficiaries.

5.2.2 Credit Utilization

As much as 47.5 percent of the credit in cash beneficiaries diverted the credit either in part or in full from purchasing livestock into other activities which include crop farming, purchasing of drugs and/or payment for animals' vaccination, rehabilitation of an old pen or construction of a new pen, payment of children school fees and resolution of other family problems. Therefore, they purchased only few animals as compared to those who received credit in kind.

Besides, all respondents who received credit in cash bought local/indigenous livestock breeds which contradicted the LDP's aim of promoting the adoption of improved livestock breeds among smallholder livestock farmers.

5.2.3 Descriptive Analysis of the LDP Impact on Livestock Production

5.2.3.1 Livestock Population

A before and after analysis of the livestock population shows that there was a slight increase in the general population of the livestock which was attributed by respondents largely to high mortality rate and other factors such as theft. From the field and the project monitoring report (for credit in kind), the mortality was caused by diseases (worm infestation, heartwater, diarrhoea, pneumonia and PPR), stress,

dystocia, eating of polythene, accident, food poisoning and miscarriage. Dystocia was the major cause of mortality among all credit in kind beneficiaries and seems to be a peculiar trait of that kind of livestock breed.

5.2.3.2 Labour

There was a general decline in the use of all other labour sources by smallholder livestock farmers, except owned and family labour which increased slightly from 74 percent before the project to 78.1 percent after the project.

Respondents who used hired labour cost between GH¢20.00 and GH¢60.00 per month. The low patronage of hired labour does not come as a surprise because agriculture in general is often undertaken for subsistence and largely depended on the family as the main source of labour. In describing a popular system of management of smallholder commercial livestock production system, Smith and Olaloku (1998) stated that "labour was required mainly for feed procurement and distribution, as well as animal house sanitation, and was provided by family members".

5.2.3.3 Livestock Housing (Pen)

Availability of pen was one of the criteria for selecting the project beneficiaries. However, before the project 17.8 percent of respondents did not have pens. This means the criteria for the selection of the beneficiaries was not strictly followed.

There was a significant reduction in the practice of the "free range" system which is associated with some losses; and a marginal reduction in the practice of partial confinement, which all translated into significant increase in the practice of complete confinement. This indicates a positive impact of the project on livestock confinement.

Since the project implementation started, 61.6 percent of respondents rehabilitated their pens in order to put them in good conditions; whilst 15.1 percent built new pens because they did not have pens before the project started. These rehabilitations and building of new pens might not have happened had the project not been implemented. This is because having a pen was even a pre-condition for selecting participants. Therefore, it was incumbent on those who did not have pens to put up new ones and those whose pens were not in good condition to rehabilitate them. This explains why some respondents who received credit in cash used part of the money to construct or rehabilitate their pens.

5.2.3.4 Feeding

Feeding is a very important input in livestock production because the animals cannot survive without feed. As a result, the number of respondents who supplied their animals with feed increased from 80.8 percent before the project to 97.3 percent after the project; whilst those who used not to supply their animals with feed reduced significantly from 19.2 percent before the project to 2.7 percent after the project.

Over the period there was a slight increase in expenditure on livestock feeding among the respondents who have been purchasing feed. There was a reduction in the number of farmers who used not to purchase feed from 43.8 percent before the project to 24.7 percent after the project. The general trend was that the number of farmers who used to spend less on feeding per month before the project reduced after the project while those who used to spend more on feeding per month increased.

Generally, expenditure on feeding was usually incurred during the dry season when there is no pasture for the animals to graze, except those respondents who were practicing complete confinement.

5.2.3.5 Veterinary Services

One of the factors that determine the health of livestock is access to veterinary services. General analysis shows that the number of respondents who were accessing veterinary services increased from 89.2 percent before the project to 97.3 percent after the project.

Majority of the respondents were patronizing only public or government veterinary services which increased from 39.7 percent before the project to 49.3 percent of respondents after the project. This was due to the fact that the public veterinary services were lower in terms of cost than private veterinary services because it is subsidised by government. However, farmers sometimes resort to private veterinary service because of limited number of government veterinary officers in the Municipality.

