COMPARATIVE ANALYSIS OF FINANCING LIVESTOCK PRODUCTION BY FORMAL AND INFORMAL FINANCIAL INSTITUTIONS IN IMO STATE, NIGERIA

BY

OLUMBA, UJUNWA MIRIAM (B.Agric, IMSU)

20154943998

THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL,

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI

NOVEMBER, 2025

COMPARATIVE ANALYSIS OF FINANCING LIVESTOCK PRODUCTION BY FORMAL AND INFORMAL FINANCIAL INSTITUTIONS IN IMO STATE, NIGERIA

BY

OLUMBA, UJUNWA MIRIAM (B.Agric, IMSU)

20154943998

THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE (M.Sc) IN AGRICULTURAL ECONOMICS (AGRICULTURAL FINANCE OPTION)

MAJOR SUPERVISOR: DR FIDELIS O. NWOSU

CO-SUPERVISOR: DR (MRS) COMFORT CHIKEZIE

NOVEMBER, 2025

CERTIFICATION

This is to certify that this thesis **"Comparative Analysis of Financing Livestock Production by Formal and Informal Financial Institutions in Imo State, Nigeria"** was carried out by **OLUMBA, UJUNWA MIRIAM (Reg. No. 20154943998) in partial fulfilment of the requirements for the award of the degree of Master of Science (M.Sc) in Agricultural Economics.** This work is original and has not been submitted in full or part to any institution for award of degree or its equivalent.

Dr F. O. Nwosu
(Principal Supervisor)

20/01/2026
Date

Dr (Mrs) C. Chikezie
(Co-Supervisor)

20/01/2026
Date

Dr F. O. Nwosu
(Head, Department of Agricultural Economics)

20/01/2026
Date

Prof. O. O. Emenalom
(Dean, School of Agriculture and Agricultural Technology)

29/01/2026
Date

Prof. (Mrs) J. N. Nwosu
(Dean, Postgraduate School)

Date

Prof. N. M. Agwu
(External Examiner)

Date

DEDICATION

This work is dedicated to Almighty God whose grace, wisdom and strength guided me through every stage of this research and to all students and researchers who will continue to explore and expand the frontier of knowledge in this field.

ACKNOWLEDGEMENTS

A work of this magnitude could never have been realized without reference to the work of others. I have had to consult numerous textbooks, research works, journals and I hereby acknowledge my indebtedness to them all. I owe a debt of gratitude to my supervisors, Dr Fidelis O. Nwosu who doubles as the Head, Department of Agricultural Economics, Dr (Mrs) Comfort Chikezie and Prof. Nicholas O. Oguoma (rtd) for their professional advice, editorial input, articulated guidance and accessibility throughout the period of this research work.

I express my profound gratitude to the Dean of Postgraduate School, Prof. (Mrs) J. N. Nwosu, Dean, School of Agriculture and Agricultural Technology, Prof. O. O. Emenalom, former Dean, School of Agriculture and Agricultural Technology, Prof. (Mrs) O. P. Onyewuchi and all my lecturers in the Department of Agricultural Economics, Prof. J. S. Orebiyi, Prof. M. A. C. Odii, Prof. P. C. Obasi, Prof. C. C. Eze, Prof. J. I. Lemchi, Prof. U. C. Ibekwe, Prof. O. S. Onyeagocha, Prof. C. O. Korie, Prof. N. C. Ehirim, Prof. C. A. Emenyonu, Dr (Mrs) G. N. Ben-Chendo, Dr S. C. Onyemauwa, Dr I. I. Osugiri, Dr I. U. O. Nwaiwu, Dr (Mrs) M. N. Osuji, Dr I. I. Ukoha, Dr (Mrs) I. J. Uhuegbulem, Dr O. B. Ibeagwa, Dr U. A. Essien, Dr (Mrs) I. O. Oshaji, Dr A. J. Arigor, Mr I. A. Maduike and Mrs U. G. Anyanwu, who imparted great knowledge in me and for their acceptance of this research work.

I gratefully acknowledge the cooperation of the financial institutions and the people involved which for the purpose of confidentiality, I will not be able to refer in my acknowledgements. I appreciate the efforts of the Zonal Extension Officers of Imo State Agricultural Development Programme (ADP) and the Livestock Officer, Mrs J. Nwosu in providing me with necessary information for this research work and aiding me to reach my respondents. I specially appreciate the efforts of Mr Henry for his immense contributions to this work.

I am eternally grateful to my parents, Nnaomadiebube Chike Olumba and Ezinne Livina Olumba, for their support. To my second daddy, Barr Ogoo Olumba who was always interested in knowing when I would finish my programme, I was always encouraged by those questions. To my friends who would ginger and tease me at the same time, Okechukwu Emeonye who helped photocopy my questionnaires and delivered them to me from Aba, Oladipo Apata, Uka Nnenna, your support and encouragement motivated and inspired me to ride on. Finally, to my siblings Obii, Onyii who arranged my first meeting with loan officers of the financial institutions and equally ADP Livestock Officer, Mma, Kaa, Uchee; my cousins, Akus who was instrumental in obtaining the number of livestock farmers in each agricultural zone from ADP, Ogooboy, Ifunanya and Ebuka; my sis-in-law Maryjane, who were always present for some errands when I needed them. Not forgetting my little niece Chizzy, who helped me dry and arrange my questionnaires when they were drenched in the rain, the joy of those moments cannot be overemphasized. I am eternally grateful to God for you all.

TABLE OF CONTENTS

Title Page	i
Certification	ii
Dedication	iii
Acknowledgment	iv
Table of Contents	vii
List of Tables	viii
List of Figures	x
Abstract	xii
CHAPTER ONE	1
1.0 Introduction	1
1.1 Background of Study	1
1.2 Problem Statement	3
1.3 Objectives of the Study	5
1.4 Hypotheses of the Study	5
1.5 Justification of the Study	6
CHAPTER TWO	7
2.0 Literature Review	7
2.1 Conceptual Literature	7
2.1.1 Concept of Agricultural financing	7
2.1.1.1 Sources of Agricultural Financing in Nigeria	8
2.1.1.2 An Overview of Direct Financial Instruments for Agricultural production	12
2.1.1.3 Problems of Agricultural Financing in Nigeria	14
2.1.1.4 Solutions to the problems of agricultural financing	17
2.1.1.5 Prospects of Agricultural financing	18
2.1.2 Concept of Credit	19
2.1.2.1 Agricultural Credit	20
2.1.2.2 Classifications of Agricultural Credit	21
2.1.2.4 Credit Demand and Supply	23
2.1.2.5 Financial Credibility and Creditworthiness	25
2.1.3 Livestock Production	28
2.1.3.1 Components of Livestock Production	29
2.1.3.2 Problems of Livestock Production	31
2.2 Theoretical Literature	33
2.2.1 Delegated Monitoring Theory	33
2.2.2 Rational Choice Theory	34
2.2.3 The Credit Rationing Theory	34
2.2.4 Transaction cost theory	35
2.3 Empirical Literature	36
2.3.1 Credit worthiness and loan repayment	36
2.3.2 Relative risk in financing livestock production	38
2.3.3 Socioeconomic and institutional factors influencing the financing of livestock production	38
2.3.4 Factors militating against livestock financing	42
2.4 Analytical Literature	46
2.4.1 Descriptive Statistics	46
2.4.2 Regression Model	47

2.4.3 Probit Model 48
2.4.4 Chow Test for Structural Stability 49
2.4.5 The Z-statistic 51

CHAPTER THREE 52
3.0 Methodology 52
3.1 Study Area 52
3.2 Sampling Technique 54
3.3 Data Collection 54
3.4 Data Analyses 54
3.5 Model Specifications 54
3.5.1 Determining the financial credibility of livestock farmers financed by formal and informal financial institutions and the influencing factors. 54
3.5.2 Determining the relative risk in financing livestock production by formal and informal financial institutions. 56
3.5.3 Determine the socioeconomic and institutional factors influencing livestock financing by formal and informal financial sources 57
3.6 Test of Hypotheses 58

CHAPTER FOUR 59
4.0 Results and Discussions 59
4.1. Socio-economic Characteristics of the Livestock Famers Financed by Formal and Informal Financial Institution 59
4.1.1. Sex 59
4.1.2. Age 60
4.1.3. Marital Status 61
4.1.4. Education Level 62
4.1.5 Household Size 63
4.1.6 Livestock Category 64
4.1.7 Livestock Farming Experience 65
4.1.8 Income 66
4.1.9. Membership of Cooperative Society 67
4.1.10 Extension Contact 68
4.1.11 Formal Training on Livestock farming 69
4.1.12 Livestock number 70
4.2 Categorization and comparison of livestock farmers by credit characteristics 71
4.3 Determination of the Socioeconomic factors influencing the financial credibility of livestock farmers 73
4.4 Risk in financing livestock production through formal and informal financial institutions 79
4.5 Socioeconomic and institutional factors influencing the financing of livestock production by formal and informal financial institutions. 81
4.6 Factors militating against livestock financing by formal and informal financial sources in the area. 84

CHAPTER FIVE 85
5.0 Summary, Conclusion and Recommendations 85
5.1 Summary 85
5.2 Conclusion 87
5.3 Recommendations 88

5.4 Contribution to Knowledge 88
References 90
Appendix 1 106
Appendix 2 110

LIST OF TABLES

Tables		Pages
4.1	Distribution of Livestock Farmers Based on Sex	59
4.2	Distribution of livestock farmers based on age range	60
4.3	Frequency Distribution of the Livestock Famers Based on Marital Status	61
4.4	Distribution of the farmers based on education level	62
4.5	Distribution of the livestock farmers based on household size	63
4.6	Distribution of the livestock farmers based on the category of livestock produced	64
4.7	Distribution of the Famers based on Farming Experience	65
4.8	Distribution of the Livestock farmers based on Income	66
4.9	Distribution of the farmers based on Membership Status of Cooperative Society	67
4.10	Distribution of the Livestock Farmers Based on Contact with Extension Agents	68
4.11	Distribution of the Livestock farmers based on Formal Training in livestock rearing	69
4.12	Distribution of the Livestock farmers based on Livestock number	70
4.13	Categorization and comparison of livestock farmers credit characteristics	71
4.14	Distribution of livestock farmers based on level of financial credibility	73
4.15	Probit Analysis of the socioeconomic factors influencing the Financial Credibility of Livestock farmers financed by formal and informal financial institutions in the study area	74
4.16	Estimation and comparison of risk in financing livestock production through formal and informal credit institutions	79
4.17	Estimated Results of the Socioeconomic and institutional factors influencing livestock financing through formal and informal financial sources	81
4.18	Multiple response of the factors militating against livestock financing by formal and informal credit institutions in the study area	84

LIST OF FIGURES

Figures		Pages
1	Map of Imo State showing the Local Government Areas of interest	53

ABSTRACT

This study aimed to comparatively analyze the financing of livestock production by formal and informal financial institutions in Imo State, Nigeria. Questionnaire was used to collect data from 120 livestock farmers comprising 60 livestock farmers financed by formal financial institutions and 60 livestock farmers financed by informal financial institutions through multistage sampling procedure. Data collected were analyzed using descriptive statistics (frequency distribution, percentages, mean score, TRCS and standard deviation) and inferential statistical tools (Probit model, Multiple Regression Model, Chow test and Z-statistic). Results of the socio-economic characteristics showed that livestock farmers financed by formal financial institutions were more of male (55%) with mean age of 47 years, married (88.3%) with average household size of 5 persons and 9.7 mean years of education, were members of cooperative society (66.7%) while livestock farmers financed by informal financial institutions were also mostly male (56.7%) with mean age of 44 years, married (86.7%) with average household size of 4 persons, majority were not members of cooperative society (80%). Findings showed that with Z-test values (6.9650) and (6.7646), *which were significant at 5% level, there was a significant difference in the credit characteristics of livestock farmers financed by formal and informal financial institutions and that livestock farmers financed by formal financial institutions were more financially credible (65%) than those financed by informal financial institutions (28.3%). Results of the probit analysis showed that income with a marginal value of 1.30e-06, livestock size (0.0013), and credit duration (0.0305) positively influenced financial credibility of livestock farmers financed by formal financial institutions while gender with a marginal value of 0.3185, level of education (0.0460), years of experience (0.0098), livestock size (0.0052) and cooperative membership (0.3561) positively influenced financial credibility for livestock farmers financed by informal financial institutions. Findings also revealed that there was a higher level of risk associated with financing livestock farmers through formal financial institutions when matched with informal financial institutions. Results of the socioeconomic and institutional factors influencing livestock financing showed that income (1.12E-06), years of experience (0.0318) and duration of credit (0.0567) positively influenced livestock financing by formal financial institutions while livestock size (0.1823), cooperative membership (0.3033) and credit duration (0.8931) influenced livestock financing by informal financial institutions. The major factors militating against livestock financing by formal financial institutions were years of account holding (75.00%), savings deposits (95.00%), insufficient collateral (85.00%) and lack of personal guarantors (83.33%), while that of livestock financing by informal financial institutions were insufficient credit (90.00%), years of membership (80.00%) and lack of personal guarantor (53.33%). It was recommended that government make improved policies and innovative financial products tailored specifically to the needs of the livestock sector to enhance its growth and productivity.*

Keywords: Livestock production, Agricultural Financing, formal and informal financial institutions, financial credibility.

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Livestock production involves the domestication of animals in agricultural settings for multiple purposes, including the provision of essential commodities such as meat, eggs, milk, wool, and leather, as well as labor. World Census of Agriculture, WCA (2020), defined the term "livestock" as "all animals, birds and insects kept or reared by the farming holdings mainly for agricultural purposes. They are also reared as a means of saving for the future. In Sub-Saharan Africa, the most common and socioeconomically vital livestock species are cattle, poultry, sheep, goats, and pigs. This sector is a thriving and rapidly growing arm of agriculture, attracting entrepreneurial farmers due to its substantial profitability (National Bureau of Statistics, 2019). The increasing demand for meat and dairy products in urban centers and export markets has spurred the commercialization of livestock production and marketing across Africa (Banerjee *et al.,* 2021). Livestock production plays a dual role: it remains a crucial means of meeting sustenance, protein, and micronutrient requirements, while also serving as a primary source of livelihood for smallholder farmers (Ajibade *et al.,* 2018). Livestock production is recognized for its profound impact on poverty reduction and is a cornerstone of both rural and national economies (Silong & Gadanakis, 2020).

Nigeria's livestock sector is a significant contributor to the national economy, accounting for approximately 6% of the country's GDP. The sector plays a vital role in rural livelihoods, with nearly 60% of the rural population relying on livestock production as a primary source of income. The sector's importance is further underscored by its impressive livestock population, which include 22.3 million cattle, 99.8 million goats, 53 million sheep, 9.3 million pigs, 278,840 camels and over 425.7 million poultries spread across the six geopolitical zones of the country (Federal Ministry of Agriculture and Rural Development (FMARD, 2022; Nigeria Bureau of Statistics (NBS, 2022). Unfortunately, the sector is characterized by low productivity, partly due to limited adoption of modern technologies. A key barrier to technology adoption is poor access to credit (Balana & Oyeyemi, 2022). Consequently, livestock farmers face significant financing constraints, hindering their ability to invest in essential inputs like high-quality feed, veterinary care, and breeding stock. A holistic approach to enhancing agriculture and rural development necessitates a strong focus on agricultural

finance (Lindsjö *et al.,* 2021). This focus is crucial, as sufficient financing is required to increase agricultural production, implement improved technologies and rural income distribution (Abhishek *et al.,* 2021).

Livestock financing enables disadvantaged farmers to maintain their standard of living, adopt cutting-edge technologies, increase their incomes (Mariam *et al.,* 2020), promote sustainability by allowing farmers to adopt resilient and environmentally friendly practices, enhance productivity and competitiveness, achieve socioeconomic development (Reddy *et al.,* 2020), and address key constraints in the rural economy (Teye & Quarshie, 2022). In the context of livestock production, access to affordable and tailored financing options is essential for boosting productivity and profitability (Kumari & Garg, 2023). Credit will give power to livestock farmers to reap economics of large scales, discover new and cheaper products, create demand where none exists and equally provide utilities to satisfy widening market. It is the flood of credit that will make agro enterprises especially livestock production to move out from a peasant occupation to be a lucrative business that can compete with other non-agro enterprises. The present economic brink of agro small and medium enterprises cannot sustain capital accumulation, therefore capital required for investment in agro business must necessarily be injected from outside. Studies, such as Pandley (2022), Masinde (2021), Moahid and Maharjan (2020), suggest that farmers access credit for their agricultural activities from various formal and informal sources. According to Moahid and Maharjan (2020), formal financial institutions such as commercial and microfinance banks are regulated by the Central Bank of Nigeria, they have a standard lending procedure including high transaction fees, collateral requirements, and administrative charges which tend to increase overall cost of credit (Amanullah *et al.,* 2019). Appiah-Twumasi *et al.,* (2022) also stated that interest rate is the key factor influencing the cost of formal credit. In rural areas, farmers tend to prefer informal credit from families, friends, and trusted business partners to formal bank credits (Banerjee *et al.,* 2021).

Informal financing, particularly through cooperatives, is often less challenging but the little amount of credit they offer to farmers is not adequate to meet the real needs of livestock farming. The cooperative society, also known as the credit thrift society or *esusu*, is a non-institutional, informal financial system based on contributions among like-minded individuals. Payments are typically made on a weekly, monthly, or daily basis. This type of funding can be managed in two primary ways. Firstly, members can participate in a rotating savings scheme,

where each member receives a lump sum at the end of each week or month. Alternatively, members can contribute funds, which are then lent to individual members at a predetermined interest rate (Adegbite & Afolabi, 2018).

Farmers often struggle to meet eligibility criteria due to limited credit history or irregular income streams that hinders their access to formal credit (Khan *et al.,* 2024). Farmers with low repayment ability also face restrictions on the amount of credit they can access as these institutions are cautious about extending larger loan amounts to those who have a higher likelihood of defaulting (Chen *et al.,* 2020). These factors affect farmers' choices of financing sources.

1.2 Problem Statement

Livestock production plays a significant role in the agricultural economy of Nigeria in general and Imo State in particular, yet access to adequate and sustainable financing remains a persistent challenge for the livestock farmers (World Bank, 2022; Chukwu, 2024). Previous studies such as (Mu'azu & Lawal, 2017; Osabohien, 2020; Nwosu et *al.,* 2021; Saka & Aladelusi, 2022 and Anocha et *al.,* 2023) on agricultural financing in Nigeria have largely focused on crop production, with limited emphasis on the livestock subsector. Where livestock financing has been addressed, most works have concentrated on the role of either formal financial institutions (such as commercial banks and microfinance banks) or informal sources (such as cooperative societies, rotating savings groups, and personal networks) in isolation, rather than conducting a comparative analysis of both systems within the same study area.

Nigeria's livestock sector, despite its vast potential, particularly in cattle production, faces significant challenges. Even with the efforts of the Nigerian Government's National Livestock Transformation Programme (NLTP) to reduce imports of animal-origin food, the country still spends approximately 1.5 billion dollars annually on the import of milk and dairy products (FMARD, 2021; Federal Ministry of Livestock Development, 2024). This production challenge was attributed to inadequate funding and investment which hinders growth and modernization, low productivity, outdated techniques, inadequate input, and poor yields of livestock farmers in the country (FMLD, 2024). This has resulted in fluctuating earnings for livestock farmers, hindered the livestock farmers' ability to finance their operations and improve productivity.

The credit supply to Nigeria's livestock sector, despite the importance of credit in agriculture, faces significant challenges. According to Udoh (2008), the personal and regional biases, as well as source-dependent attributes, hinder supply of credit to livestock sector. This could be linked to the deteriorating socioeconomic profile and livelihoods of livestock farmers, as farmers in Akwaibom cannot provide collaterals required by formal financial institutions for credit access. Even the livestock farmers that do have access to credit have been plagued with repayment issues. This and other issues labelled livestock farmers unworthy of credit access.

The inherent risks associated with livestock production, as highlighted by Evbuomwan *et al.,* (2012), Oguoma and Ohajianya (2006), and Orebiyi (2002), have led banks to hesitate in lending to farmers. The perceived unpredictability of returns further exacerbates this cautious approach. Some studies (Izekor and Alufohai, 2010; Alufohai, 2006; Alufohai and Ahmadu, 2005) have investigated the impact of socio-economic factors on credit acquisition and repayment among smallholder farmers. There is a lack of recent research (after 2020) that considers how economic changes, new policies, and market conditions affect the way livestock farmers access funds from formal and informal sources. Without this type of localized and up-to-date comparison, it is difficult to know which financing option works better for different types of farmers in Imo State. As a result of the foregoing, this study investigates the financing of livestock production by formal and informal financial institutions in Imo State Nigeria.

1.3 Objectives of the Study

The broad objective of the study is to comparatively analyse financing of livestock production by formal and informal financial institutions in Imo State Nigeria.

The specific objectives of the study include to:

i. examine the socioeconomic characteristics of livestock farmers financed by formal and informal financial institutions in the study area;
ii. determine and compare the credit characteristics of livestock farmers financed by formal and informal financial institutions in the area;
iii. analyse the financial credibility of the livestock farmers financed by formal and informal financial institutions in the area and the influencing factors;
iv. determine and compare the risk profile of livestock farmers financed by formal and informal financial institutions in the area;

v. analyse the factors that influence livestock financing by formal and informal financial institutions in the area;
vi. identify the factors militating against livestock financing by formal and informal financial sources in the area.

1.5 Hypotheses of the Study

The study tested the following hypotheses:

H_1: The credit characteristics of livestock farmers financed by formal financial institution is not significantly different from that of livestock farmers financed by informal institutions in the area;

H_2: Factors such as age, education level, household size, income, livestock number, cooperative membership and years of experience do not have any significant influence on financial credibility of the livestock farmers financed by formal and informal financial institutions;

H_3: There is no significant difference in the relative risk in financing livestock production through formal and informal financial institutions in the study area;

H_4: There is no structural break point and education level, age, household size, income, livestock number, cooperative membership and years of experience do not have any significant effect on livestock financing by formal and informal financial institutions in the area.

1.5 Justification of the Study

It is a well-known fact that financial support is necessary to facilitate agricultural development, but agricultural development is also necessary to justify financial support. This study will help financial institutions learn to better understand the specifics of livestock production and the various risks involved and tailor their financial products and services with innovative features that will increase efficiency and lower delivery cost.

This study will serve as a wakeup call to the government of Imo State in particular and Southeast in general, as it would emphasize the importance of credit as a pre-requisite for large scale livestock production and encourage farmers to actively participate, with that in place coupled with the siting of the Special Livestock processing zone in Okigwe Imo State, they will no longer have to worry about post production losses.

The findings of this study will also be beneficial to livestock farmers in the state as it will highlight the advantages of using credit from both formal and informal sources. On the other hand, to be more profitable, it will encourage the livestock farmers to improve their financial literacy and agricultural knowledge to better identify opportunities, increase production or make changes to their production mix, which normally requires additional financing. It will also assist livestock farmers in knowing the criteria used by lending institutions in granting loans and progressive use and responsible management of credit for productivity and economic growth and also help them in planning, controlling expenditure and budgetary allocations in the implementation of projects and ensure efficient utilization of resources for better financial efficiency. The Ministry of Agriculture as well as agricultural policy makers will find it useful as a guide in formulating policies for capital development or general agricultural production in the rural areas especially in mobilizing rural savings.

The study will provide useful basis upon which further studies on financing livestock production will be conducted as it will serve as a vital document for further research by students and researchers especially as it relates to agricultural financing in Imo State. It will generally inform people on the potentials of livestock production because when people are properly informed, they will see the great potentials in this sector and will invest more in it, leading to the rapid development and expansion of the industry not just in Imo State alone but in Nigeria at large.

CHAPTER TWO

LITERATURE REVIEW

This chapter is organized into four sections viz-a-viz Conceptual Literature which looked at the Concept of Agricultural Financing, Credit and Agricultural credit, and Financial Credibility and Creditworthiness; Theoretical Literature which reviewed the Delegated Monitoring Theory, Rational Choice Theory, Credit Rationing Theory and Transaction Cost Theory; Empirical Literature which reviewed related works on the subject matter and Analytical Literature which explained the statistical and econometric models to be employed in achieving stated objectives.

2.1 CONCEPTUAL LITERATURE

2.1.1 Concept of Agricultural financing

According to Okpara (2016), finance is the life-wire on which resources and its mobilization for economic development revolve. Agricultural Finance is all about the acquisition and utilization of credit, the factor of production that facilitates the acquisition, procurement and management of the other factors of production namely, land, labour, capital – physical, and entrepreneur (management), in agriculture and which is not only a lubricant but the lifeblood of the economy. It cuts across financial management and the financial institutions serving the agricultural sector of the economy. It is the most important factor in economic development (Famogbiele, 2013). Agricultural finance mainly deals with the demand and supply of funds in agricultural sector. By definition, it is said to be the financial intermediary that provides loan to the agriculture and financial market with which they operate. Capital has two concepts – the physical capital which refers to the physical assets (land, buildings, plants, machinery and equipment) used in the production of goods and services either for further or final consumption, and the financial capital which is used not only to procure the physical assets but also operates and manages the assets on daily basis to ensure continuous production of goods and services.

The concept of agricultural financing in Nigeria has over the years been largely a private indigenous activity. Of recent, government has intensified efforts and interest in the sector to infuse foreign private participation. According to Food and Agricultural Organisation, FAO (2019), Agricultural financing involves the provision of financial services such as loan, savings and insurance to support activities along agricultural value chain. Agricultural financing simply means the acquisition and utilization of funds for agricultural purposes. It involves the efficient

sourcing of funds on both money and capital market and the judicious and efficient disbursement of funds sourced for agricultural and agro-allied productions so that the investor will be able to pay both the interest and principle as and when due and generate enough return from his investment.

2.1.1.1 Sources of Agricultural Financing in Nigeria

Finance, in an economy, is basically from two (2) main sources – savings and borrowings. Savings, otherwise regarded as equities, is the basis of money economy which allows the release of production resource for investments in the production of goods and services and which enhances real economic growth. It is that part of the disposable income that is not immediately consumed. Borrowings, on the other hand, are the use of other people's money for investment purposes. While savings (equities) is a direct source of financing in an economy, credit (borrowings) is an indirect source. In the integrated and technology driven economy of today, it is evident that there is no amount of equities that can sustain the expected productivity of agriculture to meet the increasing need of the nation, either individually or corporately. It is therefore apparent that borrowing, otherwise regarded as credits, is the major and most ideal source of adequate financing for agriculture, just like any other commercial venture and/or any sector of the economy.

There are numerous ways of financing agriculture in Nigeria, among which are agricultural banks, deposit money banks, self-financing and government financing. Government at federal, state and even local level has made both direct and indirect effort to finance agriculture through moral suasion and other monetary policies. A major source of financing agriculture is the Deposit Money Banks. These were formerly known as commercial banks in Nigeria. Their loans are short-term and are used to finance annual and biennial crops such as cassava, citrus and oil palm as well as quick maturing livestock with medium term maturity of two or three years and in few cases long term perennial crops such as cocoa, kolanut and rubber which last for three or more years. Self-financing is another major source of agricultural financing, this occurs when a farmer decides to reinvest his saving in agricultural project or expands an already existing one. This attracts a slow process since saving depends on a lot of factors such as economic and fiscal policies. Government, both in federal, state and local level play a major role in financing agricultural projects in Nigeria. In short, they are the father of all other sources of finance. They give loans to farmers either directly or indirectly through some agencies like

Ministries of Agriculture, Agricultural Banks and Agricultural Development Programme (ADP).

In fact, commercial banks, merchant banks and other non-banking financial institutions through one incentive or the other are being urged to finance agriculture. However, when it seemed that the efforts to these financial institutions are not encouraging, government went a step further in establishing specialist financial institutions and specifically charged them to finance agricultural activities alone. One of such specialized banks is the Nigeria Agricultural and Cooperative Bank, now known as Nigeria Agricultural, Cooperative and Rural Development Bank (NACRDB) which was established in 1973 is aimed at stimulating the interest of Nigerians towards agricultural production, improve production technique, storage facilities and overall marketing of agricultural products in Nigeria as well as granting loans on fair terms to farmers. The chief financier of NACRDB is the Federal Government through the CBN. The major role of NACRDB in agricultural financing include: provision of loans and advances to individual farmer, cooperative organizations, limited liability companies as well as other aspect of agricultural sector; provision of direct finance and investment to agricultural and agro-allied industrial ventures and the guarantee of viable agricultural and agro-allies ventures in view of making them raise fund locally or internationally.

It is the duty of the financial institutions who as the financial intermediaries must intermediate efficiently between the savings unit and the investing unit to sustain continuous availability of borrowings (credits). The objective of agricultural financing policies is to establish an effective system of sustainable agricultural credit schemes, programmes and institutions that could provide micro and macro credit facilities for small, medium and large-scale producers, processors and marketers in the agricultural sector of the economy. The CBN (2005) asserted that "robust economic growth cannot be achieved without putting in place well focused programmes to reduce poverty through empowering the people by increasing their access to factors of production, especially credit."

a) Formal Financial Institutions

These include commercial banks, microfinance institutions, and development banks such as the Bank of Agriculture and the Nigerian Agricultural Cooperative and Rural Development Bank. These institutions provide a range of financial products including loans, credit facilities, and sometimes grants, tailored to meet the needs of large and small-scale livestock producers.

The Central Bank of Nigeria (CBN) also plays a pivotal role through initiatives aimed at boosting agricultural financing, such as the Commercial Agriculture Credit Scheme (CACS) and the Anchor Borrowers' Programme, which seek to increase funding allocation to the agricultural sector and reduce the risk associated with agricultural lending (Central Bank of Nigeria, 2021). Formal financial institutions are incorporated under the Companies and Allied Matters Act 1990, which gives them legal identities as limited liability companies, and subsequently licensed by the Central Bank of Nigeria (CBN) under the Banks and other Financial Institutions Act (BOFIA) 1991 to provide financial services under CBN regulation. The commercial banking system which is dominated by a few major banks reaches only 5% of households (World Bank, 2004) and financial analysts estimate that about 60% of the money supply in Nigeria is outside the commercial banking system. Over the years, formal financial institutions have generally shown little interest in agricultural finance for four reasons according to International Food Policy Research Institute, IFPRI (2010). First, many agricultural households were located in remote parts of the country and were often widely dispersed that financial institutions found it challenging to provide cost-effective and affordable services. Second, big swaths of the agricultural population were subject to the same weather and climate risks, making it hard for providers of financial services to hedge risks or operate profitable insurance pools. Third, service providers, mainly urban-based, simply did not know enough about the business of agriculture to devise profitable financial products. Fourth, most small agricultural producers in developing countries had little education and little knowledge of how modern banking institutions work. As a result of these difficulties, some innovations are adopted in recent times, namely; Index-based insurance schemes, microfinance, community banking, using modern communication technology to enhance payment system and financial institutions try to bundle financial services with non-financial services as some of the innovations in agricultural financing (IFPRI, 2010).

b) Informal Financial Institutions

These are non-regulated entities that provide financial services based on local customs or mutual agreement among parties. They include savings and loans groups, cooperatives, credit unions, and moneylenders. These groups often provide more accessible financing options for rural and smallholder farmers who might not meet the stringent requirements of formal financial institutions. Informal finance plays a critical role in livestock financing by offering more flexible terms and quicker access to funds, which is crucial during the planting and breeding seasons (Adeyinka, 2022). A lot of literatures abound about the origin, structures and

operations of the informal financial institutions in Africa and other continents. Obviously, whenever informal credit institutions are mentioned the first group of people that would come into one's mind is the informal sector of the economy i.e rural dwellers who are mainly poor people. According to CBN (2017), the informal sector covers a wide range of market activities. First, the informal sector is formed by the coping behavior of individuals and families in an environment in which earning opportunities are limited. Second, the informal sector is a product of rational behavior of entrepreneurs that desire to avoid state regulations, which simply means they operate outside the regulatory purview of the government. The informal sector engages in activities which are not easily measured and it cuts across a wide range of areas of informality — environmental, spatial, economic, and social, covering business activities, employment, markets, settlements, and neighborhoods. These activities include casual jobs, subsistence agriculture and unpaid jobs.

According to Obadeyi (2015), the informal financial institutions are specialized to promote grass root banking towards achieving rapid integrated rural development and entrepreneurship development. By definition, informal financial transactions do not involve legal documentation and are based primarily on a personal or business relationship. This makes them easier and attractive to rural people. Accepting this to be correct, informal credit institutions can be defined as local providers of funds for the people by the people. Ugwuanyi (2012) noted that traditional financial institutions dated back to the pie-evasion of Africa by foreign colonies. These institutions are deeply-rooted and inter-woven with the African culture and were as old as Africans themselves. Adogamhe, (2007) noted that rural institutions in Nigeria are as old as Nigeria as they started when Nigeria was created. He stressed that slave trade acted as one of the most primitive means of rural institutions finance provision. During that time, the modern money was not in use, hence crude means of transactions like the barter and later commodity money was in use.

Adam, (2007), defined informal financial institutions as a voluntary association of group of people united to encourage each other to save regularly part of their little earnings with a view of providing themselves with credit facilities at affordable interest rate. According to him, the origin of cooperative society which is one of the examples of informal financial institutions dated back to the 19th century in Germany. In the 1st half of the 19th century in Germany the peasant farmers were faced with serious problems in their farming activities as a result of lack of financial assistance either from the government or from the formal financial sector. To

resolve these problems, they resorted to credit facilities from local merchants who unfortunately charged them high interest rate, hence increased poverty level and its associated high default rate. Moved by passion, one of the German friendly-rich leaders by name Raiffeisen reacted to these problems and advocated for and formed societies which have common funds contributed by members and such funds were made available as loans to members at low interest rate without security. This move gave birth to the cooperative thrifts and has to a large extent ameliorated the finance suffering of the poor. Before his death in 1883, about 246 such societies were formed and they later spread to other parts of the world including Africa with different names but the same objectives, (Abdullah, 1993). Ijere (1998) linked the origin of cooperative thrifts in Nigeria to the establishment of the credit association known as 'Village Bank' in the Eastern Province by J.U Eka in 1938. These village banks later combined with indigenous 'isusu club' to become cooperative societies and are the most popular informal financial institutions in Nigeria even today. With this arrangement, the individual members have access to credit facilities for their businesses at friendly interest rate, collateral free with convenient time of repayment.

2.1.1.2 An Overview of Direct Financial Instruments for Agricultural production

Different financial instruments respond to different needs in the agriculture sector. Within each of the four groups, the financial instruments depend on the level of sophistication of the financial system in each country, and the willingness of the financers to take the risks in that particular market. Regulation and awareness programs also play a key role in the response to the financial needs. In addition to local financial institutions, foreign banks, development banks, governments and even actors in need of financial assistance, also provide financial solutions. Financing a particular actor of the agriculture sector is the traditional approach to financing in developing countries. This includes not only farmers but also other actors, such as input suppliers, processors, traders and exporters. All need financing to get food from the farm to the consumers. The following financial instruments are available:

1. Savings: An informal financial sector exists in countries all over the world, particularly in least developed countries, and provides for basic access to finance. The financing comes from the actors themselves. In many countries, it takes the form of community savings and non-formalized group financing mechanisms. The tontine, for example, is a Senegalese rotating system of raising capital through savings which is organized by small groups of people (Balkenhol & Gueye, 1992). In Ghana and Nigeria, women have formed groups, called esusu

group, to finance among them agricultural activities with a system that distributes the responsibility of collection and payments among the group members (IFAD, 2000).

2. Inclusive finance (or micro-finance): This instrument is slightly more sophisticated but still part of the informal financial sector. It is referred to as inclusive finance or micro-finance and has grown considerably in the last decade. The goal is to "expand access to affordable and responsible financial products and services by poor and vulnerable populations" (Principles for Responsible Investment, 2013). It includes savings, credit, insurance, remittances and payments and even guarantees to access finance. Micro-finance is particularly popular in developing countries. It has become so popular that specialized banks or units within financial institutions are also providing small loans and savings services, while accepting a wide variety of assets as collateral. The strength of microfinance institutions is the close contact with the community and, consequently, the understanding of the risk profile of customers.

3. Traditional finance: Within the formal financial system, the term "finance," which includes loans, leasing and equity finance (selling part of what you own to raise funds), is used to encompass the most common forms of finance for larger sums of money over longer periods of time. Finance can come from commercial banks, agricultural development banks, non-governmental organizations (NGOs), cooperatives or investors, in the case of equity finance. Recipients of these instruments can also benefit from support from government or international development banks (such as the World Bank and IFAD).

4. Leasing and factoring: In a country with a more developed financial system, financial institutions also offer more complex and innovative financial instruments to farmers and entrepreneurs, such as leasing and factoring. Leasing is used to finance machinery, automobiles and equipment in agriculture. Factoring is when a company sells its invoices to a third party (the factor) at a discount in order to improve cash flow. These mechanisms aim to reduce some of the traditional lending risks of agriculture. They are an alternative option for borrowers with limited collateral and credit history, to be able to rent machinery, equipment and other assets related to production (World Bank, 2009).

5. Weather-based insurance: This is an instrument that improves the chances for access to finance by insuring against bad weather. Although farmers prefer insurance for production loss, many financial institutions find the assessment too tedious and subjective. Weather-based insurance responds to objective parameters like rainfall or temperatures (World Food Program

& IFAD, 2011). Farmers who can obtain weather-based insurance have better access to other forms of financing as well. This instrument will seldom be offered in countries that lack sound statistical information (IFAD, 2011).

6. Credit guarantee schemes: To address the challenge of agricultural financing deficit and achieve food security, the central government introduced the Agricultural Credit Guarantee Scheme Fund (ACGSF) in 1977 to encourage formal financial institutions to increase and sustain lending to agriculture (Eyo, Nwaogu & Agenson, 2020). Under this scheme, the CBN act as a guarantor, and 75% of loans given to farmers by banks are guaranteed in the event of default (Nwosu, Oguoma, Ben-Chendo & Henri-Ukoha, 2010). This instrument also improves the chances for access to finance. These schemes "provide guarantees to groups that do not have access to credit by covering a share of the default risk of the loan. In case of default, the lender recovers the value of the guarantee" (Organisation for Economic Cooperation and Development (OECD), 2010. The types of financing described above can be combined in many different ways in the same project, with the participation of different actors. For example, development banks can make loans to financial institutions, which can act as intermediaries to lend or guarantee producers who, at the same time, can be also financed by a local bank. This structure has been carried out, for example, by the Inter-American Investment Corporation in Latin America (2014).

2.1.1.3 Problems of Agricultural Financing in Nigeria

In Nigeria, the acclaimed importance of credits in agribusiness promotion and development, notwithstanding their acquisition, management and repayment have been burdened with numerous challenges (Afolabi, 2010, Oboh and Ekpebu, 2011,) especially for the small holder farmer (Awoke, 2004). In the case of credit acquisition and management, Rahji (2000) observed that lack of adequate accessible and affordable credit is among the major factors responsible for the systemic decline in the contribution of agriculture to the Nigerian economy. With respect to repayment, high levels of loan default among borrowers remain a major impediment. Awoke (2004) reported that the high rate of default arising from poor management procedures, loan diversion and unwillingness to repay loans has been threatening the sustainability of most public agricultural credit schemes in Nigeria. Nwosu *et al.,* 2010 observed that late release of loan to a farmer leads to loan diversion / misuse which has been established to be a major cause of poor loan repayment. In the same vein Olagunju and Adeyemo (2007) argued succinctly that the problem of default in the repayment of agricultural

loans is one of the factors that have militated against the development of the agricultural sector in Nigeria, because it dampens the willingness of the financial institutions to increase lending to the sector. Whatever the cause, one direct consequence of loan default is that it has caused considerable reduction in the loanable funds to greater majority of loan seekers and also requires substantial amount of administrative cost and time to recover the amount in default (Udoh, 2008).

Partly because of the high default rate most credit institutions are becoming more reluctant to extend loan to smallholder farmers (Afolabi, 2010, Olagunju and Adeyemo, 2007) in dire need of the facility. Towards curtailing loan defaults and enhancing loan repayment performance among Nigeria farmers, formation and memberships of farmers' groups have been advocated. A group is a collection of individuals among whom a set of interdependent relationship exist; Groups are characterized by interaction shared values and beliefs, common goal structure and ideology (Ofuoku and Urang, 2009). Co-operatives are forms of groups that have been encouraged among farmers as instruments of social and economic transformation (Onyenucheya and Ukoha, 2007). Under the co-operatives membership model, farmers were encouraged to become members of cooperative associations which would be registered have elected officials and be holding regular meetings with documented minutes (Ofuoku and Urang, 2009).

Ololade and Olagunju (2013) hold the view that unless production credit is made available on suitable terms, the majority of the small farmers will be seriously handicapped in adopting profitable technology. Also, he outlined three reasons why credit is demanded by small scale famers. These are:

i. The farmers require credit for production purposes;
ii. Credit is required for the payment of wages, procurement of inputs, like fertilizers, herbicides and improved seeds;
iii. Credit is needed for marketing of produce like transportation, storage, processing and other marketing related functions.

However, the problem of agricultural financing in Nigeria according to Ugwuanyi (2012) could be explained in two different settings: The problems associated with agriculture itself and problems created by the farmers themselves.

a. Problems associated with agriculture itself:

(i) Unsystematic Risks: These are risks which are beyond the control of the farmer. They have to do with natural hazard, flood, drought and so on.

(ii) Time Lag: This comes as a result of changes in weather or climate, for example, failure of rain to come at the usual time could have serious consequences as farming seasons could be delayed, resulting in default in loan repayment or serving of loans.

(iii) The Nature of Land and Immobility of Labour: The almost inelastic nature of land and the immobility of qualified farm workers equally contribute to the risky nature of agriculture, making it difficult for those in business to have access to credit especially from financial institutions.

(iv) Slow Rate of Return: Some agricultural activities require a very long gestation period, resulting in slow rate of return especially in the early years of investment. It follows from the above that Agricultural investors (farmers) take long to break-even, hence, in the initial stage of investment, agricultural investors (farmers) find it very difficult in serving their loans.

b. Problems created by farmers:

(i) Loan diversion: The causes of loan diversion are many and varied. For example, the burden of extended family system can compel a farmer to use a part or all the loans he has just received from a bank to pay the hospital bill of a mother-in-law. Also, unfavourable investment climate in agriculture sector and delays in the disbursement of approved agricultural credit can also lead to loan diversion.

(ii) Unwilling cooperative attitude: To be able to pay the principal and interest on borrowed funds and to make farmers access new agricultural credits at affordable rate, farmers are encouraged to form cooperative societies. Interestingly, studies have shown that where such cooperatives are formed at all, the spirit and absolute loyalty of the farmers is not there.

(iii) Ignorance about the source of funds: Many farmers are illiterate and ignorant of the current happenings in relation to the availability of agricultural credits, as they have refused to unlearn the crude methods of farming and agricultural financing and adopt new innovation in agricultural finance and happenings.

(iv) Lack of management or management skills: Many farmers lack the desired managerial expertise or skills needed for effective agricultural operation. Many embark on agricultural investment without conducting feasibility study to evaluate the commercial viability and

economic desirability of their proposed investment. Approaching any financial institution for loan without a feasibility report therefore triggers fear of default of loan repayment and imposes a strong constraint that leads to the non-accessibility of credits by agricultural operators.

(v) Inadequate collateral, government policies that affect availability and quality of agricultural credit.

2.1.1.4 Solutions to the problems of agricultural financing

Agricultural credit suppliers are not likely to be persuaded to extend credit which fails to generate substantial return in form of interest or is not fully secured. Suggestions to reduce the problems encountered by financial institutions in their small-farmer lending programmes include the following:

(i) Group Loans: This approach focuses on groups rather than on individual farmers. The expectation is that it reduces administrative costs of reaching borrowers. Group credit is extended to farmers who form some sort of associations, credit unions, cooperatives and so on. Such organizations play the role in the securing, sharing and repayment of such funds. Group loans may lower interest charges and make loans better secured. It operates most successfully if the following conditions prevail:

a) Existence of a viable group in the farming community with a credible record of successfully working together.
b) In the absence of an existing group, a potential exists for individuals to form a group to jointly address common economic and social interest.
c) A good and credible leadership within the group.
d) There should be a marketing arrangement that aids collection of loans when products are disposed of.
e) Credit must be committed to profitable and productive enterprise that the farmers are sure is potentially rewarding.
f) Productive inputs (breeding stock, credit, fertilizer, seeds, etc) must be available at the right time.

(ii) Linking Savings with Credit: The role of capital formation in economic development cannot be overemphasized. Without savings the volume of loanable funds remains limited. To encourage savings by farming communities the following strategies have been proposed and tried in several countries, (i) cooperative savings schemes, (ii) credit unions – linking savings and credit to meet the short-term and seasonal credit needs of farmers and (iii) local savings

credit societies which could be effective if well organized and in the absence of formal savings institutions nearby.

(iii) Credit Arrangement That Incorporates Education, Input Supply and Marketing: When credit to small farmers is accompanied with extension education, input provision and advice on marketing, farmers are likely to use credit profitably. Similar experience has been shared in several African countries. Multipurpose cooperatives and agricultural service centres have proved quite useful.

(iv) Subsidized Inputs and Education but No Credit: Substituting extension education and subsidized inputs for credit has also been proposed. This method may be suitable to development agencies and project authorities but may not be acceptable to commercial credit providers. The effectiveness of these approaches has varied from one country to the other and from one type of financial institution to the other. What is undisputable and clear is that the commercial segment of the credit market is yet to devise a means by which it is to contribute much more significantly than it has done so far. It is unlikely that participants in this segment of the market will be persuaded to accord agriculture any favour that falls far short of the price of capital, that is, an adequate interest on loans disbursed to any of the economic sectors, including agriculture.

2.1.1.5 Prospects of Agricultural financing

The growing livestock farming sector is providing good returns on investment for investors and gaining greater share of voice for its proponents. The sector's steady growth has attracted investors over time. As Nigeria's and indeed the global population growth shows no signs of slowing down, demand for food will continue to increase. Strategic planning is needed for increased growth and greater returns. Additionally, direct involvement in livestock sector is a sure guarantee of food on the table. With Nigeria relying on imports to meet its increasing food and agricultural product needs, the opportunities in the sector cannot be overemphasized. According to the Federal Ministry of Agriculture and Rural Development (FMARD) 2019, Nigeria spends $5bn to import foods annually out of which $1.5bn goes to importation of milk and other dairy products, a pointer to the many profitable opportunities that comes with financing livestock production.

Livestock production involves inherent risks, such as disease outbreaks or natural disasters. Due to different circumstances, including climate, economic, and infrastructure conditions, livestock diseases will not disappear in the near future. As such, there is a need for risk management tools and financial products that can help mitigate these risks. Investors who specialize in risk management may see opportunities in financing these solutions.

Technological advancements in agriculture, such as precision livestock farming, can improve efficiency and productivity in livestock production. These innovations may attract investors who see potential for returns on their investment. Also, many consumers are becoming increasingly mindful of the environmental impact of livestock production. As a result, there is a growing market for sustainably-raised animal products. Investors may see potential in financing eco-friendly and ethical livestock operations that meet this demand.

It is estimated that up to 80 per cent of livestock farming expenses are spent on animal nutrition and supplies for better carcass quality. This means that for one to make profit out of livestock production, one has to perhaps consider that a lot of investment is required and this investment cannot be achieved without adequate capital. Financing livestock production will provide livestock farmers with the needed capital to carry out capital intensive production to increase productivity, (Udechukwu & Onduku, 2021). Nigeria government may offer more financial assistance, such as subsidies and loans, to support livestock production. This support can make it easier for producers to access financing and reduce financial risk.

2.1.2 Concept of Credit

Credit is the trust which allows one party to provide money or resources to another party wherein the second party does not reimburse the first party immediately (thereby generating a debt) but promises either to repay or return those resources (or other materials of equal value) at a later date. In other words, credit is a method of making reciprocity formal, legally enforceable, and extensible to a large group of unrelated people. The resources provided may be financial (e.g. granting a loan), or they may consist of goods or services (e.g. consumer credit). Credit encompasses any form of deferred payment, O'Sullivan and Sheffrin (2003). Credit is extended by a creditor, also known as a lender, to a debtor, also known as a borrower.

Credit is also obtaining control over the use of money at the present time in exchange for a promise to repay it at some future time. Credit can further be defined as a device for facilitating

the temporary transfer of purchasing power from those who have surpluses of it to those who need it. Thus, credit involves a temporary transfer of wealth. Financial services (including Credit, Savings and Insurance) are crucial inputs required by the smallholder farmers in developing countries. Credit and savings help small holders to establish and expand their farms with the aim of increasing agricultural production, invest in land improvements or agricultural technology, enhancing food sufficiency, promoting household and national income, and augmenting the individual borrower's ability to repay borrowed fund. It enables the poor farmers to tap the financial resources and take advantage of the potentially profitable investment opportunities and establish or expand family enterprises in their immediate environment (Zeller & Sharma 2000). The ability to modernize the agricultural sector of any nation like Nigeria depends inter alias on the availability of capital. Modern agricultural production systems are capital intensive and as such large proportion of capital used in farming is borrowed. Credit is crucial in the agricultural sector to enhance the productivity of crops and animals used as food for human beings (Akmal *et al.*, 2012). It plays a vital role in economic transformation and rural development hence, necessary for improving agricultural production especially large-scale production (Development Bank of South Africa, 2005).

2.1.2.1 Agricultural Credit

Agricultural credit has been defined as present and pro term transfers of purchasing power from a person who owns it to a person who wants it, allowing the latter the opportunity to command another person's capital for agricultural purposes but with confidence in his willingness and ability to repay at a specified future date (Kuwornu *et al.*, 2013). In other words, a transaction between two parties in which one, acting as a creditor or lender, supplies the other, the debtor or borrower, with money, goods, services or securities in return for the promise of future payment is known as credit (Kosgey, 2013). FAO and World Bank, (2001) defined credit as a device of facilitating the temporary transfer of purchasing power from one individual or organization to another. Igben and Eyo (2002) described agricultural credit as encompassing all loans and advances granted to borrowers whether beneficiaries of agricultural reform or some others to finance and service production activities relating to agriculture, fisheries, forestry and also for the processing, marketing, storage and distribution of products resulting from these activities. Agricultural Credit may not only mean loanable funds, it also includes provision of agricultural inputs like fertilizers, seedlings, day-old chicks, insecticides, livestock breeds etc.