5.2.4 Challenges and Constraints Confronting Smallholder Livestock Farmers

The major challenges confronting livestock farmers were in the areas of feeding and access to veterinary services.

With regard to feeding, respondents were unable to buy enough feed for the animals due to inadequate funds and increasing prices of the feed. Besides, there is usually scarcity of leaves and pasture during the dry season due to rampant bush burning which make adequate feeding of livestock during the dry season very difficult.

With respect to veterinary services, respondents lamented their limited access to veterinary services due to limited number of government (MoFA) veterinary officers in the Wa Municipality because they are only six officers instead of at least ten. Sometimes, smallholder livestock farmers hire vehicles and carry their sick animals from the village to the veterinary office in order to secure treatment.

5.2.5 Inferential Analysis of the Impact of the LDP on Livestock Production

Two hypotheses were tested using multiple regression models, one before the project and the other after the project to determine the relationship between livestock population and the inputs used in their production. Both models were significant at 90 percent confidence level. But the model for after the project was more powerful for predictive purposes than the model for before the project.

The results of the first multiple linear regression model (for before the LDP) indicate that only cost of livestock feeding has no significant contribution in the model (*P*-value = 0.223, $\alpha = 0.10$, beta = -0.117) and should therefore be excluded from the model. The insignificance of cost of feeding can be explained by the fact that before the project, majority of the respondents were practicing partial confinement and non-confinements systems of livestock keeping that allowed the animals to scavenge for feed during the day. The model further revealed that pen availability and cost of feeding were hindrance to livestock production in Wa Municipality before the LDP because their coefficients are negative.

The results of the second multiple linear regression model (for after the LDP) also suggest that type of livestock breed and the initial number of livestock bought/received by farmers have no significant contribution to the current livestock

population and should therefore be excluded from the model. The model further revealed that the number of livestock bought/received by farmers at the beginning of the project and the type of livestock breed they bought/received also have negative coefficients which imply inverse relationships with current livestock population. This means the number and type of livestock breed bought/received before the project were hindering livestock production after the project in Wa Municipality and therefore need to be addressed.

The predictive power of the second model (for after the LDP) was 13.5 percent higher than that of the first model (for before the LDP). Therefore, it can be concluded that the LDP generally made a positive impact on the productive activities of beneficiary smallholder livestock farmers in Wa Municipality. However, the impact can be described as being relatively moderate considering the percentage change in the predictive power of the second regression model.

5.2.6 Recommendations

Based on the findings made in this study, the following recommendations are made for consideration by Government and MoFA in subsequent projects.

First, MoFA should ensure that monitoring is not limited to a segment of future projects, but rather it should cover every aspect and every participant or beneficiary in the project. Monitoring is very important in project management. Continuous monitoring promotes project performance because it ensures efficiency and effectiveness. It ensures that inputs are put into the right use by project participants and therefore minimize diversion of inputs which characterized the credit in cash component of the LDP.

Considering the limited nature of veterinary officers in Wa Municipality and the country in general, as a matter of policy, Government needs to expand the veterinary training institutions to train more veterinary officers in the country. Besides, a policy change is required to ensure that all the veterinarians are employed by MoFA after completing the veterinary college just as Teachers are employed by Ghana Education Service after completing training college. In addition, the veterinary units should be equipped with the necessary logistics to enable carry out their duties. These would help address the veterinary service related challenges facing smallholder livestock farmers in the Wa Municipality and the country as a whole.

To address the feeding challenge confronting smallholder livestock farmers particularly during the dry season, MoFA should train smallholder livestock farmers on fodder preparation and encourage them to always prepare them at the latter part of the rainy season when grass is still in abundance. This would enable smallholder livestock farmers to continue to feed their animals adequately during the dry season without incurring any financial cost.

The type of livestock breed that was given to the credit in kind beneficiaries was characterized by high mortality caused by dystocia. It is therefore recommended that in subsequent projects, MoFA should carry out a demonstration in the area where the project would be implemented to make sure that they are satisfied with the results of the breed performance before distributing them to the farmers.

5.2.7 Conclusions

Livestock production is a major feature of agriculture in Ghana, contributing largely towards meeting food needs, providing draught power and serves as a major source

of income for farmers, particularly in northern Ghana. Therefore, promoting livestock production among smallholder farmers who dominates the agricultural sector in Ghana is a clear strategy towards poverty reduction.

It is evident that the credit in cash component of the LDP was challenged with high default rate (53.8 percent of the total amount expected from the recovery) just like other Government microcredit schemes such as MASLOC which started taking legal action against defaulting customers in order to retrieve an amount of over GH¢80 million. This high default rate associated with the LDP was partly as a result of the fact that the credit in cash beneficiaries were not monitored at all after the credit was disbursed, which allowed 47.5 percent of the credit in cash beneficiaries to divert the credit either in part or in full from purchasing livestock into other activities e.g. crop farming; coupled with high mortality of the livestock as a results of diseases and other factors.

Livestock farmers in Wa Municipality are still confronted with challenges which include limited access to veterinary services due to limited number of veterinary officers; and inadequate supply of animals with feed, particularly during the dry season.

Generally, the LDP made a positive impact on smallholder livestock production in the Municipality despite the above challenges. However, the impact could be said to be relatively moderate. This lends support to other impact assessment results which reported positive impact.

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APPENDICES

APPENDIX A

SAMPLE SURVEY QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF ARCHITECTURE AND PLANNING
DEPARTMENT OF PLANNING

QUESTIONNAIRE FOR SMALLHOLDER LIVESTOCK FARMERS

TOPIC: Impact of Microcredit on Smallholder Livestock Production in Wa Municipality. A Case of the Livestock Development Project.

Introduction

This questionnaire is designed to solicit information on the above topic for the purpose of producing a master's thesis. Please be assured that the confidentiality and anonymity of respondents is of paramount concern to the researcher and will therefore be ensured. In view of this please answer the questions objectively as much as possible. Answer all questions by fill in the spaces provided or circle the code of the appropriate answer where alternatives are provided.

Name of Interviewer:……
Date…… Time started……Time ended……
Location/Community……..

A. Demographic Characteristics of Respondents

1. Gender:

Male	1	Female	2

2. Age: How old are you?

18 – 24 years	1	45 – 49 y ears	6
25 – 29 years	2	50 – 54 years	7
30 – 34 years	3	55 – 59 years	8
35 – 39 years	4	60 – 64 years	9
40 – 44 years	5	65 years or older	10

3. Ethnicity: Which ethnic group do you belong to?

Waala	1	Grussi	6
Dagarti	2	Gruma	7
Ewe	3	Other (s), specify……	8
Sissala	4		
Akan	5		

4. Marital Status: what is your marital status?

Married	1	Divorced	4
Single	2	Widowed	5
Separated	3	Others (specify)	

5. Educational Qualification: What is the highest level of education that you have attained?

No schooling	1
Primary	2
Middle School/JHS	3
SHS/Technical	4
Post Secondary/Nursing	5
Tertiary	6
Others (specify)	

6. What is your major occupation?

Farming	1
Public servant	2
Trading	3
Artisan (e.g. tailors, dressmakers, carpenters, masons)	4
Food processing	5
Food vendor	6
Transportation business/vehicle owner	7
Driving	8
Formal private sector worker	9
Wage earner (by day unskilled labour)	10
Pensioner	11
Other (specify)……..	12

7. Which religious group do you belong to?

Catholic	1
Protestant/other Christian	2
Islam	3
Traditional African Religion	4
Others (specify)	5

8. What is the total number of persons in your household?

1 – 4 persons	1
5 – 9 persons	2
10 – 14 persons	3
15 – 19 persons	4
20 persons and above	5

9. What is the composition of your household?

	Males	Females
Number of persons below 15 years		
Number of persons between 15 - 60 years		
Number of persons above 60 years		

B. Credit

10. What kind of credit did you receive from MoFA?

Credit in cash	1
Credit in kind	2

11. In which year did you receive the credit?

2002	1	2007	6
2003	2	2008	7
2004	3	2009	8
2005	4	2010	9
2006	5	Others (specify)	