Agricultural credit is a crucial input required by the smallholder farmers to establish and expand their farms with the aim of increasing agricultural production, enhancing food sufficiency, promoting household and national income, and augmenting the individual borrower's ability to repay borrowed funds. It enables the poor farmers to tap the financial resources and take advantage of the potentially profitable investment opportunities in their immediate environment (Afolabi, 2010). The need for credit facilities is necessitated by the limitations of self-financing uncertainty pertaining to the levels of output and the time lag between inputs and output. However, its accessibility is imperative for improvement in the quality and quantity of farm products, so as to increase farmer's income and reduce rural-urban drift (Kohasal and Mansoori, 2009). It is believed that farmer credit is an indispensable tool for achieving socio-economic transformation of the rural communities. If well applied, it would stimulate capital formation and diversified agriculture, increase resource productivity and size of farm operations, promote innovations in fanning marketing efficiency and value addition while enhancing net farm incomes (Enoma, 2010).

According to (Stevens and Jabara, 2000), improvements in rural credit enable economic development in at least five ways. First, the rural financial markets provided by banks enable a greater mobility and flexibility in exchanges in rural areas. Farmers are able to make payments from distant locations without having to meet in person. Second, rural savings and loans enable improved resource allocation. This occurs when they mobilize excess cash from farmers with few, low-return investment opportunities and lend it to the farmers with higher-return investment prospects. Third, loans allow farmers to better manage the inherent risks associated to the nature of the agricultural production (high variation in weather conditions and prices). Fourth, loans enable farmers to take on large investments. And fifth, loans ameliorate life-cycle problems, in which the young need to acquire farm and household assets--often by borrowing from community members who have accumulated savings.

2.1.2.2 Classifications of Agricultural Credit:

Agricultural credit can be classified based on time (repayment period), purpose, security, generation of surplus funds, creditor/lender wise and number of activities for which credit is provided.

1. Classification based on time (repayment period)

a. Short-Term Credit:

The short-term credit ranges up to one year. The farmers need short term credit for meeting the working capital arrangements of agriculture. For instance, they need short-term credit for the purchase of feeds, seeds, fertilizers, pesticides, bullocks and other casual expenses. Sometimes short-term credits are also raised for paying rents, revenue and meeting the financial requirements of the family. The short-term credit is repaid after marketing the produce of next crop.

b. Medium-Term Credit:

The medium-term loan extends from 1 to 5 years. The farmers require medium term credit for the purchase of cattle, purchase of implements, improvements in water courses etc. The loan is obtained on the security of movable and implements.

c. Long -Term Credit:

It is advanced for periods more than 5 years and extends even unto twenty-five years against mortgage of immovable property for undertaking development works viz., sinking wells, purchase of machinery and implements, reclamation of land, building, and making permanent improvements in the farm. It has to be repaid in half-yearly or annual instalments.

2. Classification based on purpose

a. Development credit or Investment Credit: This is provided for acquiring durable assets or for improving the existing assets. Under this, credit is extended for:

- purchase of land and land reclamation.
- purchase of farm machineries and implements
- development of irrigation facilities
- construction of farm structures
- development of plantation and orchards
- development of dairy, poultry, sheep/goat, fisheries, sericulture, etc.

b. Production credit: is given for crop and animal production: Here, the loan amount is used for purchasing inputs and for paying wages.

c. Marketing credit: It is essential to carry out the marketing functions and to get higher prices for the produce.

d. Consumption credit: It is the credit required by the farmer to meet his family expenses.

3. Classification based on Generation of Surplus Funds

a. Self-Liquidating Credit: In this case, loan amount gets absorbed in the production processing one year or production period and the additional income generated is sufficient to repay the entire loan amount.

b. Non-Self-Liquidating Credit: Here the resources acquired with the borrowed funds are not consumed in the production process during the project period. The investment is spread over a period of several years. The additional income generated in one year is not sufficient to repay the entire loan amount and hence the repayment is spread over to number of years.

4. Classification based on Creditor or Lender

a) **Non - Institutional Agencies:** They include co-operatives, money lenders, traders, commission agents, friends and relatives. This kind of loan is generally exploitative.

b) **Institutional Agencies:** They include commercial banks and regional rural bank.

2.1.2.3 Characteristics of Credit

Some characteristics of credit are of prime importance while extending credit to an individual or to a business enterprise according to Reeta Mathur.

1. **Confidence:** Confidence is very important for granting or extending any credit. The person or authority must have confidence on debtor.
2. **Capacity:** Capacity of the borrower to repay the debt is also very crucial thing to be considered. Before granting or extending any advance, creditor should evaluate the borrower's capacity.
3. **Security:** Banks are the main source of credit. Before extending credit, bank ensures properly about the debtor's security. The availability of credit depends upon property or assets possessed by the borrower.
4. **Goodwill:** If the borrower has good reputation of repaying outstanding in time, borrower may be able to obtain credit without any difficulty.
5. **Size of credit:** Generally small amount of credit is easily available than the larger one. Again, it also depends on above factors.
6. **Period of credit:** Normally, long term credit cannot easily be obtained because more risk elements are involved in its security and repayments.

2.1.2.4 Credit Demand and Supply

Agricultural production is faced with several challenges including weak land tenure system, limited irrigation facilities, climate variability, shrinking arable land caused by land degradation and urbanization, and deteriorating soil fertility caused by continued use of the farms (Omboi, & Wangai, 2011). Poor quality breeds, poor management system, poor marketing and distribution system, low access to credit facilities, inadequate veterinary services and high cost of inputs have compromised livestock production leading to reduced yields. During production, livestock farmers need proper management of their breeds to ensure high and quality production and prevent losses. Livestock operators need credit facilities to facilitate the acquisition of land and equipment. There is also a growing recognition of the fact that institutional credit is increasingly becoming an integral part in modernizing agriculture. Agricultural credit is defined as loans given to farmers to assist them in buying farm inputs, quality breeds of livestock, certified seeds and for use as capital investment in the farm to carry out different farming processes among other uses (Dethier & Effenberger, 2012). As the name suggests, these credit facilities are confined to agricultural development.

Technological changes are critical in managing livestock to ensure maximum productivity. When farmers adopt new farming technologies, they increase the demand for labour and other labour-intensive entrepreneurial activities that further create the demand for credit facilities to enable successful livestock operations. Farmers, therefore, need to embrace credit facilities that enable them to improve sustainability in production and increase the prospects of achieving the expected yields. Yawson *et al.,* (2010) asserted that the availability of subsidized fertilizers to smallholder farmers and access as influenced by credit facilities was associated with the frequency of use and ultimately changes in farm food production. Credit facilities, especially loans, are also said to influence how farmers access agricultural extension services that further influence the outcomes of their farming experiences. It is clear that there is high demand for credit to finance farm operations, adoption of better farming technologies and other agricultural needs but the extent to which individual factors influence the demand is not known. Also access and supply of credit, especially from formal sources do not match the demand and farmers then opt for informal credit.

It is believed that demand for credit by smallholder farmers outstrips supply. This presumption implies that most rural households exhibit positive demand for loan facilities, but the lending institutions normally determine participation in the loan market. As a result, many studies both

theoretical and empirical have focused on the supply side constraints with little emphasis on the demand side (Mpuga, 2010). Several studies have been done on both access and demand for credit in different continents, regions, and countries yielding inconsistent outcomes. A study by Gurmessa and Ndinda (2017), cited that there is a substantial unmet investment demand for small and medium and micro enterprises amounting up to 80 % and 90 % respectively in Latin America and African countries. In China, several studies have shown that more than 75% of demand for credit in the rural areas is either unmet or rationed. Similarly, Muayila, and Tollens (2012) in their study in DRC found out that an estimated 71% of the participating households had experienced some form of credit constraints or rationing. From these studies, it is evident that smallholder farmers exhibit positive demand for loan funds but, limited access; rationing and participation in the credit market are popular challenges.

2.1.2.5 Financial Credibility and Creditworthiness

Credibility is the quality of being trustworthy, reliable and believable. Credibility in this case, is a general concept that encompasses not only financial aspects but also other qualities such as reputation, integrity and trustworthiness. A farmer is considered financially credible when they demonstrate a strong ability to manage finances and make timely payments (repayments) and show trustworthiness in honouring loan repayment agreements (Meyer, 2015). In debt repayments, while creditworthiness assesses the ability to repay debts, credibility evaluates the trustworthiness, reliability and integrity in debt repayment. The credibility proposition and its underlying theory hold that credibility is endogenous, and significantly affected by the characteristics of farmers' age, gender, education level, household income, and income sources (Zheng & Ho, 2020; Sun & Ho, 2018). Given the inherent nature of credibility, which is shaped by individual's actions and behavior, formal credit institutions prioritize factors such as applicants' criminal history, age, citizenship, education, job history, and free cash flow for repayments when issuing loans (Chmelíková & Redlichová, 2020).

In the realm of agricultural finance, where trust and reliability are of paramount importance, assessing the financial credibility of farmers stands as the bedrock of sound financial decisions. Through a thorough evaluation encompassing credit history, income, collateral, industry and economic trends, debt-to-income ratio, and credit utilization, these assessments provide a comprehensive view of a farmer's financial credibility. Financial Credibility refers to the trust and confidence that individuals, businesses or organisations inspire in their ability to manage finances responsibly and repay debts. It reflects a person's or

entity's financial reliability and stability, often assessed by credit ratings, credit scores, financial history and overall fiscal behavior. Strong financial credibility is crucial for securing loans, investments and favourable terms with creditors while poor credibility can limit access to financial services and lead to high costs or penalties. It is typically built through consistence bill payments, low debt levels, responsible credit use and maintaining positive relationships with creditors.

Creditworthiness has to do with the ability of a borrower to pay current debt. Within the context of the ability, several basic factors come into play. An evaluation of the creditworthiness of a borrower involves identifying the presence of resources that may be used to repay debts, the willingness of the debtor to use those resources for repaying debt, and a history of choosing to repay debt obligations in a timely manner. When creditors choose to extend credit to an individual or business, that extension of credit is based on the understanding that the borrower will have resources that can be used to repay the debt. The resources are normally thought of in terms of some type of cash flow. The cash flow may be from income earned from a job, or income that is received in exchange for goods and services provided to clients. Even a cash flow that results from regularly scheduled disbursements from a trust or interest income payments may be considered a verifiable type of cash flow.

Once it is established that the borrower has a flow or resources that can be used to honor the debt, it is necessary to determine if there is a willingness to follow through and actually make the payments. This is where the past credit history of the individual or business becomes important. When the borrower has a history of paying outstanding debt within terms, this is a strong sign of past creditworthiness. Using past history as an indicator, a creditor can reasonably assume the borrower will demonstrate a similar pattern in the future. Creditors will also look at the current amount of indebtedness that the individual is carrying. By comparing the ratio between current debt and income, it is possible to determine if the borrower can reasonably handle another obligation without significantly increasing the risk of default. This element of the evaluation process is in the best interests of the borrower, as it helps to prevent establishing an obligation that could have a negative impact on overall creditworthiness. Proper management of available resources goes a long way toward establishing and maintaining creditworthiness. By keeping debts in line with available income and paying off the debts in a timely manner, the credit rating of the individual will be healthy and attractive to prospective creditors.

According to Professional Banker, 2009, the creditworthiness of the applicant calls for a detailed investigation of the 5 "C" of credit – Character, Capacity, Capital, Collateral and Conditions.

a. Character:

The "character" means the reputation of the prospective borrower. This includes worthiness, industry, etc. The honesty and integrity of the borrowers is of primary importance. So, credit character should be judged on the basis of applicant's performance in bad times. Past payment history as well as any pending or resolved legal judgments against the applicant would be used to evaluate its character.

b. Capacity:

It is the management ability factor. It indicates the ability of the potential borrower to repay the debt. It also shows the borrower's ability to utilize the loan effectively and profitably. Financial statement analysis, with particular emphasis on liquidity and debt ratios, is typically used to assess the applicant's capacity.

c. Capital:

Capital refers to the general financial position of the potential borrower's firm. It indicates the ability to generate funds continuously over time. It is the financial strength of the applicant as reflected by its ownership position. Analysis of the applicant's debt relative to equity and its profitability ratios are frequently used to assess its capital.

d. Collateral:

Collateral means assets offered as a pledge against the loan. It serves as cushion at the time of insufficiency, giving a reasonable assurance of repayment of the loan. The larger the amount of available assets, the greater the chance that a firm will recover its funds if the applicant defaults. A review of the applicant's balance sheet, asset value appraisals, and any legal claims filed against the applicant's assets can be used to evaluate its collateral.

e. Conditions:

It refers to the economic and business conditions of the country and position of particular business cycle, which affect the borrower's ability to earn and repay the debt. This is beyond the control of the borrower. Sometimes borrower may have a high credit character, potential ability to produce income but the condition may not be in favor. For the proper evaluation, bank should have eyesight on the economic condition too. For this, they have to rate the borrowers in different categories like excellent, well and poor.

f. Confidence:

A successful borrower instills confidence in the lender by addressing all of the lender's concerns on the other five C's. Both the formal and non-formal tools combined would lead to perfection in credit appraisal and ward of increasing default tendency in credit. There are number of tools and techniques developed to evaluate the creditworthiness of the borrower like, ratio analysis, cash flow projections, fund flow statement, credit scoring etc.

2.1.3 Livestock Production

Livestock are domesticated animals raised in an agricultural setting to produce commodities such as food, fiber and labour. Livestock are generally raised for profit. Livestock occupy almost one-third of the ice-free terrestrial land surface of the globe and are an integral part of human history, providing multiple benefits beyond the obvious supply of food and fibre. Livestock production refers to the agricultural practice of breeding, raising, and managing animals for the production of meat, milk, eggs, fiber, and other products that humans use for food, clothing, and various industrial purposes. This field is a vital component of the agricultural sector and plays a significant role in the global economy, food security, and rural development. According to Thorton, 2010, the following livestock production systems are commonly practiced:

a. Extensive Systems:

- **Pastoralism:** This involves the grazing of animals on natural pastures. It is prevalent in arid and semi-arid regions, where crop farming is challenging due to low rainfall. Animals like cattle, sheep, and goats are common in this system. The key feature is that it relies on natural resources, and the productivity is often low but sustainable in the long term.
- **Ranching:** A more structured form of extensive livestock production, where large tracts of land are used for grazing livestock. Ranching is often practiced in regions with low population density, like parts of the United States, Australia, and South America.

b. Intensive Systems:

- **Feedlots:** These are industrial-scale operations where livestock are raised in confined spaces, often fed high-energy diets to promote rapid growth. Commonly associated with cattle, pigs, and poultry, feedlots are designed to maximize production efficiency and output.
- **Poultry and Swine Operations:** Highly specialized, these operations involve raising

chickens or pigs in controlled environments. They are characterized by high animal density, controlled feeding, and rapid production cycles, often resulting in higher yields but raising concerns about animal welfare and environmental impact.

c. Semi-Intensive Systems:

- This is mix of extensive and intensive methods, where animals are raised in pastures or open spaces but supplemented with feed, particularly during periods of low forage availability. This system is common in dairy production, where cows are grazed but also receive additional feed.

Components of Livestock Production

- **Animal Breeding:** Selective breeding is employed to improve desirable traits in livestock, such as growth rate, milk production, or disease resistance. Breeding programs can involve crossbreeding, artificial insemination, and, increasingly, genetic engineering and genomics.

- **Nutrition and Feeding:** Proper nutrition is critical for optimal animal growth, reproduction, and product quality. Livestock diets vary depending on the species, age, and production system. Ruminants like cattle can digest fibrous plants, while non-ruminants like pigs and chickens require more concentrated feeds.

- **Health and Disease Management:** Maintaining animal health is essential for productive livestock farming. Disease outbreaks can devastate herds, so preventive measures like vaccination, proper sanitation, and veterinary care are integral. Biosecurity practices are also crucial to prevent the spread of diseases.

- **Animal Welfare:** The ethical treatment of animals is a growing concern in livestock production. Practices such as confinement, tail docking, and debeaking have been criticized. Welfare considerations now increasingly influence consumer preferences, regulatory policies, and farming practices.

- **Environmental Impact:** Livestock production significantly impacts the environment. It contributes to greenhouse gas emissions (methane from ruminants), deforestation (for pasture land), water usage, and pollution (from manure and chemical runoff).

Sustainable practices are being developed to mitigate these effects, including rotational grazing, manure management, and reducing the carbon footprint of livestock operations.

Livestock production in sub-Saharan Africa has negatively impacted wildlife biodiversity mostly due to competition and disease (Ripple *et al.,* 2015). Accurate livestock diet balancing and formulation is crucial to make best and most profitable use of the feeds available in each unique production situation and deliver appropriate energy and nutrients that allow animals to express their genetic potential for growth, development, and production. It can also be important to minimize the excess of nutrients (those that will not be absorbed and utilized by the animal) that would otherwise be excreted into the environment. This practice is commonly known as precision feeding and has been defined as 'feeding livestock so that animal performance is not adversely affected but so that nutrient excretion to the environment is the smallest quantity possible' (Cole 2003). Other definitions including economic and social aspects have also been suggested. Opportunities have been documented for nitrogen and phosphorus nutrition (Vasconcelos *et al.,* 2007; Cerosaletti *et al.,* 2004) and feeding management (Vasconcelos *et al.,* 2006). Similarly, mitigation strategies for methane emission by livestock, especially ruminants, have also been proposed (Knapp *et al.,* 2014; Gerber *et al.,* 2013; Tedeschi *et al.,* 2011; Eckard *et al.,* 2010; Tedeschi *et al.,* 2003). Diet and feeding practices that have been reported (based on survey analysis) to improve sustainability include (1) minimizing water pollution, deforestation, and air pollution from an environmental perspective; (2) producing animal protein affordably without competing with crop cultivation for human food or compromising ethical aspects of livestock wellbeing; (3) reusing feed waste after ensuring its safety; and (4) providing incentives to those adopting sustainable diet and ethical feeding practices (Makkar and Ankers, 2014). Many of these goals, however, can only be achieved with the assistance of decision support systems through computer modeling and simulation that accurately and precisely formulate diets that meet animal demand for energy and nutrients for an optimized performance under various production scenarios, hence the importance of finance.

2.1.3.1 Problems of Livestock Production

There is a wide range of problems facing the livestock production industry, they exist in all forms and contribute adversely to the growth of livestock production. They include but are not limited to the following:

i. Capital

This is one of the most critical problems facing livestock farming, especially in developing countries. Capital is one of the most crucial factors of production known to man. A farmer needs money to set up his farm and manage the same. The financial constraint has led to slow growth in animal production. Low-income earners dominate the livestock farming industry and therefore find it hard to meet up with the demand of livestock production in terms of management and sustainability. Conventional banks avoid extending credits to the resource poor livestock farmers because of the relative high cost and risks associated in doing so, despite the fact that they form the large part of farming population.

ii. High cost of animal feeds

Profit is the major aim of any business, agriculture itself is business, and in livestock farming, nutrition is a major determinant of the productivity of the animals. Unfortunately, animal feeds are not readily available and even when they are, they are expensive. Though some of the food taken by ruminants are natural, for instance, grasses and legumes, these grasses can be cultivated through hydroponic method, establishing this in itself requires a lot of money. This is a big challenge for livestock farmers because they need to obtain their animals feeds at a low price to make profit from sales when the animals mature.

iii. Low Investment Potentials

In the case of ruminants, due to the slow rate of growth during the gestation period, financial institutions are reluctant to invest in them considering the time they will take in maturing unlike the non-ruminants that can be have 2 to 3 production cycles in a year. This usually makes them less attractive for investments potentials from these financial institutions which automatically affects farmers and makes it difficult for them to borrow funds for expansion.

iv. Diseases

Diseases of livestock remains a real threat to the livestock production industry in Nigeria. These diseases are so prevalent that they limit the production of livestock, increase the rate of illness and finally cause widespread death of livestock which in return leads to grave economic losses for farmers.

v. Inadequate storage facilities

Storage is a crucial part of livestock production, unfortunately, in most developing countries, storage facilities are far-fetched. Farmers are often on the bad end side of poor storage facilities; livestock products are perishable and therefore do not survive over a long period without proper storage. This is a major setback in the growth of livestock farming in most developing countries.

vi. Dependency on manpower

Agriculture generally has gone beyond using man as a source of energy, machines are used in the developed world for almost all production activities. With a larger percentage of livestock farmers as low-income earners who can hardly afford the machines needed to execute production activities, they depend on manpower. This slows the rate of production.

vii. Inadequate infrastructural development

Inadequacy of infrastructure for livestock farming has caused a huge gap in production. There is a general lack of mechanized animal farming in most developing countries especially in Africa. Much of what we enjoy today as a result of ruminant livestock production, are really produced by way of traditional methods, that is, subsistence method, as farmers are not buoyant enough in terms of finance, and the modern technology to go into commercial or large-scale production are not there, Joseph (2018). The use of machines promotes production activities, quality of products and reduces the rate of time consumption. Unfortunately, these needed machines are not always available to farmers in developing countries.

viii. Education level of farmers

In Africa for instance, a larger number of livestock farmers are uneducated or not properly educated. This makes it hard for farmers to understand new ideas, methods or system. There is already a huge gap in information (new ideas and innovations) circulation but even in cases that the information gets to the farmers. They lack the required technical know-how to execute the ideas. Joseph (2018), opined that, many Nigerians who are into ruminant livestock production lack the requisite knowledge of animal husbandry. With little grants and loans they get from the government, they do not have what it takes, the modern know-how to go about the business in commercial dimension; they are not investing in relevant literature or a body of knowledge that can direct or instruct them on how to go about animal husbandry.

2.2 THEORETICAL LITERATURE

Financial services access has two dimensions: demand and supply (Claessens 2005). The demand side examines the choice made by individuals with regard to services provided by financial institutions, while the supply side relates to financial services provision or financial intermediation. Theories on access to financial services provide a general framework for demand for financial services (demand dimension) and financial intermediation (supply dimension). There are several theories that relate to decision making in the economic literature. These theories include rationality theory, bounded rationality theory, theory of satisficing,

prospect theory, intertemporal theory, delegated monitoring theory, information asymmetry theory, and transaction cost theory (Scholtens & Wensveen, 2003). However, based on the theme of the study, which deals with financing of livestock production by formal and informal financial institutions, the study concentrates on these four theories:

2.2.1 Delegated Monitoring Theory

The theory of delegated monitoring propounded by Diamond (1984) claims that financial institutions possess the ability to act as delegated monitors for net savers. In this context, depositors have delegated the role of safekeeping of their savings to the financial intermediaries as well as entrusting them to invest their savings prudently for better returns. Thus, financial service providers have the fiduciary relationship with their clients to ensure no depreciation in deposit value or losses occur through bank staff negligence or excessive risk taking. They are likewise being entrusted with keeping depositors' and borrowers' accounts strictly confidential as financial information is costly. These intermediaries are being delegated to assess information correctly and sufficiently to arrive at sound investment and loan decisions. In this case, after loan disbursement, depositors expect the financial intermediaries to act as their agents to monitor the loan accounts and the financial position of the borrowers in order to ensure smooth loan repayments and interest. Therefore, financial intermediaries take the necessary action to execute their delegated monitoring function honestly, effectively, and efficiently to ensure that the shareholders' wealth is maximized. In view of this, savers may withdraw their savings to discipline the financial institution if they believe the interest is not being upheld by the financial institution or if they believe the activities of the financial institutions are not in their interest.

2.2.2 Rational Choice Theory

The rational choice theory is propounded by neo-classical economists. The theory, generally, starts with the consideration of the choice behaviour of the individual farmers making the decision. The proponents of the rational choice theory believe that the individual making the decision is a "representative" of a group in a financial market, such as farmers. The analysis of rational choice theory of demand for financial services generally involves a description of the following: (i) the desire for financial services (savings, credit, and money transfer services); (ii) nature and type of services provided by the financial institutions; (iii) the condition under which these services are provided. The individuals face the problem of choice among services provided by the intermediaries. The approach of the rational choice theory is based on the

fundamental principle that the choices made by the individual are the best choice to help him/her to achieve their objectives in the light of all the uncontrollable factors. The utility function is used by the rational choice theory as a mathematical function that assigns a numerical value to each of the possible alternatives the individual making the decision faces. The demand for financial services is a function of the service characteristics, the attributes of the provider of the service, and the decision-making unit. This theory has been heavily criticized on the basis that the assumptions made under the rational choice theory fail to take account of the fact that the success of the outcome of a decision is also influenced by the conditions that are not within the control of the individual making the decision. Despite this criticism, the theory has demonstrated a good basis in explaining how individual economic decisions are affected by their attributes. In this regard, this theory is important in explaining access to financial services as the attributes of the individual heavily influence both the demand and supply dimensions of access to financial services.

2.2.3 The Credit Rationing Theory

The credit rationing theory, propounded by Stiglitz and Weiss (1981), provides a framework for analyzing financial market inefficiencies. It asserts that, information asymmetry is the main cause of financial market malfunctioning in developing countries. Therefore, in our world today where people can easily get all the information they need, banks could precisely predict all actions by borrowers but may not be able to control such actions. The terms of loan contract are thus designed in a manner that induces borrowers to take actions in the interest of banks, and that also attracts low risk borrowers. For both reasons, the expected returns of banks increase less rapidly than the interest rate and beyond a certain point, actually declines. The moral hazard problem, on the other hand, is that a risk-neutral firm will prefer projects with low probability of bankruptcy and hence make lower expected returns.

The most important conclusion from Stiglitz and Weiss argument is that information asymmetry in the form of adverse selection and moral hazard is the source of market inefficiency in developing countries and this leads to low risk borrowers such as Small and Medium Enterprises being sidelined or even excluded from the stream of potential borrowers. The majority of livestock farmers experience difficulties in obtaining credit for production inputs. With the collapse of many agricultural development banks and the closure of many export crop marketing boards, which in the past supplied farmers with inputs on credit,

difficulties have increased rather than decreased. The majority of people in Low Income Countries do not have access to banks and other formal financial institutions.

The development and commercial banks view the small-scale and micro entrepreneurs as risk borrowers and extending loans to them is to cut down their profitability in the transactions and to incur irrecoverable losses to the banks. There is perception that small borrowers are riskier than larger ones for reasons often related to the difficulty in obtaining accurate information about them. A strong and competitive financial sector could make significant contributions towards increasing access to finance by livestock farmers. It is right to suggest that the financial sector liberalization was to provide access to funding for Small and Medium Enterprises. Most studies consider the access problem as a creation of the financial institutions through their lending policies. For instance, Tagoe, *et al.*, (2005) indicated that the type of financial institutions and its credit policy would determine the access problem. Where required security does not fit the needs of target group and therefore potential borrowers do not apply for credit even where it exists and when they do, rarely get access.

2.2.4 Transaction cost theory

This theory argues that financial intermediaries emerged to utilize economies of scale as well as transaction technology. The key element of transaction cost theory includes costs associated with gathering and processing information that is needed to reach a decision during the transaction process, successful contract negotiation, and policing and enforcement of contracts (Benston & Smith, 1976). Thus, financial institutions convert one financial claim into another, which is referred to as transforming an asset qualitatively. As such, the financial intermediaries offer liquidity and the opportunity of diversification to their customers. The ease or difficulty used in achieving these objectives is determined by the level and nature of the cost of the transaction. Transaction costs are derived from a combination of bounded rationality (which reflects both imperfect information and a limited capacity to analyze it) and opportunism, which Benston and Smith (1976) defined as “self-interest seeking with guile”. This has been the key problem of informal financial intermediaries serving larger borrowers. As a result, government intervention was necessary to reduce transaction costs and information asymmetry.

2.3 EMPIRICAL LITERATURE

2.3.1 Credit worthiness and loan repayment

Credit Worthiness and Loan repayment capacity of smallholder farmers have been variously investigated and reported in literature. Nwosu (2014), in his study on Financing of Livestock Production under the Agricultural Credit Guarantee Scheme Fund in South-East, Nigeria, used the Discriminant model to determine the creditworthiness of the livestock farmers who obtained loan from the lending institutions under the scheme; The farmers were grouped into two, based on their ability to meet up with the repayment schedule. Using this criterion, 99 farmers representing 52.7% of the respondents were found to be credit worthy (Group 1) while 89 farmers representing 47.3% of the respondents were classified as credit unworthy (Group 2). The analysis showed a good canonical correlation of 0.692 and Wilks Lambda value of 0.758 which indicated that the discriminant function provides significant amount of information required for measuring credit worthiness of the loan beneficiaries.

In a similar vein, Ajah, Eyo and Ofem (2014) examined the credit worthiness among the poultry farmers in Nigeria. Discrimant analysis was employed in the classification of farmers into two mutually exclusive and exhaustive categories. Using the loan repayment value as basis, loan beneficiaries were classified into two groups. They found that nearly 51% of the respondents were credit worthy. 120 poultry farmers were used in the study, the results revealed that older farmers with adequate supervision were more credit worthy than the farmers with better educational level and with large farm size. They recommended that older and experienced farmers should be taken into consideration when loan applications are received.

Nwafor *et al.*, (2018) examined the loan repayment behaviour among member of multipurpose cooperative societies in Anambra State. The study investigated the socioeconomic factors affecting the farmers' credit repayment ability and ascertained major problems affecting the farmers in loan repayment using t-test statistics and a multiple econometric model of the Ordinary Least Square (OLS). Findings of the study revealed that there is a significant difference between the amount of loan received and amount repaid by the cooperative farmers and the joint effect of the explanatory variable in the model account for 91.9% of the variations in the factors affecting the farmers' credit repayment ability. Four variables such as educational qualification, farm size, loan application cost, and collateral value are significant whereas, age, membership duration and income of the farmers are not significant but they show a positive relationship with loan repayment. Based on the study, they recommended that among others,

cooperative societies should endeavour to educate the farmers on financial discipline and management because it has proven to significantly influence loan repayment.

Sivatharshika and Thayaparan (2019) studied Creditworthiness and Repayment Performance Among Small – Holder Farmers in Sri Lanka. The results of the descriptive statistics revealed that, 43.4% of the respondents belonged to the defaulters while 56.6% of them belonged to the non – defaulters. Estimated results of the binary probit model suggest that among the demographic characteristics, age of the farmers, levels of education, number of family members positively influenced the loan repayment performance of smallholder farmers, while among farming characters, income, farm size, land ownership, farming experience, off-farm activities, purpose of loan and possibility of crop failure positively influenced on credit worthiness and repayment performance at different significant levels.

In the study by Onyenucheya and Ukoha (2007) on the Loan repayment and Creditworthiness of farmers under the Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB), farmers were grouped into two based on their loan repayment, level. The result of the standard cananonical discrimant function revealed that credit worthiness was directly influenced by age, income, educational level, farm size, and total operating expenditure - income ratio of the farmer borrower and was inversely related to outstanding loan - total asset ratio and distance between home and loan source. The classification performance was 75.6%.

Nwachukwu *et al.,* (2010) used discriminant analysis to discriminate between performing loan beneficiaries and non-performing loan beneficiaries. The results showed that, education, gender, farming experience, household size, loan period, income, amount borrowed and distance made positive contributions to the total discriminant score while age and farm size contributed negatively. The classification performance of the function was 92.0%. Nwankwo (2004) reported that the level of education made the highest absolute positive contribution to the total discriminant score, followed by farm size and family size. On the other hand, age, loan size, annual farm income and farming experience made negative contributions. The overall classification performance of the function was 100%.

2.3.2 Relative risk in financing livestock production

Chidiebere-Mark *et al.,* (2014) in their study on Factors Influencing the Disbursements of Loans from Selected Commercial Banks to Small-Scale and Medium-Scale Agro-Based Enterprises in Imo State, Nigeria, used the standard deviation model to estimate the relative

risk in financing the agro-based small and medium scale enterprise. The result of the study showed that there is a higher level of risk associated with funding medium scale agro-based enterprises compared to small scale agro-based enterprises. The coefficient of variation for the small-scale enterprises was 0.38 while that of the medium scale agro-based enterprises was 0.41. It was deduced that the banks are faced with a level of risk in financing both small and medium scale agro-based enterprises in the study area.

2.3.3 Socioeconomic and institutional factors influencing the financing of livestock production

The output from the study made by Barslund and Tarp (2008) on analysis of formal and informal credit in Vietnam using the probit and tobit model found that collateral is used for about 70% of formal loans and no collateral is needed for the informal loans. The result also showed that age, livestock and sex have positive influence on the demand for credit from formal and informal sources. Although the view that finance is not important for economic development is still held by some prominent economists, most now agree that financial markets play a central role in fostering growth, and that the financial system affects the behavior of firms and individuals (Holden and Prokopenko, 2001). Amjad and Hasnu (2007) analyzed smallholders' access to rural credit (formal and informal sources) in Pakistan and found out that tenure status, family labour, literacy status, off-farm income, value of non-fixed assets, infrastructure quality and total operated area are factors that affect farmers' access to credit.

Tang *et al.,* (2010) evaluated formal and informal credit markets and rural credit demand in China. They used binary choice probit models and a multinomial probit model to analyze both determinants of credit market access and credit constraints. From that study, household size, agricultural land size, and household head's education level were found to increase the probability of borrowing from formal credit markets. The effect of the variables with regard to informal credit demand was inconsistent. Household with more social network or social capitals and more off-farm activities had a higher likelihood of borrowing from formal or informal markets. China and Nigeria share similarities in terms of coexistence of informal and formal credits in the rural areas. However, the productive capacities of each country differ.

Adebosin *et al.,* (2013) study on determinants of farmers' demand for micro finance: The case of a rural community in Nigeria, found out that the household size, farm size, returns on farming activities, gender and time lag for loan disbursement are all significant at 1% level

implying that these variables determine the demand for microfinance. He recommended that there is an urgent need for greater flexibility in lending procedure of financial institution to reduce the time lag involved in loan procurement.

Sebopetji and Belete (2009) used probit modelling approach to analyse the influence of household characteristics of farmers' decision to use credit in South Africa, the result of the findings revealed that farming experience, gender and marital status had positive significant effect on farmers' decision to use credit. In contrast, farmers' age, education level and membership to farmers' association had negative significant effect. Pandit *et al.,* (2007) conducted a study on financing agriculture in Bihar and West Bengal for potato cultivation. The results of the logit model on the determinants of institutional loans revealed that as education and family size increases, probability of availing loans increases. The coefficient of education was highly significant, indicating that complex formalities and lack of information kept away the less educated farmers from the source of institutional credit.

Amha (2009) used binary logit model to examine the factors that influence smallholder farmers' decision to access credit in Ethopia and identified that land size, age of the household head, level of education and access to extension services were significant factors influencing the decision. Amount of land owned has a positive and significant effect on access to credit indicating that farmers with large land size have higher probability of taking loan compared to farmers with lower land size. Also, farmers with relatively higher level of education had higher probability of accessing loan from diverse finance providers. The age of the household head has a negative and significant effect on access to loan implying that relatively younger household heads had higher probability of taking loans. At 10% significant level, farmers who were frequently visited by extension agents had higher probability of borrowing loan from diverse finance providers.

Mpuga (2004), employing a tobit model analysis of formal and informal credit sector in Uganda shows the impact of explanatory variables on the amount of credit received by the individual. The result of the study indicates that household size, total asset, educational level and ownership of land were significant factors.

Evidence from Karlan *et al.,* (2011) show that farming communities generally face a complex set of risks and uncertainties that complicate their decision to borrow. According to Swain (2002), farmers with small-scale and fragmented holdings located in areas with poor

infrastructural facilities often have limited access to new technologies, markets and support services and possibly a low return on capital. This can obviously restrict their demand for credit facilities. Atieno, (2001) identified weak entrepreneurship capacity, lack of viable enterprise to finance, risks associated with agricultural production and market for outputs, poor infrastructure and other support services, inability to meet collateral and other requirements, lack of suitable loan attributes (such as credit duration, loan amount and terms of payment), and high costs of borrowing to have a profound negative influence on farm households" borrowing decisions.

Understandably, distance to the lending financial institutions was reported by several studies to have a negative influence on loan demand. For instance, studies conducted in Nigeria (Oni *et al*, 2005; Akpan *et al.*, 2013), Ghana (Akudugu, 2012), Pakistan (Khan and Hussain, 2011) and China (Bing *et al.*, 2008) found a negative and significant relationship between distance to the lending agency and loan demand. This is not surprising as distance is directly related to cost of borrowing, information asymmetry and accessibility. This has important policy implications for government and financial institutions in terms of improving infrastructure and distribution of their branch networks. Though most existing studies tend to report presence of a positive association between educational level and demand for loan, there are inconsistencies in the findings of studies conducted in different countries or regions. For instance, educational status was found to have a positive influence on credit demand in Nigeria (Oni *et al*, 2005; Akpan *et al.*, 2013), Uganda (Mpuga, 2010), Pakistan (Khan and Hussain, 2011), China (Rui and Xi, 2010; Tang *et al.*, 2010), Ethiopia (Girma and Abebaw, 2015) and Ghana (Akudugu, 2012). Surprisingly, another study from China (Bing *et al.*, 2008) reported a negative influence on credit demand, while a study conducted in Thailand (Wiboonpongse *et al.*, 2006) reported absence of significant relationship between the two variables. Overall, the findings show that education is one of the key variables in influencing the decision to take loans. With regard to the influence of age, contrary to the longstanding belief that as age progresses farmers would be more conservative and reluctant in demanding credit, studies conducted in Uganda (Mpuga, 2010) and Nigeria (Akpan *et al.*, 2013) reported that age of the household is positively related to their loan demand. In other words, older farmers were more likely to demand for credit. Possibly this might be related to resource endowment as older farmers often tend to have better access to some critical assets such as land, especially in the African context.

In a study by Bendig *et al.,* (2009) using a comprehensive survey in Ghana to identify the possible drives that affect the different types of households' demand for financial services, results from a multivariate probit regression method showed a positive influence of household size on demanding microcredit as larger households are more exposed to shock (e.g. illness) from higher number of household members.

Rahji and Adeoti (2010) identified the factors influencing Commercial banks decision to ration agricultural credit in South-Western, Nigeria. Data for the analysis were sourced from the agricultural credit transactions of the banks. Evidence from the estimated logit model indicated that farm size of the farmers; previous year's income, enterprises type, household net worth and level of household agricultural commercialization were significant but negative factors influencing the bank's decision to ration credit. Higher values of these factors decrease the probability that the borrowers will be credit rationed. The number of dependents in the household had a positive significant impact on the probability of being credit constrained by the banks. Hence higher values of this variable increase the likelihood of borrowers being credit rationed. The results also indicated that the larger the magnitude of the coefficient estimated, the bigger is its impacts on the odds of being credit rationed per unit change in its variable. On the other hand, the larger the parameter, the lower the percentage changes in the odds per unit change in the variable. Based on the results obtained, farmland redistribution, farm income improvement, gender specific and credit allocation policies to the crop sub-sector were recommended.

Stavárek and Vodová (2010) using non-equilibrium model examined the changes in demand for loans and loan supply in the Czech Republic on quarterly data from 1994 to 2007. Among the determinants affecting the supply of credit inflation included, the total volume of deposits of residents and non-residents, the gross domestic product at current prices, bank capital calculated as share capital, retained earnings or loss and gain or loss in the current period also was included in the share of classified loans to total loans, capital adequacy, sales from industrial activity, the interest rate on loans, credit capacity, calculated as total liabilities of banks humiliated balances on bank accounts mandatory minimum reserves, cash and capital. Furthermore, the authors included the return on average assets calculated by dividing the net profit on average assets and return on average equity calculated as the ratio of net income to average equity. The dependent variable was defined as the total volume of loans granted to residents and non-residents. For deposits, capital and lending capacity has been shown that the

growth of resources available for lending will cause growth of supply of loans. For variables such as gross domestic product and industrial production index was recorded positive influence. There was recorded a negative influence between inflation rate and supply of loans. It is also an important variable interest rate on loans. The growth of profitability of lending will cause to growth of supply of loans. The high proportion of non-performing loans on the contrary, reduces the supply of credit. In the case of interest margin was found to be negative influence. Finally, there was found that the supply of credit in the Czech Republic is a function of deposits, industrial production, interest rates of loans and classified loans. Non-equilibrium model has been proven to offer loans in the Czech Republic is growing in the growth of deposits, industrial production and interest rates and a decline in non-performing loans.

2.3.4 Factors militating against livestock financing

Any borrower, however credit worthy, faces a limit on the overall amount he or she can borrow from any given source of credit. This maximum amount, arising from the limits to the resources of potential lenders, is independent of the interest rate that can be charged and the likelihood of default. Furthermore, due to the lack of effective contract enforcement mechanisms, lenders have the incentive to further restrict credit supply even if they have more than enough to meet a given demand and a borrower is willing to pay a high interest rate.

According to Okojie *et al.,* (2010), the lack of bank accounts, collateral, and information regarding the procedure for accessing credits from banks limit rural women's access to credit from formal institutions. Adejobi and Atobatele (2008) suggested that loan default could limit access to credit, while Agnet (2004) opined that the complex mechanism of commercial banking is least understood by the small-scale farmers, and thus, limits their access and that loan default ranks highest among the factors limiting small-scale farmers' access to credit, followed by high interest rates, poor credit information, and poor markets structure, which impedes the sales of farm produce.

Rahji and Fakayode (2009) blamed the limitation on imperfect and costly information problems encountered in the financial markets; credit rationing policy; and banks' perception of agricultural credit as a highly risky venture; while Philip *et al.,* (2009) stated that high interest rate and the short-term nature of loans with fixed repayment periods do not suit annual cropping, and thus constitute a hindrance to credit access. He also mentioned the location of banks in urban centers as a limiting factor, among others earlier mentioned. Aliyu (2012) stated

that financial lending Institutions in Nigeria often shy away from giving loans to farmers because of the high cost of administering such loans and the perceived high default rates among farmers.

Badiru (2010) reported that an interview with the ACGS Fund desk of the SME Unit of CBN suggested that small-scale fanners' low access to credit institutions is due to the requirement for collateral and the perceived high risk and uncertainty of agricultural production. Furthermore, an interview with a cooperative official corroborated the notion that unstable markets tied to uncertain harvests increased lenders' perceptions of risk in lending to small-scale fanners. Other interviews he reported suggested that credit is misallocated to non-intended beneficiaries in government-backed credit programs. Despite the significant benefits of access to credit as summarized above, it is unfortunate that fanners in underdeveloped countries continue to experience a lot of difficulties in the area of acquisition of credit. There is no doubt that this leads to the discouragement of most fanners to access formal credits which consequently have negative effects on the productivity of the agricultural sector.

Adeola (2008) pointed out the borrowing behavior of respondents in Oyo state using the logit model and identified the determinants of credit constraints. His results showed that the coefficient of transitory income, education level and predicted interest rate have important bearing on borrowing behavior. The study also reveals that 59% of the respondents had access to formal credit as against 41% that had no formal credit. A study conducted by

Patil (2000) studied performance of primary cooperative agriculture and rural development banks in Dharwad district and concluded that the opinion of the respondents showed that bank officials did not give proper guidance, cumbersome loaning procedures and the favourable point of the bank was the good staff treatment.

Ghosh *et al.*, (2002) conducted the study on the identification of problems being faced by the small and marginal farmers in getting cheap and adequate credit from the rural financial institutions. The study was based on both primary and secondary data. The primary data was collected from two agriculturally active districts of West Bengal chosen purposively viz., Hooghly and Nadia representing traditional financial institutions and the functioning of new generation of credit institutions, respectively. A total of 50 households equally spread over two selected districts constituted the sample size of the study. The study pointed out the issues relating to the accessibility of formal sector credit to vulnerable group of landless, small and

marginal farm households. The legal hurdles complicated lending procedures followed by formal sector institutions. The study also brought out credit gaps in the existing credit delivery mechanism followed by formal credit institutions particularly by co-operatives.

Rajput and Verma (2005) examined financing by Regional Rural Banks in Madhya Pradesh during the year 2000-01. The study was based on intensive inquiry of 100 randomly selected farmers from seven villages in Hoshangabad district which included 50 borrowers and 50 non-borrowers. The study noted that the credit supply from the RRBs to the sample farms for crop loan, term loan and total loan per hectare was not adequate to meet the credit requirements in respect of these components. The main constraints faced by the borrowers in obtaining credit were the security formalities in availing credit, inadequate credit and its unplanned disbursement, lack of proper guidance and delay of disbursement of credit. The study gave specific policy measures like, simplification of the procedures, easier terms of security, production-oriented timely availability of credit and adequacy of credit at reasonable interest rates were suggested to promote the development of agriculture.

Makar and Ghosh (2005) carried out the study to determine the role of institutional credit for agricultural revolution in tribal hill areas based on a study in Nagaland and identify the problems and solutions in this area. It was suggested that land records should be designed in such a way that an individual farmer can avail the credit facility for agricultural production. At the same time, the organized financial institutions have to think of liberal outlook so that more and more self-employment and entrepreneurial prospects are credited in agriculture and allied activities.

Samal and Rath (2005) while analyzing credit use by farmers in rainfed areas of costal Orissa, they noted that on an average the farm households borrowed Rs 6,129 from all types of sources. The amount of borrowing by marginal and small farmers was Rs 4,549 and Rs 7,541 respectively. Maximum amount borrowed was from co-operatives followed by banks, money lenders and relatives and friends. The constraint analysis revealed that the loans from institutional sources were not available in time and desired quantity.

Srivastava and Singh (2005) studied the inefficient functioning of financial institutions as a major constraint on agricultural credit flow. The study revealed that marginal and small farms constituted more than 30 per cent of respondents felt that the requirement of completion of

more formalities and time consumption as the major constraints besides, consuming around one third of borrowed money in the completion of different formalities.

Thanarathnam (2006) while studying the working of primary agriculture co-operative banks analyzed the loan dispersal by them. The study revealed easy accessibility of credit (24 per cent) and (76 per cent) low rate of interest were the reasons for borrowing from cooperatives as expressed by farmers and considered as a good indicator of good performance of bank. It was found that difficulties in getting loans were due to the difficult procedures as expressed by 22 per cent farmers, cost of availing loans by 16 per cent, security required by 24 per cent, untimely loans availability by 18 per cent of the farmers along with difficulties in providing documents by 20 per cent of the farmers. He opined short term loans were generally provided on personal security. Therefore, the problem of providing security as a problem could be easily remedied.

Pandit *et al.*, (2007) examined the determinants of access to institutional loans and the major constraints in availing credit. The study was based on primary data collected from 439 farm families in West Bengal and Bihar for the reference period January-February 2007. It was revealed that only 6 per cent of the cost in Bihar and 20 per cent in West Bengal were financed through institutional credit. Logit model regression showed that young age, large operational holdings, higher education, and absence of off-farm income were the conducive factors for accessing institutional loans. Complicated procedures, lack of knowledge, crop failure, delay in loan disbursement, untimely and insufficient credit appeared as constraints in availing institutional loans.

Deb and Rajeev (2007) while studying the credit pattern of borrowers from the formal sector in Hooghly district of West Bengal concluded that the entire set of medium farmers could avail loan within a period of one month, this percentage declined to 83 for the small farmers and 75 to the marginal ones. As these loans were crop loans, one can easily imagine the problem of disbursement. In particular, four per cent of the marginal farmers needed to wait for six months, for the disbursement of loans. The study also identified that poor farmers incurred high transaction cost in availing the funds as the number of visits to the bank increased. While the small and medium farmers required to visit twice. However, 29 per cent of the marginal farmers visited the bank premises more than five times (such visit involved opportunity cost for the farmers) which may be due to the fact that marginal farmers were educationally backward.

Singh *et al.,* (2007) studies on institutional agriculture credit in Punjab, its growth and inadequacies. The results revealed that about three fourth of the farmers opined complicated and time-consuming procedures as constraints to procure loans from the institutional agencies and as many as 25 per cent of the farmers reported that bribe as common complaint. Similarly, factors like illiteracy and availability of only collateral loans make farmers incapable in approaching the banks for loans.

Various researchers opined that the major problem faced by farmers in availing credit are security formalities in availing credit, inadequate credit and its unplanned disbursement, lack of proper guidance and delay in disbursement of credit.

2.4 ANALYTICAL LITERATURE

2.4.1 Descriptive Statistics

According to Studenmund (2011) the term "Descriptive Statistics" is used to describe the basic features of the data in a study. They provide simple summaries about the samples and measures. It therefore means that descriptive statistics are important tools for interpreting and analyzing data. Neuman (2007) stated that the primary use of descriptive statistics is to describe information or data through the use of numbers (create number pictures of the information). He also added that the characteristics of groups of numbers representing information or data are called descriptive statistics. Descriptive analysis utilizes data collection and analysis techniques that yield reports concerning the measures of central tendency, variation and correlation (Krysik and Fian, 2007). This statistical tool was used to show the theoretical analysis and interpretation of the data using means, frequency, percentage and graph.

a. Mean

According to Neuman (2007) the mean is a number having an intermediate value between several other numbers in a group from which it was derived and of which it expressed the average value. The mean is a measure of central tendency (other measures include the mode and median) which is computed by adding all the data values (x) together and dividing it by the total number data values (n).

It is express as $X = \frac{(\sum fx)}{n}$ (1)

Saddiq (2012) noted that the mean is a measure which is most resistant to sampling fluctuation. Thus, implies that if samples are taken repeatedly from a population and the mean, mode and median of the samples are obtained, the mean is the measure which will vary the result from sample to sample.

b. Frequency Distribution

According to Studenmund (2011), Frequency distribution is a tallying of the number of times (frequency) each score value (or interval of score values) is represented in a group of scores. Frequency distribution summaries and compress data by grouping them into classes and recording how many data points fall into each class. Mcharo & Mwajombe (2015) noted that if a data is arranged so that the scores on a variable of interest are in order of magnitude, that is, the data is ranked, and then indicates by means of a table or graph how often a score occurs, a frequency distribution has been constructed. Frequency distribution can be used to learn about the content of a given set of data and make decisions about how the data will be structured.

c. Percentage

Percentages are used to relate how much of a part is of the whole and establish a basis for comparing information from groups of unequal sizes (Krysik and Fian, 2007). Percentages are calculated by dividing the frequency of one variable by the total number of observations then multiplying it by 100.