12. If it is credit in cash, how much did you receive? GH¢…….

13. If it is credit in kind, how many animals did you receive?

Males	
Females	
Total	

14. If you received credit in cash, how many animals did you buy?

Males	
Females	
Total	

15. What type of animals did you buy or receive from MoFA?

Goats	1	Pigs	3
Sheep	2	Cattle	4

16. What type of livestock breed did you receive or buy?

Local/indigenous breed	1
Exotic/improved breed	2

17. Apart from the purchase of the animals, what else did you use the money for?

……

……

……

18. Have you repaid your credit/animals?

Yes	1	No	2

19. If yes, how many animals did you use for the repayment?
……

20. If no (to Q.18), why?
…….....
……

C. Livestock Population

21. Before you received the credit/animals from MoFA, how many animals did you have?

Males	
Females	
Total	

22. Currently, how many animals do you have with respect to the specific animal specie you bought or received from MoFA?

Males	
Females	
Total	

23. Since you collected or bought the animals, how many of them died?.....

24. What cause their death?

Disease	1
Accident	2

25. How many of the animals have you sold? ……

26. How many of the animals have been used to perform a ceremony or rite?.....

27. How many of the animals got stolen? ……..

D. Labour

28. Before you received the credit/animals, what was your source(s) of labour in taking care of the animals?

Self only	1	Self and Hired	4
Family only	2	Family and Hired	5
Hired only	3	Self and Family	6

29. If you used to hire labour before you received the credit/animals, how much was the cost per month? GH¢…….

30. Currently what is your source (s) of labour for production?

Self only	1	Self and Hired	4
Family only	2	Family and Hired	5
Hired only	3	Self and Family	6

31. If currently labour is hired, how much is the cost per month? GH¢……

32. What specific activity (ies) does the hired labour undertakes?.....
……
……

E. Housing

33. Did you have a pen before you received the credit/animals?

Yes	1	No	2

34. If yes, what was the mode of confinement of your animals?

Complete confinement	1	No confinement (free range)	3
Partial confinement	2	Others (specify)	

35. Did you incur any cost to rehabilitate or improve upon the pen?

Yes	1	No	2

36. If yes, how much? GH¢……

37. If no, how much did you cost to build a pen? GH¢……

38. Currently, what is the mode of confinement?

Complete confinement	1	No confinement (free range)	3
Partial confinement	2	Others (specify)	

39. Do you have any challenge with respect to housing?.....
……
……
……

F. Feeding

40. Before you received the credit/animals, did you used to supply your animals with feed?

Yes	1	No	2

41. If yes, how did you used to get the feed?

Purchased	1
Household waste	2
Others (specify)	

42. About how much did you used to spend on feeding in a month? GH¢……

43. If no, why did you not used to feed the animals? ……
……
……

44. After you received the credit/animals, do you supply your animals with feed?

Yes	1	No	2

45. If yes, how do you normally get the feed?

Purchased only	1
Household waste only	2
Purchased and household waste	3
Others (specify)	

46. Currently, how many times do you feed your animals in a day?

Once	1
Two times	2
Three times	3
Four times	4
Five times	5
More than five times	6

47. Currently, about how much do you spend on feeding in a month? GH¢……

48. If no (to Q.40), why?
……
……
……

49. What challenges are you currently facing with respect to feeding your animals?
……
……
……

G. Veterinary Services

50. Before you received the credit/animals, have you ever vaccinated your animals against any disease?

Yes	1	No	2

51. If yes, who does the vaccination?

MoFA veterinary officers	1
Private veterinary officers	2

52. If no, why did you not vaccinate them?
……

……
……

53. Each time you vaccinate them, what was the cost per animal? GH¢……

54. After you received the credit/animals, have your animals ever been vaccinated?

Yes	1	No	2

55. If yes, who vaccinated them?

MoFA veterinary officers	1
Private veterinary officers	2

56. Since you received the credit/animals, how many times have the animals been vaccinated?

Once a year	1
Two times a year	2
Three times a year	3
Four times a year	4
Others (specify)	

57. How much was the cost per animal during the last vaccination? GH¢……

58. What common diseases were the animals vaccinated against?.....
……
……

59. Whenever some of the animals are sick, what do you normally do?.....
……
……

60. Currently, what challenges are confronting you with regards to accessing veterinary services? ……
……
……

THANK YOU FOR YOUR AUDIENCE!!