2.4.2 Regression Model

Regression analysis provides an objective and systematic way to analyze data. As a result, decisions based on regression are less likely to be subject to bias, they are consistent, the basis for the decisions can be fully explained - and they are generally useful. The gains are especially well documented when compared to judgmental decisions based on the same data (Yusuf *et al.*, 2016). However, two illusions, statistical significance and correlations, can reduce the value of regression analysis. Most agricultural experiments involved either a non-normal distribution for one set of measurement or completely arbitrary series of values. For this kind of problem, regression rather than correlation is more suitable. Of the two variables, one represents cause and the other represents effect (Nawai and Shariff, 2010).

When only two variables are involved the functional relationship is known as simple regression. When there are more than two variables and one of them is assumed to be dependent

upon the others, the functional relationship between them is called multiple regression. It is obviously the appropriate technique when we want to investigate the effects on Y of several variables simultaneously (Mcharo & Mwajombe, 2015).

Simple regression is explicitly modeled as:

$$Y = a + bx + e \quad (2)$$

Where: Y = dependent variable

x = independent variable

a = intercept

b = parameter

e = error term

Multiple regression is also explicitly modeled as:

$$Y = a + b_1X_1 + b_2X_2 + ... + b_nX_n + ei \quad (3)$$

Where:

Y = dependent variable

X_1- X_n = independent variables

b_i - b_n = parameters

a = constant

ei = error term

In agricultural research, we come across the dependent variables which are influenced by a number of causal variables than by a single variable. The model relating the variables is estimated in four functional forms of linear, exponential, semi-log and double log. The best fit is chosen following statistical and econometric reason. The one with the highest value of coefficient of multiple determination (R) and highest number of significant variable is always chosen as the lead equation for analysis.

2.4.3 Probit Model

Probit regression, also called a probit model, is a binary classification model in which the conditional probability of one of the two possible realizations of the output variable is equal to a linear combination of the inputs, transformed by the cumulative distribution function (CDF) of the standard normal distribution. Probit model is used to model dichotomous or binary outcome variables i.e. the dependent variable takes on two possible outcomes, typically coded as 0 and 1 Aldrich and Nelson (1984). The purpose of the model is to estimate the probability that an observation with particular characteristics will fall into a specific one of the categories. When viewed in the generalized linear model framework, the probit model employs a probit

link function which is the inverse of the CDF of the standard normal distribution. This link ensures the probabilities are between 0 and 1. (Agresti, 2015). It is most often estimated using the maximum likelihood procedure.

Probit model can be expressed as:

$$P(Y = 1 \mid X) = \Phi\,(X^T\beta) \quad (4)$$

Where P is the probability

Φ is the Cumulative Distribution Function (CDF) of the standard normal distribution

β is vector of unknown parameters estimated by maximum likelihood.

The model assumes the existence of an unobserved (latent) variable, which is linearly related to the predictors but maps onto the observed binary outcome via the CDF of the normal distribution in which case

$$Y^* = X^T\beta + \varepsilon \quad (5)$$

Where $\varepsilon \sim N(0,1)$. The Y can be viewed as an indicator for whether the latent variable is positive:

$$\boldsymbol{Y} = \begin{cases} 1 & Y* > 0 \\ 0 & otherwise \end{cases} = \begin{cases} 1 & X^T\beta + \varepsilon > 0 \\ 0 & otherwise \end{cases} \quad (6)$$

2.4.4 Chow Test for Structural Stability

The Chow Test (Chow, 1960) is a method well known in econometrics. It was originally designed to analyze the same variables obtained in two different data sets to determine if they were similar enough to be pooled together. Equality of error variances in two linear regression equations is the main restriction assumed in the Chow test (Chow, 1960). This can be illustrated by use of two models for formal and informal credit beneficiaries (Equation 1 and 2):

$$Y_g = X_g\beta_g + \varepsilon_g = X_g b_g + e_g \quad (7)$$

$$Y_j = X_j\beta_j + \varepsilon_j = X_j b_j + e_j \quad (8)$$

where X_i , ($i = g, j$ for formal and informal credit beneficiaries respectively) are non-singular matrices of explanatory variables, β_i are column vectors of the K regression coefficients and Y_i are column vectors for the dependent variable. It is assumed that the stochastic terms ε_i's are normally distributed with zero mean and variance covariance matrix $\sigma^2 I$, whereby I represent an identity matrix, b and e are estimated vectors.

The Chow test is preferred due to less computational difficulty compared to alternative approaches suggested in literature such as co-integration tests (Campos *et al*., 1996), bootstrap procedure (Diebold and Chen, 1996), Bayesian techniques (Kozumi and Hasegawa, 2000) and comparison of slopes alone (Wilcox, 1997). Application of the Chow test requires that the number of observations in both sub-samples should be nearly the same. In situations where there is a significant difference in the number of observations between sub-samples and greater error variability in the two data sets, a transformation of the data is necessary to assure homoscedasticity before the test can be applied (Ghilagaber, 2004).

The main hypothesis in the Chow test is that the coefficients are equal for both sub-samples (Equation 3):

$H_0 : \beta_g - \beta_j = 0$ (9)

Three linear regressions were fitted to operationalise the Chow test; one equation for the restricted model (pooled data) and separate regressions for the unrestricted models (formal and informal credit beneficiary's data).

The test statistic was formally stated as follows:

$F^* = (RSS_w - (RSS_g + RSS_j))/(RSS_g + RSS_j)*(T - 2K)/K$ (10)

where F* is the test statistic

RSSw = residual sum of squares for the whole sample (restricted model)

RSSg = residual sum of squares for the formal credit beneficiaries

RSSj = residual sum of squares for the informal credit beneficiaries

T = total number of observations in the whole sample

K = number of regressors (including the intercept term) in each unrestricted sub-sample regression

2K = number of regressors in both unrestricted sub sample regressions (whole sample).

In the Chow test, if there is no significant statistical difference between two sub-samples (i.e., if $\sigma_g^2 = \sigma_j^2$), then the regression test statistic in Equation (4) follows an *F(K, T-2K)* distribution. However, if the test statistic (F*) is greater than the respective *F-statistic* at 5% level of significance, the null hypothesis should be rejected. This is the statistical evidence which justifies the decision to estimate separate models for the sub-samples and even make comparisons with results of the whole sample analysis.

2.4.5 The Z-statistic

The Z-statistic is a statistical test used to determine whether two population means a different when the variance are known and the sample size is large. It can also be used to compare one mean to a hypothesized value. It is represented as:

$$Z = \frac{x-\mu}{\sigma} \quad (11)$$

Where:

Z = Standard score

x = observed value

μ = mean of sample

σ = standard deviation of sample

It tells the number of standard deviations a value is from the mean of a given distribution ie, how far above or below the mean a data point is. The negative z-scores indicate the value lies below the mean and positive z-scores indicate the value lies above the mean.

CHAPTER THREE
METHODOLOGY

3.1 Study Area

The study was carried out in Imo State, Nigeria. Imo State is located in the Southeastern zone of Nigeria. It is divided into three agricultural zones viz-a-viz Orlu, Okigwe and Owerri. These divisions are for administrative and extension services and not for any agro-ecological difference. It is delineated into 27 Local Government Areas. The state lies between latitudes 4^{o} 45'N and 7^{o} 15'N of the equator and longitudes 6^{o} 50'E and 7^{o} 25'E of the Greenwich Meridian (Journal of Geographical Research, JGR, (2021); Civil Resource Development and Documentation Centre, CIRDDOC (2024) and Wikipedia, 2024). It occupies the area between the lower River Niger and the upper and middle Imo River. It is bounded on the East by Abia State, on the West by the River Niger and Delta State; and on the North by Anambra State, while Rivers State lies to the South. Imo State covers an area of about 5,135km^2, with an estimated population of 5,459,300 and population density of about 1,063km^2 (National Population Commission and National Bureau of Statistics, 2022).

The State has an average annual temperature of 24.1°C which can rise up to 32.6°C during the dry season, an average annual relative humidity of 64.2% which can rise to up to 77.9% during the rainy season, average annual rainfall of 1800mm to 2738mm and an altitude of about 100m above sea level (NBS, 2016). Agriculture is practiced by a good number of the population in the state. Crop farming is majorly regulated by the seasonal distribution of rainfall, although there are few farmers involved in dry season farming of some food crops and vegetables. Also, livestock like cattle, sheep, goats, pigs, poultry, rabbit, and snails are reared through subsistence and commercial farming in the state.

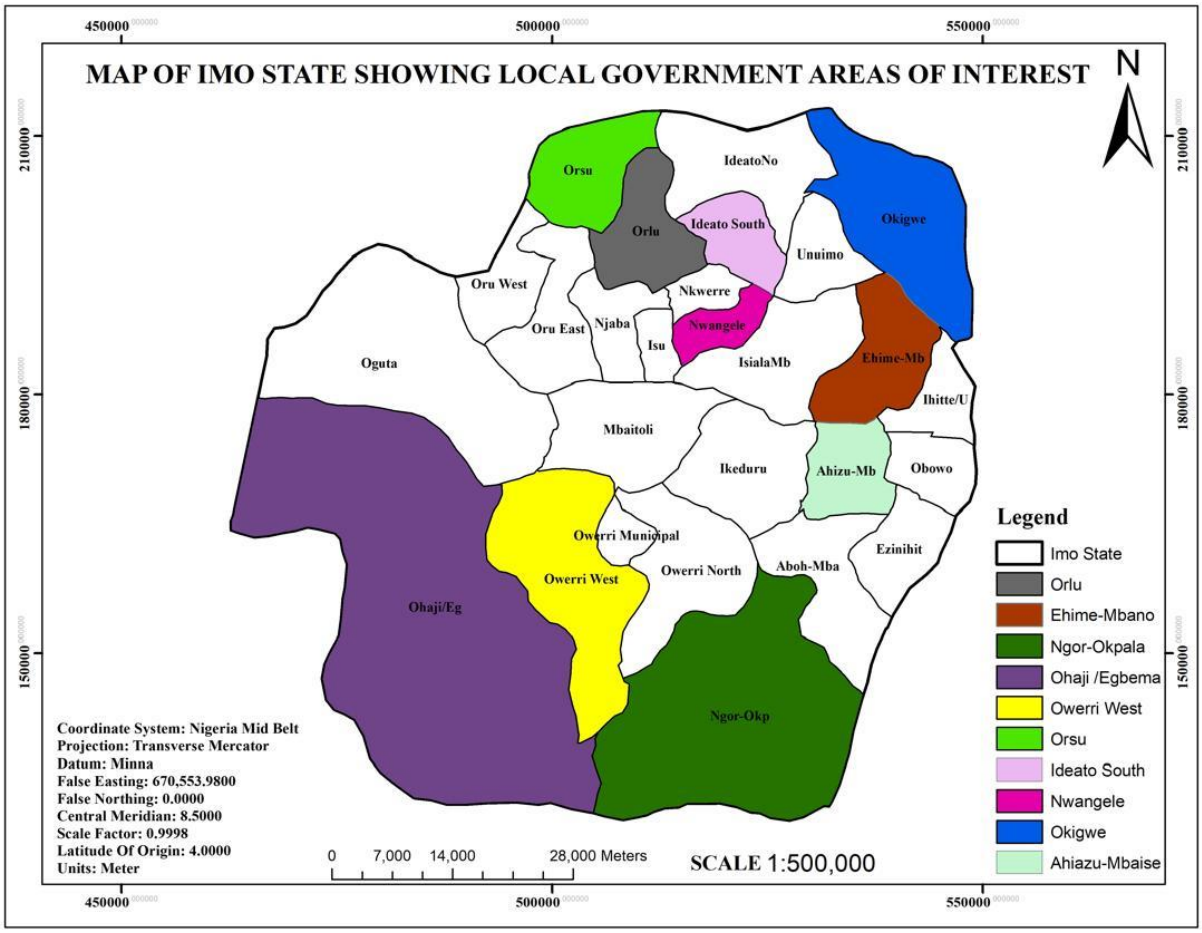

Figure 1: Map of Imo State showing the Local Government Areas of interest
Source: Researchers construct, 2024.

3.2 Sampling Technique

Multistage sampling technique was used in the selection of respondents. Firstly, the three agricultural zones of the state were selected to enable the survey cover the entire state. Orlu, Okigwe and Owerri zones are made up of ten, six and eleven Local Government Areas respectively. Because of the difference in the number of LGAs in each agricultural zone, proportionate sampling was used to select four LGAs from Orlu zone, two LGAs from Okigwe zone and four L.G.As from Owerri zone bringing it to a total of ten (10) L.G.As from the three Agricultural zones. A total of five hundred and thirty (530) active livestock farmers from the ten (10) L.G.A were randomly selected from the list of livestock farmers obtained from Agricultural Development Programme., this formed the sampling frame for the study. Sixty (60) livestock farmers who obtained credit from formal financial institutions and sixty (60) who obtained from informal financial institutions were purposively selected from the frame. This brought the sample size to a total of one hundred and twenty (120) livestock farmers.

3.3 Data Collection

The main tools for primary data collection were questionnaire and oral interview. The variables that were captured in the questionnaire include socioeconomic data of the livestock farmers such as age, marital status, household size, farming experience, farm income, cooperative membership, extension contact, sources of credit, interest rate, amount of loan applied for and amount received, period of credit etc. Secondary information like theoretical models and explanations of research methods were sourced from textbooks, professional journals and online materials.

3.4 Data Analyses

Data collected for the study were analysed using both descriptive and inferential statistical tools.

Objectives (i), part of objective (ii) and (vi) were achieved using descriptive statistics.

Part of Objective (ii) was compared using Z-statistics.

Objective (iii) was achieved using Probit Model.

Objective (iv) was realized using Standard deviation analytical tools and Z-statistics.

Objective (v) was realized using multiple regression technique and Chow-test.

3.5 Model Specifications

3.5.1 Determining the financial credibility of livestock farmers financed by formal and informal financial institutions and the influencing factors.

The financial credibility of livestock farmers financed by formal and informal financial institutions was determined using the timely repayment credibility scores (TRCS). In this case, livestock farmers were classified into two mutually exclusive categories (those financed by formal and informal financial institutions). Their integrity and trustworthiness were tied to their ability to honour the repayment agreements in a timely manner. Scores were assigned to farmers based on their adherence to repayment dates stipulated in their respective agreements with formal or informal financial institutions. In this case, farmers in each agreement category with less than 80% scores were considered not credible, while those with more than 80% scores were considered credible, as stated as:

$$TRCS_i < 80\% \; with \; more \; than \; one \; month \; loan \; default \;\; = \;\; Not \; Credible$$
$$TRCS_i \geq 80\% \;\; with \; no \; or \; less \; than \; one \; month \; loan \; default \;\; = \;\; Credible$$

Furthermore, the credibility status (not credible and credible) was then recorded as a dichotomous variable for the dependent variable in the probit analysis. Coded as:

$TRCS_i < 80\%$ *with more than one month loan default* $= 0$ (12)

$TRCS_i \geq 80\%$ *with no or less than one month loan default* $= 1$ (13)

Therefore, the determinants of financial credibility of livestock farmers were ascertained using the Probit model. The seemingly unrelated bivariate probit (SURBP) model would have been fitted but the mutual exclusivity of the two equations (formal and informal credit agreement equations) violated the assumptions of the SURBP model. Seemingly unrelated bivariate probit model is used when two equations are to be estimated and the dependent variable of one of them is an explanatory variable in the other (Seyoum, 2018). As a result, separate probit models were employed for each equation. Therefore, the probit model is specified as:

$$y_i^* = \beta_j x_i + U_i \quad (14)$$

Given the financial credibility status of each group, livestock farmers were observed to be financially credible if y_i^* crosses the threshold value 0. That is,

$y_i = 1\ if\ y_i^* \geq 80\%$, if ith farmer has no or less than one-month loan default (15)

$y_i = 0\ if\ y_i^* < 80\%$, if ith farmer has more than one-month loan default (16)

This is stated as:

$$y_i = \begin{cases} 1\ if\ y_i^* \geq 80\% \\ 0\ if\ y_i^* < 80\% \end{cases} \quad (17)$$

Where,

y_i = Observed dichotomous dependent variable (financial credibility)

y_i^* = Underlying latent variable;

β_j = Vector parameter estimate of jth variable;

X_i = Vector exogenous variables (socioeconomic factors).

Where,

X_1 = Age of the ith farmer (years)

X_2 = Gender (dummy, male =1, otherwise = 0)

X_3 = Marital status (dummy variable, married = 1, otherwise = 0)

X_4 = Level of education (years)

X_5 = Years of experience (years)

X_6 = Level of income (Naira)

X_7 = Interest rate (percent)

X_8 = Household size (number)

X_9 = Flock size (number)

X_{10} = Membership of cooperative society (dummy variable, yes =1, otherwise =0)

X_{11} = Credit duration (months)

U_i = Standard normally distributed error term,

The probit model was employed to separately determine the socioeconomic factors influencing the financial credibility of livestock farmers financed by formal and informal financial institutions.

3.5.2 Determining the relative risk in financing livestock production by formal and informal financial institutions.

To estimate the relative risk in financing livestock production, the standard deviation model is specified as:

$$\sigma_1 = S^2 = S_i^2 = \sum_{i=1}^{n}(X_i - \varepsilon v)^2 P_i \quad (18)$$

Where, σ_1= Standard Deviation of Earnings.

S^2 =Variance of the Earnings.

X_i = Earnings of livestock farmers

ε ν = Expected Value of Earnings

P_i = Probability Distribution of Expected Earnings

The coefficient of variation model is specified as, CV= σ_1 /ε ν. (Pandey, 2005)

Where, CV = Co-efficient of Variation of Expected Earnings.

σ_1 = Standard Deviation of Expected Earnings.

ε ν = Expected Earnings.

b. Comparing the relative risk in financing livestock production through formal and informal financial institutions

The co-efficient of variation of expected earnings was compared using t-test as the marginal difference is shown by the mean difference in the z-statistics model as specified in equation below:

$$t_{cal} = \frac{U_1 - U_2}{\sqrt{\frac{\delta_1^2}{n_1 - 1} + \frac{\delta_2^2}{n_2 - 1}}} \quad (19)$$

Where

U_1 = Mean value of co-efficient of variation of expected earnings of formal credit beneficiaries

U_2 = Mean value of co-efficient of variation of expected earnings of informal credit beneficiaries

$U_1 - U_2$ = Mean difference of the co-efficient of variation of expected earnings

δ_1^2 = Variance of co-efficient of variation of expected earnings of formal credit beneficiaries

δ_2^2 = Variance of co-efficient of variation of expected earnings of informal credit beneficiaries

n_1 = Number of formal credit beneficiaries

n_2 = Number of informal credit beneficiaries

3.5.3 Determine the factors influencing livestock financing by formal and informal financial sources

Ordinary Least Square regression model is implicitly represented as:

$$Y_i = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}) \quad (20)$$

Where:

Yi= 1, 2

Y_1= Value of credit obtained by farmers from formal sources (Naira)

Y_2= Value of credit obtained by farmers from informal sources (Naira)

X_1 = Herd/flock size (number)

X_2 = Income (₦)

X_3 = Age of the farmer (years)

X_4 = Gender of the farmer (1= male; 0 = female)

X_5 = Marital status (1 = married; 0 = single)

X_6 = Household size (number)

X_7 = Farming experience (years)

X_8 = Educational attainment (years)

X_9 = Cooperative membership (member 1, otherwise 0)

X_{10} = Interest Rate (%)

X_{11} = Payback period (months)

Chow test was conducted to test the structural differences between the socioeconomic and institutional factors influencing livestock financing by the formal and informal financial institutions respectively. The chow test is given as:

$$F \approx chow = \frac{[(RSS_3 - (RSS_1 + RSS_2)/k}{(RSS_1 + RSS_2)/(n_1 + n_2 - 2k)} \quad (21)$$

Where:

RSS_1 is the residual sum of squared from the regression model of livestock farmers financed by formal financial institutions.

RSS_1 is the residual sum of squared from the regression model of livestock farmers financed by informal financial institutions.

RSS_3 is the residual sum of squared from the pooled regression of livestock farmers financed by both formal and informal financial institutions.

n_1 is the number of observations of livestock farmers financed by formal financial institutions.

n_2 is the number of observations of livestock farmers financed by informal financial institutions.

K is total number of regressors estimated in each model including the intercept

The decision rule for this model is that if Chow F-statistics is greater than that of F-table at 5% level of probability, it then means that there is a structural difference between the outcomes of the formal credit and informal credit beneficiaries.

3.6 Test of Hypotheses

Hypotheses (i) and (iii) were tested using Z-statistics.

Hypothesis (ii) was tested from the result of objective iii using LR Chi-square test.

Hypothesis (iv) was tested from the result of objective v using F-statistics and chow test.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Socio-economic Characteristics of the Livestock Famers Financed by Formal and Informal Financial Institution

Table 4.1 shows the distribution of Livestock farmers financed by formal and informal financial institutions according to sex.

Table 4.1: Distribution of Livestock Farmers Based on Sex

Sex	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions	
	Frequency	% Distribution	Frequency	% Distribution
Male	33	55	34	56.7
Female	27	45	26	43.3
Total	60	100	60	100

Source: Field Survey Data, 2023

4.1.1. Sex

The Table 4.1 shows that 55% of livestock farmers financed by formal financial institutions and 56.7% of those finance by informal financial institutions were males while the rest (45% and 43.3%) respectively were female. The findings show that, though financial inclusion for both men and women has increased there is an indication of male dominance in access to both formal and informal financial institutions in the study area. This could stem from the fact that male farmers have resources at their disposal and capable of meeting the credit requirement of the financial institutions than female farmers. The findings highlight the importance of considering gender dynamics in livestock financing among financial sources, ensuring equity in financing, regardless of gender.

4.1.2. Age

The distribution of Livestock farmers based on age range is represented in Table 4.2 below.

Table 4.2: Distribution of livestock farmers based on age range

Age	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions	
	Frequency	% Distribution	Frequency	% Distribution
21-30	0	0	4	6.7
31-40	17	28.3	22	36.7
41-50	20	33.3	16	26.7
51-60	21	35	16	26.7
61-70	2	3.3	2	3.3
Mean	**47yrs**		**44yrs**	
Total	60	100	60	100

Source: Field Survey Data, 2023

The Table 4.2 contains information about the age distribution of the livestock farmers. The mean age of the livestock farmers were 47 years for those financed by formal financial institutions and 44 years for those financed by informal financial institutions. This shows that the livestock farmers were within the age range of 41-50 years. This is in agreement with the findings of Nwosu (2014) who posited that people within the age range are knowledgeable enough to know the importance of using a credit facility to invest in livestock production and Xiao *et al.,* 2015 who stated that confidence in financial decision-making increases with age as middle-aged adults within the age bracket of 41 to 60 years are more effective borrowers. This could also be attributed to the general rule in lending that an applicant must not be below 18 years at loan application and not more than 55 years at loan maturity date. However, many financial institutions have their criteria and age limit when it comes to personal loan.

4.1.3. Marital Status

The information on the distribution of respondents based on marital status is represented in Table 4.3.

Table 4.3: Frequency Distribution of the Livestock Famers Based on Marital Status

Marital Status	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions	
	Frequency	% Distribution	Frequency	% Distribution
Married	53	88.3	52	86.7
Single	7	11.7	8	13.3
Total	60	100	60	100

Source: Field Survey Data, 2023

The result shows that majority (88.3%) of the farmers financed by formal financial institutions and (86.7%) of farmers financed by informal financial institutions were married. The dominance of married people indicated that financial institutions see married livestock farmers as comparatively more secure, accountable and willing to repay borrowed fund. It also implies that livestock production in the study area is handled by matured and responsible people, the implication is that they were going to show more seriousness and commitment because they had families to provide for. The finding is consistent with that of Aladejebi *et al.,* (2018) who observed that single farmers acquired less agricultural credit compared to married farmers. It also supports the result of Onubuogu *et al.,* (2013) who opined that married farmers tend to have easy access to production variables such as land which can be used as collateral to obtain credit and large family size which are traditionally owned and provided by household heads (husbands) to compliment family labour to enhance production and reduce the cost of hired labour.

4.1.4. Education Level

The Table 4.4 has information about the level of education of the livestock farmers.

Table 4.4: Distribution of the farmers based on education level

Education	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions	
	Frequency	% Distribution	Frequency	% Distribution
Primary (1 – 6 years)	15	25	11	18.3
Secondary (7 – 12 years)	28	46.7	35	58.3
Tertiary (13 – 18 years)	17	28.3	14	23.3
Mean	**9.7**		**9.8**	
Total	60	100	60	100

Source: Field Survey Data, 2023

A fair percentage of the livestock farmers (46.7%) financed by formal financial institutions and 58.3% of those financed by informal financial institutions had secondary education as their highest level of education with mean years of 9.7 and 9.8 years respectively. Cumulatively, the table shows that 100% of the livestock farmers can marginally be classified as literate since they all had one form of education or the other. It is an indication that the livestock farmers are able to understand the terms and conditions in borrowing from financial institutions, articulate in their decision-making process and have high level of awareness of credit facilities and its importance as it affects their productivity. This finding agrees with Ijioma and Osondu (2015) who posited that educated farmers allocate farm resources more efficiently than uneducated farmers.

4.1.5 Household Size

Table 4.5 shows the distribution of livestock farmers based on household size.

Table 4.5: Distribution of the livestock farmers based on household size

Household size	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions	
	Frequency	% Distribution	Frequency	% Distribution
1-5	37	61.7	52	86.7
6-10	22	36.7	7	11.7
11-15	1	1.6	1	1.6
Mean	**5**		**4**	
Total	60	100	60	100

Source: Field Survey Data, 2023

Result shows that 61.7% of livestock farmers financed by formal financial institutions and 86.7% of those finance by informal financial institutions had their household sizes ranging from 1-5 persons with a mean of 5 and 4 persons respectively. This is an indication that the livestock farmers had small family size. This is in agreement with the findings of Effiong (2005) who reported that very large household size may rob a farmer the opportunity of obtaining loans from lending institutions as it is believed that the loan may be diverted to some other family matters. On the other hand, small household size could result in increased expenses on hired labour as large household size tends to serve as source of labour in event of constraints to farm labour availability as reported by Ugwu *et al.,* (2017).

4.1.6 Livestock Category

Table 4.6 contains information on the livestock category produced by the farmers.

Table 4.6: Distribution of the livestock farmers based on the category of livestock produced

Livestock Category	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions	
	Frequency	% Distribution	Frequency	% Distribution
Cattle	3	6	0	0
Sheep	8	13.3	12	20
Goat	13	21.6	20	33.3
Total Ruminants	**24**	**40**	**32**	**53.3**
Poultry	21	35	19	31.7
Piggery	11	18.3	8	13.3
Rabbitry	4	6.6	1	1.7
Total Non-Ruminants	**36**	**60**	**28**	**46.7**
Total	60	100	60	100

Source: Field Survey Data, 2023

It shows that 40% of ruminant livestock farmers (cattle sheep and goat) and 60% of non-ruminant livestock farmers (poultry, pig and rabbit) obtain credit from formal financial institutions while 53.3% of ruminant livestock farmers and 46.75% of non-ruminant livestock farmers obtain credit from informal financial institutions. Also, from the table, it can be seen that poultry, pig and goat farmers top the livestock category of farmers who obtain credit irrespective of the source. This could be because of the market demand for the products in the study area. The production cycle of poultry and pig which can come more than once a year and their predominance in the study area increases their potential for income generation and this could be why they are viewed favourably by lenders.

4.1.7 Livestock Farming Experience

The distribution of livestock farmers according to years of farming experience is represented in Table 4.7 below.

Table 4.7: Distribution of the Famers based on Farming Experience

Years of experience	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions	
	Frequency	% Distribution	Frequency	% Distribution
1-5	6	10	8	13.3
6-10	28	46.7	33	55
11-15	7	11.7	6	10
16-20	6	10	4	6.7
21-25	0	0	1	1.7
Mean	**7.4**		**7.6**	
Total	60	100	60	100

Source: Field Survey Data, 2023

The number of years of livestock will determine how the farmer will organize his/her resources in order to achieve high level of production. Table 4.7 shows that a greater percentage of the farmers (46.7%) of those financed by formal financial institutions and 55% of those financed by informal financial institutions had spent between 6 - 10 years in livestock production. Very few (10% and 13.3%) respectively agreed that they spent between 1 - 5 years, indicating that the farmers had been in the business for a long time. However, their mean year of experience was 7.4 and 7.6 years respectively. This shows that the farmers were well grounded in the rudiments of livestock farming, and it can reflect in their demand for loan irrespective of the source. It can also in turn give confidence to a lender that a borrower is well suited make efficient use of credit facilities if extended to them.

4.1.8 Income

The distribution of livestock farmers based on income is represented in Table 4.8 below.

Table 4.8: Distribution of the Livestock farmers based on Income

Income range	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions	
	Frequency	% Distribution	Frequency	% Distribution
1-100,000	8	13.3	28	47.7
100,001-200,000	17	28.3	14	23.3
200,001-300,000	8	13.3	7	11.7
300,001-400,000	2	3.3	8	13.3
400,001-500,000	7	11.7	0	0
500,001-600,000	4	6.7	0	0
600,001-700,000	4	6.7	0	0
700,001-800,000	2	3.3	0	0
800,001-900,000	3	5	0	0
900,001-1,000,000	2	3.3	0	0
1,000,001-1,100,000	1	1.7	0	0
1,100,001-1,200,000	2	3.3	0	0
Total	60	100	60	100

Source: Field Survey Data, 2023

Table 4.8 shows that 28.3% of livestock farmers who obtain credit from formal sources earn between ₦100,001 - ₦ 200,000 while 3.3% earn between ₦ 1,100,001 - ₦ 1,200,000 and the mean farm income is ₦301,342. This is an indication that formal financial institutions extend credit to livestock farmers with high level of monthly farm income. Farm income is an important determinant of utilization of formal financial services among smallholder farmers (Seluhinga, 2023, Wabwire, 2021). Also, majority of the livestock farmers (47.7%) who obtain credit from informal financial institutions earn between ₦1 - ₦ 100,000 while 13.3% earn between ₦ 300,001 - ₦ 400,000. With a mean farm income of ₦ 87,815 and judging from the fact that the amount of credit obtained from the informal sources is usually small, they will have money to repay their credit. This is in agreement to the study of Ugbaja (2011) who stated that it is expected that, high farm income will serve as a security for farmers to take farm credit

for expansion purposes. The high propensity to save from high income will also necessitate high credit need. Monthly deposits in form of income streams serves as a collateral, and often used as security to obtain formal credit from financial institutions. Lack of such collateral limits access to formal credit facilities (Chen *et al*., 2020; Appiah-Twumasi *et al.,* 2022).

4.1.9. Membership of Cooperative Society

Table 4.9 shows the distribution of the livestock farmers based on membership status of cooperative society

Table 4.9: Distribution of the farmers based on membership status of cooperative society

Cooperative Membership	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions	
	Frequency	% Distribution	Frequency	% Distribution
Member	40	66.7	12	20
Non-Member	20	33.3	48	80
Total	60	100	60	100

Source: Field Survey Data, 2023

Information in table 4.9 shows that 66.7% of the livestock farmers who are financed by formal financial institutions were members of a cooperative society while 33.3% were not. On the other hand, majority of the livestock farmers financed by informal financial institutions (80%) did not belong to any cooperative society while 20% were members. The implication is that the livestock farmers who are financed by formal financial institutions do realize benefits of such joint action in farming. This finding also lays more credence to the study of Ukwuaba and Onwu (2020) who observed that many farmers who do not belong to a cooperative are constrained from accessing credit from formal sources and will lack the benefits enjoyed by members of the cooperative society and as such, will have no option than to access credit from informal sources where they can easily meet credit requirements. The study of Basorunb and Fasakin (2012) reported that farmers who belong to cooperative society gather more information on availability and type of financial services obtainable, exchange labour, acquire reasonable amount of credit especially from formal sources and knowledge on how to efficiently use productive resources to enhance their output than those who do not belong to any agricultural cooperative society.

4.1.10 Extension Contact

Distribution of the Livestock farmers based on contact with extension agents is represented in Table 4.10.

Table 4.10: Distribution of the Livestock Farmers Based on Contact with Extension Agents

Extension Contact	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions	
	Frequency	% Distribution	Frequency	% Distribution
Yes	37	61.7	16	26.7
No	23	38.3	44	73.3
Total	60	100	60	100

Source: Field Survey Data, 2023

Table 4.10 shows that, for the livestock farmers who are financed by formal financial institutions, 61.7% had contact with extension agents while 38.3% did not. Also, for the livestock farmers financed by informal financial institutions, 26.7% had contact with extension agents while a greater percentage of them (73.3%) did not have. This implies that more of the livestock farmers financed by formal financial institutions enjoy the services of extension agents who visit their farms and disseminate information on the most effective management system to adopt, advise them on the sources of input and credit facility for their production. More so, a greater percentage of those financed by informal financial institutions do not enjoy this service. This finding is in conformity with the study of Adesehinwa *et al.*, (2004) who asserted that farmer's access to extension services through visit by extension agents enhanced their production.

4.1.11 Formal Training on Livestock farming

Table 4.11 shows the distribution of the Livestock farmers based on formal training in livestock rearing.

Table 4.11: Distribution of the Livestock farmers based on Formal Training in livestock rearing

Formal Training	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions	
	Frequency	% Distribution	Frequency	% Distribution
Yes	49	81.7	33	55
No	11	18.3	27	45
Total	60	100	60	100

Source: Field Survey Data, 2023

Table 4.11 shows 81.7% of the farmers financed by formal financial institutions and 55% of the farmers financed by informal financial institutions understand the rudiments of livestock production before venturing into the business. This implies that a good number of the farmers did not just venture into livestock farming for farming sake, they rather acquired the basic knowledge to better understand what it entails before they made the decision to begin.

4.1.12 Flock size

The distribution of livestock farmers based on flock size is represented in Table 4.12

Table 4.12: Distribution of the Livestock farmers based on Flock size

Flock size	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions		Mean
	Frequency	% Distribution	Frequency	% Distribution	
1-50	37	61.7	51	85	
51-100	6	10	7	11.7	
101-150	3	5	0	0	
151-200	8	13.3	2	3.3	
201-250	1	1.7	0	0	
251-300	0	0	0	0	
301-350	0	0	0	0	
351-400	0	0	0	0	
401-450	0	0	0	0	
451-500	2	3.3	0	0	
501-550	1	1.7	0	0	
551-600	1	1.7	0	0	
601-650	0	0	0	0	
651-700	1	1.7	0	0	
Total	60	100	60	100	

Source: Field Survey Data, 2023

Table 4.12 reveals that farmers financed by formal financial institutions have more flock size as 61.7% have between 1 and 50, 10% have 51 to 100, 13.3% have 151-200, 1.7% have livestock number ranging from 200 to 700. This is an indication that they have the potential for greater income through sales of livestock which can improve their ability to repay credit and make more attractive candidates for credit as livestock can be considered collateral when applying for credit. This is in agreement with Silong & Gadanakis (2020) who asserted that flock sizes facilitate access to formal credit, and the formal financial institutions extend credit to farmers with larger flock sizes. On the other hand, a larger percentage 85% of the livestock farmers financed by informal financial institutions have between 1 to 50 livestock, 11.7% have from 51 to 100 and only 3.3% have 151 to 200.

4.2 Categorization and comparison of livestock farmers by credit characteristics.

Table 4.13 shows the livestock farmers' categorization and comparison by average credit demanded and supplied, average interest rate, credit duration and repayment in the study area.

Table 4.13: Categorization and comparison of livestock farmers by credit characteristics

Items	Formal Financial Sources	Informal Financial Sources	% Difference	Z-values
Average amount of credit demanded	3,520,000	822,000	76.65	6.9650*
Average amount of credit supplied	1,515,833	244,167	83.89	6.7646*
Average interest rate	7.025	0.729	89.62	10.4319*
Average credit duration	17.55	7.00	60.11	7.2729*
Repayment (average amount repaid)	80,919	34,709	57.11	7.418687*

*significant at 5%

Source: Field Survey data, 2023

Results showed that the average amount of credit demanded by livestock farmers from formal financial sources was three million five hundred and twenty thousand Naira (₦3,520,000), while that demanded by farmers from informal financial sources was eight hundred twenty-two thousand Naira (₦822,000). The Z-test value (6.9650), which was significant at 5% level, showed that there is a significant difference between the amount of credit demanded by livestock farmers from formal financial sources and that from informal financial sources. Farmers who dwell more on livestock financing from formal financial institutions demand more credit (₦3,529,000) than their counterparts who dwell more on informal financial institutions, as evidenced by the percentage difference of 76.65%. Results also showed that the average amount of credit supplied to livestock farmers by formal financial institutions was one million five hundred and fifteen thousand eight hundred and thirty-three thousand Naira (₦1,515,833). While that supplied by informal financial institutions to farmers was two hundred and forty-four thousand one hundred and sixty-seven Naira (₦244,167), with a percentage difference of 83.89%. The Z-test value (6.7646), which was significant at 5% level, further confirmed that there is a significant difference between the amount of credit supplied to livestock farmers by formal and informal financial institutions. Therefore, the null hypothesis that the amount of credit supplied to livestock farmers by formal financial institutions is not different from that supplied by informal financial institutions was rejected. The study accepted the alternative hypothesis and concluded that the amount of credit supplied to livestock farmers by formal financial institutions is different from that supplied by informal

financial institutions. This could stem from the fact that formal financial institutions in the area supply more amount of credit to livestock farmers than their counterparts in the informal sector.

Results also showed that the average interest rate charged by formal financial institutions was 7.025%, while that of the informal credit institutions was 0.729%, with a percentage difference of 89.62%. The Z-test value (10.4319), which was also significant at 5% level, further confirmed that there is a significant difference in the interest rate charged by formal and informal credit institutions in the area. This implies that formal financial institutions charge higher interest rates than informal institutions, though farmers still borrow from them because they offer more amount of credit. High interest rate is one of the factors limiting farmers from accessing credit from formal financial institutions (Seluhinga, 2023). High interest rate increases the production costs as farmers spend more servicing their borrowed loans. Appiah-Twumasi *et al*. (2022) reported that the interest rate is the key factor influencing high cost of financing in agriculture. Results also showed that the average duration of credits from formal financial institutions was 17.55, approximately eighteen (18) months, while that of the informal credit institutions was seven (7) months, with a percentage difference of 60.11%. The Z-test value (7.2729), which was significant at 5% level, further confirmed that there is a significant difference between the credit durations of formal and informal financial institutions in the area. Hence, the null hypothesis that there is no significant difference in the interest rate charged by formal and informal credit institutions in the area was rejected. This is an indication that informal financial institutions such as farmers' cooperatives or Associations charge less interest rate and less credit durations.

Results showed that the average amount of credit repaid monthly by livestock farmers financed by formal credit sources was eighty thousand nine hundred and nineteen Naira (₦80,919), while that of the livestock farmers financed by informal credit sources was thirty-four thousand seven hundred and nine Naira (₦34,709) with a percentage difference of 57.11%. This is an indication that farmers financed by formal institutions have higher repayment rates than their counterparts financed by informal institutions. This also suggests that the formal institutions tend extend more credit to farmers with strong repayment histories. Chen *et al.,* (2020) asserted that farmers with low repayment capacity face credit constraints, as lenders are cautious about extending larger amounts to borrowers with a higher risk of default. Ajibade *et al.,* (2018) argued that farmers are more likely to use formal financial institutions if they relax their stringent rules, as this would provide a longer repayment period compared to the informal credit

sector. The Z-test value (7.418687), which was significant at 5% level, further confirmed that there is a significant difference between the repayment capacity of farmers financed by formal and informal credit sources in the area. Therefore, the null hypothesis that there is no difference in the repayment capacity of livestock farmers financed through formal and informal credit institutions was rejected. The study accepted the alternative hypothesis and concluded that there is a significant difference in the repayment capacity of livestock farmers financed by formal and informal credit institutions in the area. The difference in repayment capacity could stem from the difference in the credit amount accessed by livestock farmers financed by formal and informal credit sources in the area.

4.3 Factors influencing the financial credibility of livestock farmers

The distribution of livestock farmers based on the level of financial credibility is represented in Table 4.14.

Table 4.14: Distribution of livestock farmers based on the level of financial credibility

Level of financial credibility	Farmers financed by Formal Financial Institutions		Farmers financed by Informal Financial Institutions	
	Frequency	% Distribution	Frequency	% Distribution
Credible	39	65	17	28.3
Non-credible	21	35	43	71.7
Total	60	100	60	100

Source: Field Survey Data, 2023

Table 4.14 showed that 65% of livestock farmers financed by formal financial institutions are financially credible as they were able to repay their financial obligation within the specified period while 35% were non-credible. On the other hand, only 28.3% of livestock farmers financed by informal financial institutions were financially credible while a greater percentage (71.7%) were not able to meet their financial obligation and as such non-credible. This implies that most farmers financed by formal financial institutions fulfill their obligations to repay their loans on time and in a trustworthy manner, while most farmers financed by informal financial institutions do not fulfill their obligations to repay on time. Lu *et al.,* (2024) posited that most farmers lack credibility. This could be linked to integrity issues and problem with financial management. The integrity issues and lack of trustworthiness lead to high loan

risks, and financial institutions are usually cautious about extending loans to farmers with high loan risks (Guo *et al.,* 2024). Topor *et al.,* (2024) asserted that financial institutions especially formal sources have greater confidence in timely loan repayment. Non-repayment of loans affects the financial health of credit institutions (Rengarajan & Sushmitha, 2024).

Table 4.15: Probit Analysis of the factors influencing the Financial Credibility of Livestock farmers financed by formal and informal financial institutions in the study area

Table 4.15 shows probit analysis of the factors influencing the financial credibility of livestock farmers financed by formal and informal financial institutions in the study area.

	Formal Financial Sources		Informal Financial Sources	
Activities	**Coefficients**	**Marginal Effects**	**Coefficients**	**Marginal Effects**
Age	0.0164 (0.0505)	0.0024	-0.0001 (0.0246)	-0.00002
Gender	-0.1005 (0.6829)	-0.01495	1.7054* (0.6440)	0.3185*
Marital Status	-0.1016 (0.2845)	-0.0149	-0.5235 (0.5758)	-0.0978
Education	-0.0288 (0.0633)	-0.0042	0.2462** (0.1057)	0.0460*
Years of Experience	0.0803 (0.0892)	0.0118	0.0526*** (0.0309)	0.0098***
Level of Income	8.85e-06* (2.96e-06)	1.30e-06*	-2.60e-07 (3.30e-06)	-4.86e-08
Interest Rate	-0.1955*** (0.1058)	-0.0288**	-0.0318 (0.0296)	-0.0059
Household size	-0.5301** (0.2423)	-0.0780*	-0.4266* (0.1533)	-0.0797*
Flock Size	0.0087*** (0.0048)	0.0013**	0.0277* (0.0097)	0.0052*
Cooperative Membership	-0.8341 (0.7308)	-0.1227	1.9070* (0.7180)	0.3561*
Credit Duration	0.2076* (0.0708)	0.0305*	0.2915 (0.1045)	0.0544*
LR chi2(11)	**39.70***		**41.36***	
Prob > chi^2	**0.0000**		**0.0000**	
Pseudo R^2	**0.5555**		**0.5037**	
Log likelihood	**-15.9135**		**-20.3758**	

*significant at 1%, **significant at 5%, ***significant at 10%. Values in parenthesis are standard errors

Source: Computer analysis of the field survey data (2023) using STATA Software

It shows the coefficient and marginal effects of the Probit model. The Pseudo R^2 value for farmers financed by formal institutions was 0.5555, while that of livestock farmers financed by informal financial institutions was 0.5037. This is an indication that the socioeconomic

factors of the livestock farmers financed by formal and informal financial institutions included in the probit models explained about 55.55% and 50.37% of the variations in the financial credibility of livestock farmers financed by formal and informal financial institutions, respectively. The Likelihood Ratio (LR) Chi-square statistics (which shows the model's goodness-of-fit) for farmers financed by formal (39.70) and informal (41.36) financial institutions were significant at 1%. Therefore, the null hypotheses that there is no significant relationship between socioeconomic factors and financial credibility of livestock farmers financed by formal and informal financial institutions, respectively were rejected. This shows that there is a significant relationship between the socioeconomic factors and the financial credibility of livestock farmers

Results showed that the coefficients of income, interest rate, household size, livestock size, and credit duration for livestock farmers financed by formal financial institutions were statistically significant at 1%, 5% and 10%, respectively, while gender, level of education, years of experience, household size, livestock size and cooperative membership of the farmers financed by informal financial institutions were statistically significant at 1%, 5% and 10% respectively. However, since the Probit model is non-linear, the estimated coefficients cannot give the correct measure of the effect of the explanatory variables on the dependent variable. The most fitting method is to use marginal effects rather than their coefficients. Hence, the study focused on the marginal effects of the Probit analysis.

The results of the socioeconomic factors influencing the financial credibility of farmers financed by formal financial institutions showed that the coefficient of income level was positive and statistically significant at 1%, and the marginal value was 1.30e-06. This is an indication that income level has a positive effect on the financial credibility of livestock farmers. The implication is that an increase in income level by one percent, increases the probability of livestock farmers of being considered financially credible by formal financial institutions by 1.30e-06%. This implies that the formal financial institutions take into account the income level of livestock farmers when assessing their eligibility for livestock financing and farmers' repayment capabilities. This in turn determines the credibility for further financing.

The coefficient of interest rate was negative and significant at 10%, and the marginal value was -0.0288. This implies that one percent increase in farmer's interest on loan decreases the

probability of being financially credible by 2.88%. This stems from the fact that high interest rate rips off the part of the farmer's profits that would have been used to service the loan. This in turn leads to loan defaults, and hence financially precarious or non-credible.

The coefficient of household size was negative and statistically significant at 5%, and the marginal value was -0.0780. This is an indication that household size has a negative effect on the financial credibility of livestock farmers. The implication is that an increase in household size by one percent, decreases the probability of livestock farmers of being considered financially credible by formal financial institutions by 7.80%. This implies that the formal financial institutions also take into account the household size of livestock farmers when assessing their eligibility for livestock financing and repayment capabilities. Increase in household size increases the financial responsibilities of farmers and farmers are likely to focus their income on domestic and non-business issues such spending more on feeding, paying children school fees and other obligations. This brings about the issue of loan defaults and in turn farmers are considered ineligible for livestock financing.

The coefficient of flock size was positive and statistically significant at 10%, and the marginal value was 0.0013. This is an indication that farmer's flock size has a positive effect on the financial credibility of livestock farmers. This is an indication that an increase in flock size by one percent, increases the probability of livestock farmers of being considered financially credible by formal financial institutions by 0.13%. This implies that the formal financial institutions consider flock size when assessing farmer's eligibility and credibility for livestock financing and repayment capabilities.

Finally, the coefficient of credit/loan duration was positive and statistically significant at 1%, and the marginal value was 0.0305. This is an indication that loan duration has a positive effect on the financial credibility of livestock farmers. This implies that an increase in loan duration by one month, increases the probability of livestock farmers of being financially credible by 3.05%. Increase in loan duration reduces the repayment pressure and gives the livestock farmers more time to transact and generate more profits for loan servicing and increases the financial credibility of livestock farmers.

On the other hand, the results of the factors influencing the financial credibility of farmers financed by informal financial institutions showed that the coefficient of gender was positive

and statistically significant at 1%, and the marginal value was 0.3185. This is an indication that the probability of extending financing to male-headed livestock farmers increases by 31.85% more than their female counterparts in livestock production. This implies that the informal financial institutions consider more of male-headed livestock farms than female-headed farms when assessing their eligibility for livestock financing. This also implies that male livestock farmers are more financially credible than their female counterparts in managing finances, repaying debts and maintaining a stable financial position.

The coefficient of educational attainment was positive and statistically significant at 5%, and the marginal value was 0.0460. This is an indication that an increase in educational attainment of livestock farmers by one percent, increases the probability of being financially credible by 4.60%. Educated farmers are financially credible and more likely to manage their finances, repay debts and maintain a steady financial position more than their counterparts that are less educated.

The coefficient of years of experience was positive and statistically significant at 10%, and the marginal value was 0.0098. This is an indication that an increase in years of experience by one percent, increases the probability of being more financially credible in livestock business by 0.98%. This implies that livestock farmers gain knowledge of financial management through years of experience in livestock business and the more years they have in livestock business, the more accountable they are in fulfilling financial obligations.

The coefficient of household size was negative and statistically significant at 1%, and the marginal value was -0.0797. This is an indication that household size has a negative effect on the financial credibility of livestock farmers financed by informal financial institutions. The implication is that an increase in household size by one percent, decreases the probability of livestock farmers of being considered financially credible by informal financial institutions by 7.97%. This implies that the informal financial institutions take into account the household size of livestock farmers when assessing their eligibility for livestock financing and repayment capabilities. Increase in household size increases the financial responsibilities of farmers and farmers focus more of their income on domestic and non-business issues such spending more on feeding, paying children school fees and other obligations. This brings about the issue of loan defaults and lack of credibility in managing their financial commitments of their livestock business.

The coefficient of flock size was positive and statistically significant at 1%, and the marginal value was 0.0052. This is an indication that farmer's flock size has a positive effect on the financial credibility of livestock farmers. This implies that an increase in flock size by one percent, increases the probability of livestock farmers of being financially credible by 0.52%. This implies that the informal financial institutions consider livestock size when assessing farmer's eligibility and credibility for livestock financing.