APPENDIX B

SAMPLE INSTITUTIONAL QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF ARCHITECTURE AND PLANNING
DEPARTMENT OF PLANNING

QUESTIONNAIRE FOR THE PROJECT OFFICER (LDP)

TOPIC: Impact of Microcredit on Smallholder Livestock Production in Wa Municipality. A Case of the Livestock Development Project.

Introduction

This questionnaire is designed to solicit information on the above topic for the purpose of producing a master's thesis. Please be assured that the confidentiality and anonymity of the respondent is of paramount concern to the researcher and will therefore be ensured. In view of this please answer the questions objectively as much as possible. Answer all questions by filling in the spaces provided or tick the appropriate answer where applicable.

Date……

Background Data of Respondent

1. What is your age? ……
2. What is your official position in the institution? ……
3. For how long have you been with the institution? ……..
4. What is your qualification?.....

Nature of Operations of the Project

5. When did the implementation of the credit component of the LDP start in Wa Municipality?.....
6. Please outline criteria that was used in selecting the beneficiaries?

……

……

……

……

……

……

……

7. Since the beginning of the project, how much cash have been disbursed to the beneficiary farmers? Please provide the annual breakdown as indicated below.

YEAR	AMOUNT (GH¢)
TOTAL	

8. Were the farmers given the same amount of cash/animals or it varied?.....
   ……
9. What was the terms of repayment for the credit in cash?.....
   ……
   ……
   ……
10. What was the terms of repayment for the credit in kind?.....
    ……
    ……
    ……
11. What inform your decision to shift away from credit in cash to credit in kind?
    ……
    ……
    ……
    ……
    ……
    ……
12. Which directorates/sub-units within MoFA are involved in the project implementation?.....

……

……

……

13. What specific role does each of these directorates/sub-units play in the implementation process?.....

……

……

……

……

……

……

14. After granting farmers the credit (both cash and kind), was there any monitoring system in place? Yes [ ] No [ ]
15. If yes, please describe the nature of the monitoring system and how effective it has been……..

……

……

……

16. Through the monitoring, how would you describe the success or otherwise of the credit in cash and kind components of the LDP?.....

……

……

.....

.....

17. Have you started recovery with respect to the credit in cash? Yes [ ] No [ ]
18. If yes, how much have you recovered and how much is left? ……

……

……

19. If no, why have you not started recovery?.....

……

……

……

20. Have you started recovery for the credit in kind? Yes [ ] No [ ]
21. If yes, how many animals have you received from the recovery process?

    ……
22. How many animals do you expect in total from the credit in kind recovery process?.....
23. In a situation where all the animals of a particular farmer are dead, what would happen with regards to repayment?.....

    ……

    ……
24. Based on your monitoring reports regarding the performance of the animals, do you think that the farmers are capable of repaying in full? Yes [ ] No [ ]
25. If no, why?.....

    ……

    ……

    ……
26. In line with the LDP, has MoFA undertaken any special livestock vaccination exercise? Yes [ ] No [ ]
27. If yes, how many vaccination exercises have been undertaken since the beginning of the project and which specific diseases were covered?.....

    ……

    ……
28. In the last vaccination exercise, how much was charged per animal across the various livestock species?.....

    ……

    ……
29. Apart from veterinary services, are there any other complementary services provided under the LDP to help the credit beneficiaries improve upon their livestock production?.....

    ……

    ……

    ……

    ……..

30. What challenges have you encountered or is encountering with regards to the implementation of the credit component of the LDP?.....

……

……

……

……

……

31. In your view, what is the way forward in addressing these challenges?

……

……

……

……

……

……

……

THANK YOU FOR YOUR AUDIENCE!!!