The coefficient of cooperative membership was positive and statistically significant at 1%, and the marginal value was 0.3561. This is an indication that cooperative membership has a positive effect on the financial credibility of livestock farmers. This implies that an increase in membership of cooperatives by one percent, increases the probability of being financially credible by 35.61%. informal financial institutions such as cooperatives extend credit to their members and facilitate effective loan utilization among members, ensuring funds are used for their intended purpose. This, in turn, increases the financial credibility of her memberships.

Finally, the coefficient of credit/loan duration was positive and statistically significant at 1%, and the marginal value was 0.0544. This is an indication that loan duration has a positive effect on the financial credibility of livestock farmers. This implies that an increase in loan duration by one month (or one percent of the normal duration), increases the probability of livestock farmers of being financially credible by 5.44%. Increase in loan duration reduces the repayment pressure and gives the livestock farmers more time to transact and generate more profits for loan servicing and increases the financial credibility of livestock farmers. This is in line with Zheng and Ho (2020), Sun and Ho (2018) who also reported that the characteristics of farmers' age, gender, education level, household income, and income source significantly affect the financial credibility.

4.4 Risk risk in financing livestock farmers through formal and informal financial institutions

Table 4.16 shows the estimation and comparison of risk in financing livestock production through formal and informal financial institutions in the area.

Table 4.16: Estimation and comparison of risk in financing livestock farmers through formal and informal financial institutions

	Category A Farmers (Financed through Formal Financial Institutions)			**Category B Farmers (Financed through informal Financial Institutions)**		
Net Cash Inflow (Naira)	**Freq**	**Probability**	**Expected Values**	**Freq**	**Probability**	**Expected Values**
1-100,000	8	0.13	6666.73	14	0.47	11666.78
100,001-200,000	17	0.28	42500.14	28	0.23	70000.23
200,001-300,000	8	0.13	33333.40	7	0.12	29166.73
300,001-400,000	2	0.03	11666.68	3	0.05	17500.03
400,001-500,000	7	0.12	52500.06	8	0.13	60000.07
500,001-600,000	4	0.07	36666.70	-	-	-
600,001-700,000	4	0.07	43333.37	-	-	-
700,001-800,000	2	0.03	25000.02	-	-	-
800,001-900,000	3	0.05	42500.03	-	-	-
900,001-1,000,000	2	0.03	31666.68	-	-	-
1,000,001-1,100,000	1	0.02	17500.01	-	-	-
1,100,001-1,200,000	2	0.03	38333.35	-	-	-
Expected Value (εν)	**381,667.17**			**188,333.83**		
Variance	**92830555556**			**16575000000**		
Standard deviation (σ)	**304,681.07**			**128,743.93**		
Sample size	**60**			**60**		
CV	**0.798**			**0.684**		
Mean value of coefficient of variation	0.20451			1.73351		
Variance of coefficient of variation	0.012306411			1.484995221		
Z-Statistics	2.800794*					

*significant@5% levels

Source: Computer analysis of the field survey data (2023) using EXCEL

Results showed that the expected net cash inflow of livestock farmers financed through formal financial sources was three hundred and eight-one thousand six hundred and sixty-seven Naira seventeen kobo (₦381,667.17) with a standard deviation of three hundred and four thousand six hundred and eighty one Naira seven kobo (₦304,681.07), while the expected net cash inflow of livestock farmers financed through informal financial sources was one hundred and

eighty eight thousand three hundred and thirty-three Naira eight three kobo (₦188,333.83) with a standard deviation of one hundred and twenty eight thousand seven hundred and forty three Naira ninety three kobo (₦128,743.93). The higher value of the standard deviation for livestock farmers financed through formal financial sources is an indication that there is a higher level of risk associated with financing livestock farmers through formal credit institutions when matched with their counterparts who financed their livestock production through informal credit institutions.

Results also showed that the coefficient of variation for livestock farmers financed through formal credit institutions was 0.798 while that of the livestock farmer financed through informal credit institutions was 0.684. The coefficient variation of livestock farmers financed through formal credit sources was higher than livestock farmers financed through informal credit sources. This implies that there is a slightly high level of risk involved in financing livestock production through formal financial sources than informal financial sources in the study area. This could stem from the higher interest rate and other administrative fees charged by formal financial sources that affect the repayment capacity of farmers especially in the event of disease outbreak that increases the mortality rate of these livestock and reduces the returns upon which the farmers repay these formal financial institutions. The limitations of formal credit sources in supporting farmers often drive them to seek informal financing options, particularly in times of income shocks (Moahid & Maharjan, 2020). While formal credit sources charge higher interest rates to compensate for perceived higher risk (Chiu *et al.*, 2014), resulting from the uncertainties in agricultural production or lack of collateral. On the other hand, farmers prefer financing options that match their production cycles with flexible terms (Khan *et al.*, 2024), in order to reduce the risks of defaulting.

Results also showed that the Z-value was 2.800794 which was also statistically significant at 5% level. Therefore, the null hypothesis that there is no significant difference in the relative risk profile of livestock farmers financed through formal and informal credit sources in the area was rejected. The alternative was accepted and the study concluded that there is a significant difference in the relative risk profile of livestock farmers financed through formal and informal credit sources in the area.

4.5 Factors influencing the financing of livestock production by formal and informal financial institutions.

Table 4.17 shows the multiple regression results of the factors influencing livestock financing through formal and informal financial sources in the study area.

Table 4.17 Estimated Results of the factors influencing livestock financing through formal and informal financial sources

	Formal financial sources	**Informal financial sources**	**Pooled effects**
Variables	**Exponential**	**Double-log**	**Double log**
constant	12.36469	9.915895	8.106637
	(33.62064)*	(8.428476)*	(7.554613)*
Flock size	-0.00033	0.182256	0.090714
	(-0.67026)	(4.231107)*	(2.358308)**
	1.12E-06	0.095929	0.35854
Income	(4.301971)*	(1.42858)	(6.878049)*
	-0.0149	-0.36431	-0.5085
Age	(-1.49938)	(-1.3603)	(-2.01083)**
	0.171029	-0.00844	0.107074
Gender	(1.187416)	(-0.08973)	(1.25138)
	-0.01184	-0.00659	-0.05414
Marital Status	(-0.05069)	(-0.03749)	(-0.34906)
	0.039677	0.166298	0.182817
Household size	(1.196729)	(1.472762)	(1.82325)***
	0.031797	0.102356	0.100336
Years of Experience	(2.063042)**	(1.07426)	(1.066801)
	0.006259	-0.01995	-0.0285
Education	(0.474235)	(-0.19022)	(-0.41805)
	-0.1204	0.303344	0.005346
Cooperative membership	(-0.8424)	(2.509936)**	(0.053562)
	0.029395	-0.01504	0.234809
Interest rate	(1.364294)	(-0.1755)	(3.819235)*
	0.056659	0.893092	0.740388
Duration of credit	(6.945366)*	(10.91286)*	(10.22726)*
R-square	**0.8332**	**0.8234**	**0.8829**
F-value	**21.79204***	**20.3456566***	**74.05741***
Observations	**60**	**60**	**120**
Sum of Square Residuals	**9.36442**	**4.692701**	**18.46867**
Chow F-value		**2.534****	

Figures in parentheses are t-values; *significant at 1%, **significant at 5%, and ***significant at 10% levels. Chow test df, K = 12, $n_1+n_2-2k = 96$, F critical =1.854.

Source: Computer analysis of the field survey data (2023) using EXCEL

The four functional forms for linear, semi log exponential and double log were fitted and based on the values of R^2, F-values, number of significant parameters and the apriori expectation, the exponential function was chosen as the lead equation for the function for formal financial sources, while the double log was chosen as the lead equation for the function for informal financial sources. The coefficient of multiple determinations (R^2) for formal financial sources model was 0.8332, while that of the informal financial sources model was 0.8234. This implies that about 83.32% variability in livestock financing through formal financial sources and 82.34% variability in livestock financing through informal financial sources were explained by the independent variables specified in the respective models, while the remaining 16.68% for formal financing model and 17.66% for informal financing model were not accounted for by the variables. The F-values for formal (21.79204**)** and informal (20.3457) financial sources were significant at 5% levels. This is an indication that the explanatory variables specified have significant influence on livestock financing by formal and informal credit institutions in the area. The t-values significant at 1% and 5% levels further showed that income, years of experience and credit duration significantly influenced livestock financing by formal financial institutions, while livestock size, cooperative membership and credit duration were the major factors that significantly influenced livestock financing by informal financial institutions in the area.

For the formal financing model, results showed that the coefficients of income (1.12E-06), years of experience in livestock production (0.0318) and duration of credit (0.0567) were positive and statistically significant at 1% and 5% levels, respectively.

The coefficient of income (1.12E-06) was positive and significant 1% level. This implies that an increase in income by one percent increases the amount accessed for livestock financing by 1.12E-04%. This is an indication that farmers with high level of income access more credit than those with less income level. Financial institutions' strict eligibility criteria pose a major challenge for farmers with irregular farm income streams (Khan *et al.,* 2024). The coefficient of years of experience (0.0318) was positive and significant at 5% level. This implies that an increase in years of experience by one percent increases the amount accessed for livestock financing by 3.18%. This is an indication that years of experience in livestock production business increases the technical know-how of livestock farmers and instills confidence in the minds of risk managers of the formal financial institutions. The coefficient of credit duration (0.0567) was positive and significant at 1% level. This implies that an increase in the duration

of the credit by one percent increases the amount accessed for livestock financing by 5.67%. This is an indication that an increase in credit duration increases the repayment capacity of farmers and hence more credit access (Ajibade *et al.*, 2018).

On the other hand, the coefficients of flock size, cooperative membership and duration of credit were positive and significant at 1% and 5% levels, respectively, for informal financing model. The coefficient of livestock size (0.1823) was positive and significant at 1% level. This implies that an increase in livestock size by one percent increases the amount accessed for livestock financing by 18.23%. This is an indication that informal credit institutions consider the number of flocks in credit disbursement and distribute credits based on the number of livestock owned. The flock size influences the amount of credit demanded by livestock farmers as reported by Silong and Gadanakis (2020).

The coefficient of cooperative membership (0.3033) was positive and statistically significant at 5% level. This implies that an increase in number of cooperative memberships by one percent increases the amount of credit accessed for livestock financing by 30.33%. This is an indication that members of cooperative societies accessed more credit from informal credit institutions for livestock financing than non-members. The coefficient of credit duration (0.8931) was positive and significant at 1% level. This implies that an increase in credit duration by one percent increases the amount accessed for livestock financing by 89.31%. This is an indication that an increase in credit duration increases the repayment capacity of livestock farmers and hence the amount of credit disbursed by informal credit institutions.

However, in order to test the presence of structural break in the two regression coefficients, a Chow test was employed using the individual regressions for formal and informal livestock financing and the pooled effects as shown in Table 4.17. Results showed that the Chow-F value was 2.534 and significant at 5% level (since F-critical was 1.854). Therefore, the null hypothesis that there is no structural break point and the explanatory variables specified are consistent across the models for formal and informal financing sources was rejected, and the alternative accepted. It was concluded that there is a structural break point and the explanatory variables specified are not consistent across the models for formal and informal financing sources. This is an indication that the parameter estimates for the formal financing sources are not equal to that estimated for informal financing sources. This could stem from the differences in policies and operation procedures in formal and informal financial institutions, as informal

sources are exerting more lenient credit policies when compared to their counterparts in formal institutions.

4.6 Factors militating against livestock financing by formal and informal financial sources in the area.

Table 4.18 shows the multiple response of the factors militating against livestock financing by formal and informal credit institutions in the study area.

Table 4.18 Multiple response of the factors militating against livestock financing by formal and informal credit institutions in the study area

	Farmers financed by Formal Credit Institutions		Farmers financed by Informal Credit Institutions	
Factors	**Frequency**	**% Distribution**	**Frequency**	**% Distribution**
Lack of credit facilities/insufficient credit	4	6.67	54	90.00*
Years of membership/account holding	45	75.00*	48	80.00*
Monthly Savings deposits	57	95.00*	7	11.67
Insufficient collateral	51	85.00*	46	76.67*
Ineligibility resulting from improper documentation	21	35.00	12	20.00
Lack of consistent cash flow	1	1.67	3	5.00
Lack of personal guarantor	50	83.33*	32	53.33*

Source: Field Survey, 2023
***Major factors** $\geq$ **50**%

Results showed that the major factors militating against livestock financing by formal credit institutions were years of account holding (75.00%), savings deposits (95.00%), insufficient collateral (85.00%) and lack of personal guarantors (83.33%), while that of livestock financing by informal credit institutions were insufficient credit (90.00%), years of membership (80.00%), insufficient collateral (76.67%) and lack of personal guarantor (53.33%). This implies that years of account holding, savings deposits, insufficient collateral and lack of personal guarantor are the major factors militating against livestock financing by formal credit institutions while insufficient credit, years of membership, insufficient collateral and lack of personal guarantor are the major factors militating against livestock financing by informal credit institutions in the area.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.2 SUMMARY

The study was on comparative analysis of financing livestock production by formal and informal financial institutions in Imo state. Specifically, the study examined the socioeconomic characteristics of livestock farmers financed by formal and informal financial institutions in the study area, determined and compared the credit characteristics of livestock farmers, analysed the financial credibility of livestock farmers and their influencing factors, determined and compared the relative risk in financing livestock production, analysed the factors that influence livestock financing by formal and informal financial institutions and identified the factors militating against livestock financing by formal and informal financial sources in the area. The following hypotheses were tested; there is no significant difference in the credit characteristics of livestock farmers financed by formal and informal financial institutions, there is no significant difference in the relative risk in financing livestock production by formal and informal financial institutions, socio-economic characteristics of the livestock farmers do not have any significant effect on livestock financing by formal and informal financial institutions in the area. Using both proportionate, random and purposive sampling, a total of 120 respondents were chosen comprising of 60 livestock farmers financed by formal financial institutions and 60 livestock farmers financed by informal financial institutions. Using questionnaires, primary data was obtained from the livestock farmers. Data collected were analyzed using descriptive statistical tools like mean, frequency, TRCS and percentage and inferential tools like probit model and ordinary least square regression model.

Results of socio-economic characteristics of the livestock farmers showed that those financed by formal financial institutions were more of males (55%) with a mean age of 47 years, mostly married (88.3%), moderately educated with 9.7 years as mean years of education attainment, mean household size of 5 persons, 40% into ruminant livestock production while 60% were into non ruminant livestock production with 7.4years as the mean years of farming experience, an average monthly income of ₦301,342 with 66.7% being members of cooperative society and 61.7% having extension contact. Those financed by informal financial institutions were also mostly males (56.7%) with a mean age of 44 years, mostly married (86.7%), moderately educated with 9.8 years as mean years of education attainment, mean household size of 4 persons, 53.3% into ruminant livestock production while 46.7% were into non ruminant

livestock production with 7.6 years as the mean years of farming experience, an average monthly income of ₦87,815 with only 20% belonging to cooperative society and 26.7% having extension contact.

The study further revealed that there was a significant difference in the amount of credit demand by livestock farmers from formal and informal financial sources and the also a difference in the amount of credit supplied by the formal and informal financial institutions to the livestock farmers as the average amount of credit demanded by livestock farmers from formal financial sources was three million five hundred and twenty thousand Naira (₦3,520,000), while that demanded by farmers from informal financial sources was eight hundred twenty-two thousand Naira (₦822,000). The average amount of credit supplied to livestock farmers by formal financial institutions was one million five hundred and fifteen thousand eight hundred and thirty-three thousand Naira (₦1,515,833). While that supplied by informal financial institutions to farmers was two hundred and forty-four thousand one hundred and sixty-seven Naira (₦244,167), with a percentage difference of 83.89%. Results also showed that the average interest rate charged by formal financial institutions was 7.025%, while that of the informal credit institutions was 0.729%, with a percentage difference of 89.62%. The average amount of credit repaid monthly by livestock farmers financed by formal credit sources was eighty thousand nine hundred and nineteen Naira (₦80,919), while that of the livestock farmers financed by informal credit sources was thirty-four thousand seven hundred and nine Naira (₦34,709) with a percentage difference of 57.11%.

The probit analysis of the factors influencing the financial credibility of livestock farmers financed by formal and informal financial institutions showed that the Pseudo R^2 value for farmers financed by formal institutions was 0.5555, while that of livestock farmers financed by informal financial institutions was 0.5037. This is an indication that the factors included in the probit models explained about 55.55% and 50.37% of the variations in the financial credibility of livestock farmers financed by formal and informal financial institutions, respectively. The Likelihood Ratio(LR) Chi-square statistics (which shows the model's goodness-of-fit) for farmers financed by formal (39.70) and informal (41.36) financial institutions were significant at 1%. Therefore, the null hypotheses that there is no significant relationship between socioeconomic factors and financial credibility of livestock farmers financed by formal and informal financial institutions, respectively were rejected. This shows that there is a significant relationship between the socioeconomic factors and the financial

credibility of livestock farmers. Results showed that the coefficients and marginal values of income, flock size and credit duration were positive and statistically significant at 1%, 5% and 10%, respectively, while interest rate and household size were statistically significant at 1%, 5% and 10%, respectively for livestock farmers financed by formal financial institutions. However, the coefficients and marginal values of gender, level of education, years of experience, flock size and cooperative membership of livestock farmers financed by informal financial institutions were statistically significant at 1%, 5% and 10% respectively, while household size was negative and significant at 1%. Positive marginal value is an indication that the factor under consideration increases probability of being financially credible in managing finances, repaying debts and maintaining a stable financial position, while negative marginal value shows a decrease in probability of being financially credible especially in managing finances, repaying debts and maintaining a stable financial position.

The study also showed that there is a higher level of risk associated with financing livestock farmers through formal credit institutions when matched with their counterparts who financed their livestock production through informal credit institutions. Furthermore, income, years of experience and credit duration significantly influenced livestock financing by formal financial institutions, while flock size, cooperative membership and credit duration were the major factors that significantly influenced livestock financing by informal financial institutions in the area. Results showed that the major factors militating against livestock financing by formal credit institutions were years of account holding (75.00%), savings deposits (95.00%), insufficient collateral (85.00%) and lack of personal guarantors (83.33%), while that of livestock financing by informal credit institutions were insufficient credit (90.00%), years of membership (80.00%), insufficient collateral (76.67%) and lack of personal guarantor (53.33%).

5.3 CONCLUSION

Financing livestock production in Imo State through formal and informal institutions is crucial for the livestock sector's development. The findings of the study underscore the complexities of livestock financing in Imo State, Nigeria. Both financing types play critical roles in livestock production but they cater to different needs and risks. The interaction between the formal and informal financial institutions is vital for comprehensive financial inclusion of livestock farmers. The analysis reveals that formal credit sources offer higher credit amounts, longer credit durations, and greater repayment capacities compared to informal credit sources.

However, this increased access to credit comes with higher risk, as evidenced by the greater variance and standard deviation associated with formal credit sources. Moreover, the study highlights the numerous constraints that hinder livestock financing, including insufficient collateral, lack of credit facilities, and stringent account holding and membership requirements. The findings have implications for policymakers, financial institutions, and livestock farmers, highlighting the need for improved access to formal credit sources for livestock farmers, as they provide higher credit amounts and longer credit durations.

5.3 RECOMMENDATIONS

The following recommendations are made based on the findings:

i. There should be targeted financial inclusion programs that specifically target women, providing them with credit access especially to formal financial services, financial literacy training and entrepreneurship support in order to address the male dominance in financial institutions, which perpetuates gender inequality and financial inclusion in the State. Also educating farmers with informal credit arrangements on sound financial management practices and credit management will help them improve their financial credibility.

ii. Fostering partnerships between formal financial institutions, government agencies and livestock associations to reduce the high interest rate charged by formal financial institutions will promote access to formal credit and support the growth of livestock sector in the State.

iii. Livestock farmers should also be encouraged to maintain accurate records of their farming activities and finances which will come in handy during loan requests.

iv. Policy makers should focus on creating an inclusive financial environment that harnesses the strengths of both formal and informal financial institutions to enhance livestock production efficiency and sustainability.

5.4 CONTRIBUTION TO KNOWLEDGE

The comparative analysis of financing livestock production by formal and informal financial institutions can contribute to knowledge in several ways:

1. **Identifying Capacity-building Needs:** The study established that there is a significant relationship between livestock farmers socioeconomic and credit characteristics and their level of financial credibility. Understanding the evaluation criteria and decision-making processes of formal and informal financial institutions can help identify areas where

livestock owners, entrepreneurs, and intermediaries may require capacity-building support. This can inform the design and implementation of training programs, financial literacy initiatives, and other interventions to enhance the financial management skills and financial credibility of livestock stakeholders.

2. **Identifying Gaps and Barriers:** Comparing the practices and requirements of formal and informal financial institutions can reveal gaps, disparities, or barriers that livestock owners face when seeking financing. Understanding these gaps can inform policy and regulatory interventions to improve access to livestock financing, particularly for smallholder farmers.

3. **Assessing the Suitability of Financial Products:** Evaluating the appropriateness and effectiveness of existing financial products and services offered by formal and informal institutions can help identify areas for improvement or the need for new, tailored financial solutions for the livestock sector. This can contribute to the development of more suitable and accessible financing options for various livestock enterprises, improving the overall financial inclusion and support for the sector.

4. The study established that there is a higher level of risk involved in financing livestock production through formal financial sources, this will inform the development of risk-sharing mechanisms, credit guarantee schemes, or other innovative approaches to address the unique risks associated with livestock production and marketing.

5. By analyzing the influence of socioeconomic characteristics through marginal effects, the study went a step further to ascertain the marginal change in financial credibility and its responsiveness to significant explanatory variables rather than only depending on the coefficients to give correct measure of the effect of the explanatory variables on the financial credibility.

The insights from this study can help researchers and policymakers contribute to a deeper understanding of the challenges, opportunities, and best practices in this critical component of the livestock value chain.

REFERENCES

Abdullah, M. Y (1993). The Design and Management of poverty Alleviation projects in Africa. Washington, D. C.: Economic Development Institute of the World Bank.

Abhishek, T., Srivastava, S., & Sailaja, P. (2021). Loan as a backbone for agriculture: Evidence from banks. *Turkish Journal of Computer and Mathematics Education, 12(11), 106–114.*

Adam, A. J. (2007). Conceptual Issues on Savings in Nigeria. CBN Bullion, 30(1). Article 4.

Adebosin, W. G., Adebayo, A. A., Ashagidigbi, W. M. and Ayanwole, A. A. (2013). Determinants of farmers; demand for microfinance: the case of a rural community in Nigeria. *Journal of Economics and Sustainable Development*. *Vol 4, No. 5.*

Adegbite, D. A., and Afolabi, M. O. (2018). Integrating indigenous knowledge system into agricultural financing: A pathway to sustainable rural development in Nigeria. *Journal of Agricultural Extension, 22(1), 98-108.*

Adejobi, O and Atobatele, J. T. (2008). An analysis of loan delinquency among small-scale farmers in Southwestern Nigeria: Application of logit and loan performance indices. *East African Agriculture and Forestry Journal, Vol. 74, Issue 3, pp. 149-157.*

Adeola, R. G. (2008). Economic analysis of credit use among rural farmers in Oyo State, Nigeria. *International Journal of Agricultural Economics and Rural Development., 1(2), 52-58.*

Adesehinwa, A. O. K; Okunola, J. O and Adewunmi, M. K (2004). Socio-economic characteristics of ruminant livestock farmers and their production constraints in some parts of South Western Nigeria. *Livestock Research for Rural Development* vol 16 (8) Art #61. Retrieved April 13, 2024, from http://www.lrrd.org/lrrd16/8/ades16061.htm

Adeyinka, S. A., (2022). "Role of Informal Financial Institutions in Agricultural Development in Nigeria." *Journal of Agricultural Economics and Development.*

Adogamhe, P. (2007). The Nigerian Economic Empowerment and Development Strategy (NEEDS): A Critical Assessment. A paper delivered at the 48th Annual Convention of International Studies Association, February 28 - March 3, 2007, Chicago, IL, USA.

Afolabi, J. A. (2010). Analysis of loan repayment among small scale farmers in Oyo State. *Journal of Social Science 22(2): 115-119.*

Agnet (2004). Making farm credit work for the small-scale farmers. *International Journal of Environmental and Agricultural Research, ISSN 2454-1850, Vol 4, Issue 3.* (www.agnet.org/library).

Agresti, A. (2015). Foundations of Linear and Generalised Linear Models. (1st ed.). Wiley. ISBN: 978-118451920.

Ajah, E. A; Eyo, E. O and Ofem, U. I. (2014). "Loan repayment among bank of Agricultural loan beneficiaries in Nigeria" *International Journal of Livestock Production, vol.5 (9), pp 155-164.*

Ajibade T.B., Ajibade E.T., and Oloyede W.O (2018). Economic Appraisal of Formal and Informal Credit Sources Usage in Livestock Financing Among Women in South-Western Nigeria. *PAT, 14 (1), 106-112.*

Akmal, N., Rehman, B., Ali, A., and Shah, H. (2012). The Impact of Agriculture Credit on Growth in Pakistan. *Asian Journal of Agriculture and Rural Development*, 2(4), 579.