APPENDIX C

DATA SCORES FOR REGRESSION MODEL 1

Table A1: Summary[b] Statistics of Multiple Linear Regression Model 1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.726[a]	.527	.499	1.0833

a. Predictors: (Constant), Availability of Pen, Cost of Hired Labour per month before Project, Total Vaccination Cost before Project, Cost of Feeding per month before Project

b. Dependent Variable: Livestock Population before Project

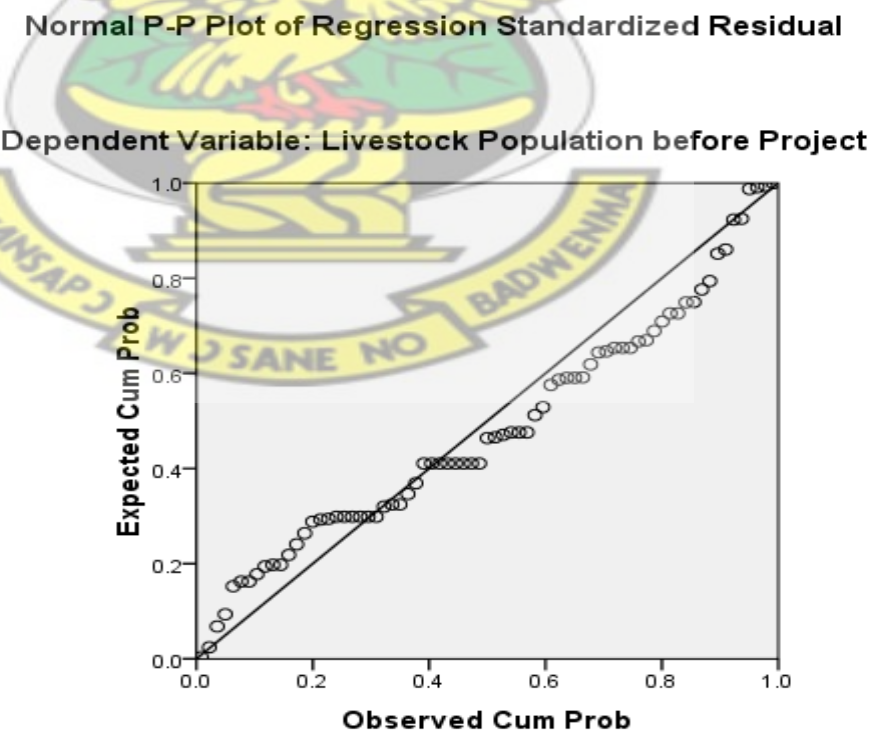
Table A2: ANOVA[b] of Multiple Linear Regression Model 1

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	88.831	4	22.208	18.924	.000[a]
	Residual	79.799	68	1.174		
	Total	168.630	72			

a. Predictors: (Constant), Availability of pen, Cost of Hired Labour per month before Project, Total Vaccination Cost before Project, Cost of Feeding per month before Project

b. Dependent Variable: Livestock Population before Project

Figure A1: Normal Probability Plot of Regression Standardized Residuals



APPENDIX D

DATA SCORES FOR REGRESSION MODEL 2

Table A4: Summary[b] Statistics of Multiple Linear Regression Model 2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.813[a]	.662	.631	1.1046

a. Predictors: (Constant), Current total Vaccination Cost, Current Cost of Hired Labour per month, Type of Livestock Breeds Bought/Received, Availability of Pen, Current Cost of Feeding per month, # of Animals Bought/Received

b. Dependent Variable: Current Livestock Population

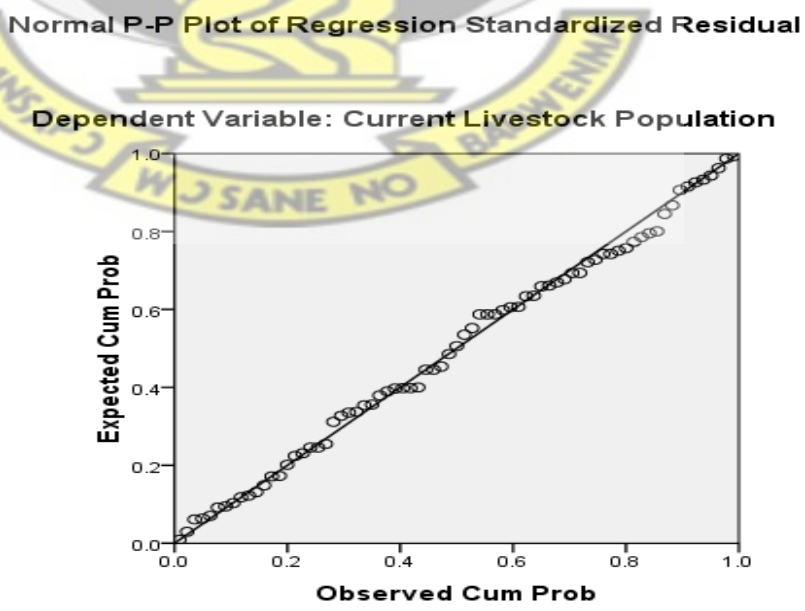
Table A5: ANOVA[b] of Multiple Linear Regression Model 2

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	157.395	6	26.232	21.501	.000[a]
	Residual	80.523	66	1.220		
	Total	237.918	72			

a. Predictors: (Constant), Current total Vaccination Cost, Current Cost of Hired Labour per month, Type of Livestock Breeds Bought/Received, Availability of Pen, Current Cost of Feeding per month, # of Animals Bought/Received

b. Dependent Variable: Current Livestock Population

Figure A2: Normal Probability Plot of Regression Standardized Residuals



APPENDIX E

Table A7: *F*-Table - Values of $F_{.10}$

Denominator Degree of Freedom (df_2)	Numerator Degree of Freedom (df_1)																	
df_2	df_1 1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
1	39.86	49.50	53.59	55.83	57.24	58.2	58.91	59.44	59.86	60.19	60.71	61.22	61.74	62.00	62.26	62.53	62.79	63.06	63.33
2	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38	9.39	9.41	9.42	9.44	9.45	9.46	9.47	9.47	9.48	9.49
3	5.54	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24	5.23	5.22	5.20	5.18	5.18	5.17	5.16	5.15	5.14	5.13
4	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94	3.92	3.90	3.87	3.84	3.83	3.82	3.80	3.79	3.78	3.10
5	4.06	3.78	3.62	3.52	3.45	3.40	3.37	3.34	3.32	3.30	3.27	3.24	3.21	3.19	3.17	3.16	3.14	3.12	2.72
6	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96	2.94	2.90	2.87	2.84	2.82	2.80	2.78	2.76	2.74	2.47
7	3.59	3.26	3.07	2.96	2.88	2.83	2.78	2.75	2.72	2.70	2.67	2.63	2.59	2.58	2.56	2.54	2.51	2.49	2.29
8	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56	2.54	2.50	2.46	2.42	2.40	2.38	2.36	2.34	2.32	2.16
9	3.36	3.01	2.81	2.69	2.61	2.55	2.51	2.47	2.44	2.42	2.38	2.34	2.30	2.28	2.25	2.23	2.21	2.18	2.06
10	3.29	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.35	2.32	2.28	2.24	2.20	2.18	2.16	2.13	2.11	2.08	1.97
11	3.23	2.86	2.66	2.54	2.45	2.39	2.34	2.30	2.27	2.25	2.21	2.17	2.12	2.10	2.08	2.05	2.03	2.00	1.90
12	3.18	2.81	2.61	2.48	2.39	2.33	2.28	2.24	2.21	2.19	2.15	2.10	2.06	2.04	2.01	1.99	1.96	1.93	1.85
13	3.14	2.76	2.56	2.43	2.35	2.28	2.23	2.20	2.16	2.14	2.10	2.05	2.01	1.98	1.96	1.93	1.90	1.88	1.80
14	3.10	2.73	2.52	2.39	2.31	2.24	2.19	2.15	2.12	2.10	2.05	2.01	1.96	1.94	1.91	1.89	1.86	1.83	1.76
15	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09	2.06	2.02	1.97	1.92	1.90	1.87	1.85	1.82	1.79	1.72
16	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	2.06	2.03	1.99	1.94	1.89	1.87	1.84	1.81	1.78	1.75	1.69

Denominator Degree of Freedom (df_2)	df_1	Numerator Degree of Freedom (df_1)																		
	df_2	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
	17	3.03	2.64	2.44	2.31	2.22	2.15	2.10	2.06	2.03	2.00	1.96	1.91	1.86	1.84	1.81	1.78	1.75	1.72	1.66
	18	3.01	2.62	2.42	2.29	2.20	2.13	2.08	2.04	2.00	1.98	1.93	1.89	1.84	1.81	1.78	1.75	1.72	1.69	1.63
	19	2.99	2.61	2.40	2.27	2.18	2.11	2.06	2.02	1.98	1.96	1.91	1.86	1.81	1.79	1.76	1.73	1.70	1.67	1.61
	20	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00	1.96	1.94	1.89	1.84	1.79	1.77	1.74	1.71	1.68	1.64	1.59
	21	2.96	2.57	2.36	2.23	2.14	2.08	2.02	1.98	1.95	1.92	1.87	1.83	1.78	1.75	1.72	1.69	1.66	1.62	1.57
	22	2.95	2.56	2.35	2.22	2.13	2.06	2.01	1.97	1.93	1.90	1.86	1.81	1.76	1.73	1.70	1.67	1.64	1.60	1.55
	23	2.94	2.55	2.34	2.21	2.11	2.05	1.99	1.95	1.92	1.89	1.84	1.80	1.74	1.72	1.69	1.66	1.62	1.59	1.53
	24	2.93	2.54	2.33	2.19	2.10	2.04	1.98	1.94	1.91	1.88	1.83	1.78	1.73	1.70	1.67	1.64	1.61	1.57	1.52
	25	2.92	2.53	2.32	2.18	2.09	2.02	1.97	1.93	1.89	1.87	1.82	1.77	1.72	1.69	1.66	1.63	1.59	1.56	1.50
	26	2.91	2.52	2.31	2.17	2.08	2.01	1.96	1.92	1.88	1.86	1.81	1.76	1.71	1.68	1.65	1.61	1.58	1.54	1.49
	27	2.90	2.51	2.30	2.17	2.07	2.00	1.95	1.91	1.87	1.85	1.80	1.75	1.70	1.67	1.64	1.60	1.57	1.53	1.48
	28	2.89	2.50	2.29	2.16	2.06	2.00	1.94	1.90	1.87	1.84	1.79	1.74	1.69	1.66	1.63	1.59	1.56	1.52	1.47
	29	2.89	2.50	2.28	2.15	2.06	1.99	1.93	1.89	1.86	1.83	1.78	1.73	1.68	1.65	1.62	1.58	1.55	1.51	1.46
	30	2.88	2.49	2.28	2.14	2.05	1.98	1.93	1.88	1.85	1.82	1.77	1.72	1.67	1.64	1.61	1.57	1.54	1.50	1.38
	40	2.84	2.44	2.23	2.09	2.00	1.93	1.87	1.83	1.79	1.76	1.71	1.66	1.61	1.57	1.54	1.51	1.47	1.42	1.29
	60	2.79	2.39	2.18	2.04	1.95	1.87	1.82	1.77	1.74	1.71	1.66	1.60	1.54	1.51	1.48	1.44	1.40	1.35	1.19
	120	2.75	2.35	2.13	1.99	1.90	1.82	1.77	1.72	1.68	1.65	1.60	1.55	1.48	1.45	1.41	1.37	1.32	1.26	1.00
	∞	2.71	2.30	2.08	1.94	1.85	1.77	1.72	1.67	1.63	1.60	1.55	1.49	1.42	1.38	1.34	1.30	1.24	1.17	

Source: Merrington M. and Thompson C. M. (1943), cited in Bowerman *et al.* (2001)