Akpan, S., Patrick, I., Udoka, S., Offiong, E., and Okon, U., (2013). Determinants of Credit Access and Demand among Poultry Farmers in Akwa Ibom State, Nigeria. *American Journal of Experimental Agriculture 3(2): 293-307.*

Akudugu, M., (2012): "Estimation of the Determinants of Credit Demand by Farmers and Supply by Rural Banks in Ghana's Upper East Region", *Asian Journal of Agriculture and Rural Development, Vol. 2, No. 2, pp. 189-200.*

Aladejebi, O. J, Omolehin, R. A, Ajiniran, M. E and Ajakpovi, A. P. (2018). Determinants of credit acquisition and utilization among household farmers in the drive towards sustainable output in Ekiti State, Nigeria. *International Journal of Sustainable Development, 11, 25-36.*

Aldrich, J. H and Nelson F. D. (1984). Analysis with a limited dependent variable: Linear Probability, Logit and Probit Models. SAGE.

Aliyu, A. A. (2012). An investigation into the relationship between agricultural production and credit supply in Nigeria. *International Journal of Agriculture and Forestry*. 2:22.

Alufohai, G. O. (2006). Sustainability of farm credit delivery by Cooperatives and NGOs in Edo and Delta States, Nigeria. *Educational Research and Reviews, 1(8), 262-266.*

Alufohai, G. O and Ahmadu, J. (2005). Queue management by Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) in farm credit delivery: The case of Benin Branch, Edo State, Nigeria. In Proceedings of the 39th Conference of Agricultural Society of Nigeria (ASN), University of Benin, October 9-13, 2005, pp. 300-303. *International Journal of Agriculture, Environment and Bioresearch.*

Amanullah, A., Jing Wang, J. W., Khan, I., Channa, S. A., & Magsi, H. (2019). Farm level impacts of credit constraints on agricultural investment and income. *Pakistan Journal of Agricultural Sciences, 56(2), 511–521.*

Amha,W. (2009). Meeting the Financial Needs of Smallholder Farmers in Ethopia. Proceedings of the 10th Anniversary of Association of Ethopian Microfinance Institutions (AEMFI), pp. 09-46.

Amjad, S. and Hasnu, S. A. F. (2007). Smallholders' Access to Rural Credit: Evidence from Pakistan. *Lahore Journal of Economics, vol 12(2), pp.1-25.*

Anocha, N. O., Agunannah, M. U and Njoku, K. (2023). Trends in financing crop production under selected policies, programmes and schemes in Nigeria (1980 – 2016). *G.SC Advanced Research and Reviews, 16(02), 116-122.*

Appiah-Twumasi, M., Donkoh, S. A., & Ansah, I. G. K. (2022). Innovations in smallholder agricultural financing and economic efficiency of maize production in Ghana's northern region. *Heliyon, 8(12), e12087.*

Arene, C. J (1993). An analysis of loan repayment potentials of small holder soyabean group farmers in Nigeria. Q. *Journal of International Agric*ulture 32:160-169.

Asiegbu, B. C and Ebiringa, O. T (2005). "A Discriminant Analysis of Balance of Trade Adjustment in Nigeria" *Nigeria Journal of Economics and Financial Research. 1:1*

Atieno, R (2001). Formal and informal institutions lending policies and access to credit by small scale enterprises in Kenya: An empirical Assessment. Afr. Econ. Res. Consortium Res. 111:1-60.

Awoke, M. U. (2004). Factors affecting loan acquisitions and repayment patterns of small holder farmers in Ika Northeast of Delta State, Nigeria. *Journal of Sustainable Tropical Agriculture and Research*. 9:61-64.

Badiru, A. (2010). Report of interview with Agricultural Credit Guarantee Scheme Fund Desk, Small and Medium Enterprises Unit, Central Bank of Nigeria. Unpublished Manuscript.

Balana B.B., and Oyeyemi, M.A. (2022*).* Agricultural credit constraints in smallholder farming in developing countries: Evidence from Nigeria. *World Development Sustainability 1, 100012.*

Balkenhol, B. and Gueye, E. H. (1992). Tontines and the banking system: Is there a case for building linkages. Poverty-Oriented Banking (INT/92/M01/FRG). Working Paper 2. International Labour Organization. Retrieved from http://www.ilo.org/wcmsp5/groups/public/@ed_emp/documents/publication/wcms_118281.pdf

Banerjee, R., Barry, B., Jaquez, C., Meakin, N., Wiggins, S., and Yussuf, M. (2021) *The state of finance in the drylands: formal and informal finance in Kenya, Mali and Somalia*. Scoping paper, SPARC. London: ODI

Barslund, M., and Tarp, F., (2008). Formal and informal rural credit in four provinces of Vietnam. *Journal of Development Studies, Vol. 44, No. 4, 485–503.*

Basorund, J. O and Fasakin, J. O. (2012). Food Security in Nigeria: A development framework for strengthening Igbemo-Ekiti as a regional agropole. *International Journal of Sustainable Development and Planning, 7(4), 495-510.* DOI: 10.2495/SDP-V7-N4-495-510

Bendig, M., Giesbert, L. and Steiners, S. (2009). Savings, Credit and Insurance: Household Demand for Formal Financial Services in Rural Ghana. GIGA Research Programme: Transformation in the Process of Globalisation.

Benston, G. J and Smith, C. W. Jr (1976). A Transactions Cost Approach to the Theory of Financial Intermediation. *Journal of Finance, 31(2): 215-231.*

Bing, Z., Guo-yu., Ping-gui, Z., Yang, C., and Shuai, Y., (2008). Empirical study on the financial repression of rural households" debit and credit and the effects on their welfare in less developed regions – Take Suqian city of Jiangsu province as an example. *Journal of Modern Accounting and Auditing, Vol.4, No.12.*

Campos, J., Ericsson, N. R. and Hendry, D. F., (1996). Co-integration tests in the presence of structural breaks. *Journal of Econometrics, 70:187-220.*

Central Bank of Nigeria (2005). The impact of post banks consolidation on the Nigerian economy, Business Guardian, December 13th, Nigeria.

Central Bank of Nigeria (2017). The Nigerian Financial System at a Glance. A literacy publication of the Monetary Policy Department of Central Bank of Nigeria. Pg 9-11

Central Bank of Nigeria (2019). Update on Prudential Guidelines for Deposit Money Banks in Nigeria (available at www.cbn.gov.ng)

Central Bank of Nigeria. (2021). "Initiatives to Support Agriculture and Promote Food Security."

Cerosaletti, P. E, Fox, D. G and Chase, L. E. (2004). Phosphorus reduction through precision feeding of dairy cattle. *Journal of Diary Science*. 87:2314–2323.

Chen, X., Zeng, D., Zhang, H., & Kang, C. (2020). Farm expansion under credit constraint: Evidence from commercial rice farmers in Guangxi, China. *International Food and Agribusiness Management Review, 23(2), 203–215.*

Chidiebere-Mark, N. M; Oguoma, N. N. O; Onyeneke, R. U and Henri-Ukoha, A (2014). Factors influencing the Disbursements of Loans from Selected Commercial Banks to Small-Scale and Medium-Scale Agro-Based Enterprises in Imo State, Nigeria. *Agricultura Tropica Et Subtropica, 47/2, 72-78.*

Chiu, L. J. V., Khantachavana, S and Turvey, C. G. (2014). Risk rationing and the demand for agricultural credit: A comparative investigation of Mexico and China. *Agricultural Finance Review, 74(2), 240-270.*

Chmelíková G., Redlichová R. (2020). Is there a link between financial exclusion and over-indebtedness? Evidence from Czech peripheral municipalities. *Journal of Rural Studies, 78: 457–466.*

Chow, G. C. (1960). Tests of equality between sets of coefficients in two linear regressions. Econometrica. 26(3), 591-605.

Chukwu, E. A. A (2024). Livestock industry in Nigeria: Challenges, Current state and path to transformation. *Nigerian Journal of Animal Production 247-249.* DOI: 10.51791/njap.vi.4686

Civil Resource Development and Documentation Centre, CIRDDOC (2024). Imo State fact sheet. Retrieved from www.cirddoc.org

Claessens, S. (2005). Access to financial services: A Review of the Issues and Public Policy Objectives. World Bank Policy Research Working Paper No 3589.

Cole, N. A. (2003). Precision feeding: opportunities and limitations. In: Proceedings of the Plains Nutrition Council Conference. Amarillo: Texas A&M Research and Extension Center.

Deb, S. and Rajeev, M. (2007). Banking on 'Baniyas' for Credit. Econ. And Political Weekly, 42 (2):280-283.

Dethier, J. J and Effenberger, A. (2012). Agriculture and Development: A brief review of literature, Economic Systems, Elsevier, vol 36(2), pg 175-205.

Development Bank of South Africa (2005). Development Report 2005, Agriculture in South African's second Economy (chapter 7), W.dbsa. org/document/development/dev. accessed November 12, 2022.

Diamond, D. W. (1984). Financial Intermediation and Delegated Monitoring. The Review of Economic Studies, 51(3), 393-414.

Diebold, F. X. and Chen, C., (1996). Testing structural stability with endogenous breakpoint – A size comparison of analytic and bootstrap procedures. *Journal of Econometrics, 70:221-241.*

Eckard, R. J, Grainger, C and De Klein, C. A. M. (2010). Options for the abatement of methane and nitrous oxide from ruminant production: a review. Livestock Sci. 130:47–56.

Effiong E.O (2005) Efficiency of Production in selected livestock Enterprises in Akwa Ibom state. Nigeria. Unpublished Ph.D Thesis, Department of Agricultural Economics, Michael Okpara University of Agriculture, Umudike, Abia State.

Eghball, B. (2002). Soil properties as influenced by phosphorus and nitrogen-based manure and compost applications. *Agronomy Journal*. 94:128–135.

Enoma, A. (2010): Agricultural Credit and Economic Growth in Nigeria. An Empirical Analysis. *Business Economics Journal*. (BEJ). 14(7): 1-7.

Evbuomwan G. O., Ikpi A.E., Okoruwa V. O., Akinyosoye V.O. (2012): Preferences of Micro, Small and Medium scale enterprises to financial products in Nigeria. *Journal of Agricultural Economics and Development 1(4): 8098.*

Eyo, E. O., Nwaogu, M. A., & Agenson, M. E. (2020). Agricultural credit guarantee in Nigeria and the uncertainties of the macroeconomic environment. *International Journal of Economics and Financial Issues, 10(20), 20 – 29.*

Fakoya, E. O., Agbonlahor, M. U. and Dipeolu, A. O (2007). Attitude of Women Farmers Towards Sustainable Land Management Practices in South-Western Nigeria. *World Journal of Agricultural Sciences 3(4), 536-542.*

Famogbiele, A (2013). The Challenges of Agricultural Finance in Nigeria: Constraints to Sustainable Agricultural and Economic Revival. *International Journal of Business and Social Research (IJBSR), Volume -3, No.-5.*

Federal Ministry of Agriculture and Rural Development (FMARD) (2019). Animal population data. Federal Ministry of Agriculture and Rural Development.

Federal Ministry of Agriculture and Rural Development (FMARD). (2022). Estimation of Livestock Statistics. Federal Ministry of Agriculture and Rural Development.

Federal Ministry of Livestock Development (FMLD) (2024). Supporting Nutrition, Health and Economic Resilience around the Globe. World Milk Day, Abuja.

Food and Agriculture Organisation (2019). Agricultural Finance and Investment for Development. https://www.fao.org/

Food and Agriculture Organisation and World Bank (2001). 'Farming system and poverty-improving farmer's livelihood in a changing World'' Rome and Washington D.C.

Gender Centre of Excellence (2022), Understanding Nigerian Women's Access to Credit and Loans: Gender-Disaggregated date analysis of the Nigerian Lending Market. Rockfeller Philanthropy Advisors. March 9, 2022.

Gerber, P. J, Hristov, A. N, Henderson, B, Makkar, H, Oh, J, Lee, C, Meinen, R, Montes, F, Ott, T and Firkins, J, (2013). Technical options for the mitigation of direct methane and nitrous oxide emissions from livestock: a review. Animal. 7:220–234.

Gerschenkron, A. (1962). Economic Backwardness in Historical Perspective. Belknap Press of Harvard University Press, Cambridge.

Ghilagaber, G., (2004). Another look at Chow's test for the equality of two heteroscedastic regression models. Quality and Quantity, 38:81-93, Kluwer Academic Publishers, The Netherlands.

Ghosh, J. K., Khan, F. H. and Vivekananda Datta. (2002). Flow of credit to small and marginal farmers in West Bengal. *Study Agro Econ. Res. Cent., 2 (144): 182.*

Gill, M. (2013). Converting feed into human food: the multiple dimensions of efficiency. In: Makkar HPS, Beever D editors. Proceedings of the FAO Animal Production and Health, No. 16; 2012 Nov 27; Bangkok. Rome: Food and Agriculture Organization of the United Nations (FAO) and Asian-Australasian Association of Animal Production Societies; p. 1–13. http://www.fao.org/docrep/018/i3331e/i3331e.pdf.

Girma, M., and Abebaw, D., (2015). Determinants of Formal Credit Market Participation by Rural Farm Households: Micro-level evidence from Ethiopia. Paper for presentation at the 13th International Conference on the Ethiopian Economy. Ethiopian Economic Association (EEA) Conference Centre, Addis Ababa, Ethiopia, July 23-25, 2015.

Guo S., Niu R and Zhao Y. (2024): Credit evaluation and rating system for farmers' loans in the context of agricultural supply chain financing based on AHP-ELECTRE III. *Agric. Econ. – Czech, 70: 541–555*

Gurmessa, N. E and Ndinda, C. (2017). Smallholder's access to and demand for credit and influencing factors: policy and research implications for Ethiopia. *Journal of Business and Economic Policy. 4(3):48-60*

Holden, P and Prokopenko, V. (2001). Financial Development and Poverty Alleviation: Issues and Policy Implications for Developing and Transition Countries. IMF Working Paper No 01/160.

Igben, M. S and Eyo, E. O (2002). Agricultural Economics: An Introduction to Basic Concepts and Principles. Bestprints Business Press, Uyo, Akwa Ibom State, Nigeria. pp. 186-193.

Ijere, M. O (1998) "New Perspectives in financing Nigerian Agriculture- an Economic and Financial Analysis", *India Journal of Economics* Vol. 54 No 5, pp. 334.

Ijioma, C. J. and Osondu, C. K. (2015). Agricultural credit sources and determinants of credit acquisition by farmers in Idemili Local Government Area of Anambra State. *Journal of Agricultural Science and Technology, B5(2015), 34-43. DOI: 10.17265/2161-6264/2015.01.004.*

Imo Agricultural Development Programme (ADP) (2014). Monthly Technology Review Meeting, Owerri, Imo State.

Imo State Subdivision www.citypopulation.de. Retrieved 5 February, 2024.

Inter-American Investment Corporation. (2014). Products and services. Retrieved from http://www.iic.org/en/products-and-services/investment-products

International Food Policy Research Institute (IFPRI) (2010). Innovations in rural and agriculture finance. Focus 18, Brief 1. Washington, D. C.: IFPRI.

International Fund for Agricultural Development (IFAD). (2000). Ghana: Rural Financial Services Project, 2000. Retrieved from http://www.ifad.org/ gender/learning/sector/finance/41.htm

International Fund for Agricultural Development (IFAD). (2011). Weather-based insurance in agricultural development: A technical guide. Retrieved from http://www.ifad.org/ruralfinance/pub/WII_tech_guide.pdf

Izekor, O. B and Alufohai, G. O. (2010). Assessment of Comparative Societies Effectiveness in Agricultural Credit Delivery in Ikpoba-Okha Local Government Area, Edo State, Nigeria. *African Journal of General Agriculture, vol.6 no.3.*

Jabbar, M. A; Ehui, S. K and Von-Kaufman, R. (2002). Supply and demand for livestock credit in sub-Saharan Africa. Lessons for designing new credit schemes. World development vol. 30 (6). Pp 1029-1042.

Janzen, H. H. (2011). What place for livestock on a re-greening earth? Animal Feed Science Technology. 166–167:783–796.

Joseph, A. (2018). Problems and Prospects of Livestock Industry in Nigeria. February 24, 2018. retrieved from infoguidenigeria.com on November 30, 2018.

Journal of Geographical Research (2021). Imo State Coordinates 4(1).

Karlan, D., Kutsoati, E., McMillan, M., and Udry, C., (2011). Crop price indemnified loans for farmers: A pilot experiment in rural Ghana. *The Journal of Risk and Insurance*, 78 (1), 37–55.

Khan, F.U., Muhammad Nouman, Lucia Negrut, Junaid Abban, Laura Mariana Cismas and Muhammad Fahad Siddiqi (2024) Constraints to agricultural finance in underdeveloped and developing countries: a systematic literature review, *International Journal of Agricultural Sustainability, 22:1, 2329388*

Khan, R. and Hussain, T. (2011). Demand for formal and informal credit in agriculture: A case study of cotton growers in Bahawalpur. *Interdisciplinary Journal of Contemporary Research in Business*. Vol 2, No. 10 February 2011.

Knapp, J. R, Laur, G. L, Vadas, P. A, Weiss, W. P and Tricarico, J. M. (2014). Invited review: enteric methane in dairy cattle production: quantifying the opportunities and impact of reducing emissions. *Journal of Dairy Science*. 97:3231–3261.

Kohansal, M. R, Mansoori, H. (2009). Factors Affecting Loan Repayment Performance of Farmers in Kharasan-Razavi Province of Iran. A Paper Presented in a Conference on International Research on Food Security. Natural Resource Management and Rural Development, University of Hamburg, October 6-8, 2009.

Kosgey, Y. K. K (2013). Agricultural credit access by grain growers in Uasin-Gishu County, Kenya. *IOSH Journal of Economics and Finance 2(3):36-52.*

Kozumi, H. and Hasegawa, H., (2000). A Bayesian analysis of structural chances with an application to the displacement effect. The Manchester School of Economic and Social Studies, 68:476-490.

Krysik, J. L and Finn, J. (2007). Research for Effective Social Work Practice. (2nd ed.). McGraw-Hill.

Kumari, A., and Garg, V. (2023). Impact of credit on sustainable agricultural development in India. *Journal of Sustainable Finance & Investment, 13(1), 560–571.*

Kuwornu, J. K. M; Ohene-Ntor, I. D; Asuming-Brempong, S. (2013). Agricultural credit allocation and constraint analyses of selected maize farmers in Ghana. *British Journal of Management Trade*. *2(4):353-374.*

Lindsjö, K., Mulwafu, W., Andersson Djurfeldt, A., and Joshua, M. K. (2021). Generational dynamics of agricultural intensification in Malawi: Challenges for the youth and elderly smallholder farmers. *International Journal of Agricultural Sustainability, 19(5-6), 423-436.*

Lu, Q., Liao, C., Chen, M., Shi, V., Hu, X., & Hu, W. (2024). Platform financing or bank financing in agricultural supply chains: The impact of platform digital empowerment, *European Journal of Operational Research,315(3),952-964*

Makkar, H. P. S and Ankers, P. (2014). Towards sustainable animal diets: a survey-based study. *Anim Feed Sci Technol. 198:309–322.*

Makar, A. K. and Ghosh, S., (2005). Institutional credit for agrarian revolution in tribal hill areas- a study of Nagaland. Indian Agriculturist., 49(1/2): 79-87.

Mariam, N, Syed F.I & Ambreen, F. (2020). Formal financial penetration and households' welfare in Pakistan. *International Journal of Financial Engineering,* 7(4): 1-20

Masinde J. W. (2019). Informal financing and the use of formal financial services among small holder farmers in Kenya. *Management and Economics Research Journal, 5, 873220, 9.*

Mcharo, A. C and Mwajombe, K. K. (2015). The perception of farmers on effectiveness of agricultural agents in knowledge transfer to maize growers in Kilindi District, Tnga, Tanzania. *Researchjournali Journal of Agriculture.*

McKinnon, R. I. (1973). Money and Capital in Economic Development. Washington D. C.: Brookings Institution.

Meyer, R. (2015) *Financing Agriculture and Rural Areas in Sub-Saharan Africa: Progress, challenges and the way forward*. Working paper. London: IIED.

Moahid, M and Maharjan, L.M. (2020). Factors Affecting Farmers' Access to Formal and Informal Credit: Evidence from Rural Afghanistan. *Sustainability, 12, 1268*

Mpuga, P. (2004), "Demand for credit in Rural Uganda: Who cares for the peasants?", Paper presented at the conference on Growth, Poverty Reduction and Human Development in Africa Center for the Study of African Economies. Uganda.

Mpuga, P. (2010). Constraints in Access to and Demand for Rural Credit: Evidence from Uganda. African Development Review. African Development Bank- Vol. 22. 2010, 1, p.115-148

Muayila, K. H and Tollens, E. (2012). Assessing the impact of credit constraints on farm household economic welfare in the hinterland of Kinshassa, Democratic Republic of Congo. *African Journal of Food, Agriculture and Nutrition.* V*ol 12*

Mu'azu, A. U and Lawal, M. (2017). The impact of agricultural financing on agricultural output in Nigeria: An empirical analysis. *Journal of Agriculture and Environment, vol 13(1), 13-26.*

National Bureau Statistics (NBS, 2019). Annual Abstract of Statistics. 2019 edition. https://nigerianstat.gov.ng/elibrary/read/1241525.

National Livestock Transformation Plan (NLTP) 2019-2028. Strategy Document, National Economic Council.

Nawai, N and Shariff, M. N. M. (2010). Determinants of Repayment Performance in Microcredit programmes. A Review of Literature. *International Journal of Business and Social Science, 1(2): 152-161.*

Neuman, W. L. (2007). Basics of Social Research: Qualitative and Quantitative Approaches, (2nd ed.). Pearson.

Nigeria Agricultural and Rural Development Bank (NACRDB) (2010). NACRDB annual report: Cross River State. Abuja: NACRDB, pp. 87-124.

Nigeria Bureau of Statistics (NBS), (2022). Nigeria Bureau of Statistics Annual Abstract of Statistics report, vol 1.

Nigeria Bureau of Statistics (NBS), (2016). Nigeria Bureau of Statistics Annual Abstract of Statistics report, vol 1 pp:3-106.

Nwachukwu, I. N., Alamba, C. S and Oko-Isu, A. (2010). Determinants of Institutional Credit repayment performance among farmers' in Afikpo, North Local Government Area of Ebonyi State, Nigeria AAB Bioflux 2(3)211-226.

Nwafor G. O, Agu, A. F, Anigbogu, T and Umebali, E. E. (2018). Loan Repayment Behaviour among Member of Farmers Multipurpose Cooperatives in Anambra State. *International Journal of Community and Cooperative Studies*. *Vol.6 (1). pp.28-49.*

Nwankwo, U. M (2004). Impact of Community Banks on Women Farmers Poverty Level in Rural Abia State Nigeria. M.Sc Thesis, Department of Agricultural Economics, Abia State University Uturu.

Nwosu, F. O., Ibeagwa, O. B., Anene, H. U., Anyiam, K. H and Isaiah, G. I. (2021). Financing of Agricultural Entreprises by Microfinance Banks in Orlu Agricultural Zone of Imo State, South East, Nigeria. *European Journal of Development Studies, vol 1(3), 12-14.*

Nwosu, F. O (2014). Financing of Livestock Production Under the Agricultural Credit Guarantee Scheme Fund in South-East, Nigeria. Ph.D Dissertation, University of Nigeria Nsukka, Enugu State.

Nwosu, F. O, N. N. O. Oguoma; N. G. Ben-Chendo; and A. H. Ukoha (2010). The Agricultural Credit Guarantee Scheme: its roles, problems and prospects in Nigeria's quest for agricultural development. Researcher, 2009; 2(2):87-90. (ISSN: 1553-9865).

Obadeyi, J. A. (2015). Microfinance banking and development of small business in emerging economy: Nigerian approach. *IOSR Journal of Economics and Finance (IOSR-JEF), 2 (1), 50-60.*

Oboh and Ekpebu (2011). Determinants of formal agricultural credit allocation to the farm sector by arable crop farmers in Benue State, Nigeria, Department of Agricultural Economics, Federal University of Agriculture, Makurdi, Nigeria. *African Journal of Agricultural Research Vol. 6(1), pp. 181-185.*

Ofuoku, J. O., and Urang, O. E. (2009). Determinant of loan repayment among smallholder farmers in Ogbomoso Agricultural Zone of Oyo State, Nigeria. *Journal of Social Science, 17(1), 59-62.*

Oguoma N. N. O. (2003): Analysis of Loan Repayments by Crop and Livestock Farmers under the Agricultural Credit Guarantee Scheme in Imo State, Nigeria. *Journal of Sustainable Tropical Agricultural Research* 7: *56-61.*

Oguoma N. N. O., Ohajianya D. O. (2006): Performance and Risk Levels in Financing Cooperative Societies as Self– Help Groups under the Agricultural Credit Guarantee Scheme in Imo State. *Journal of Sustainable Tropical Agricultural Research 17: 38-45.*

Oguoma, N. N. O. (2003). Financing small ruminant operations along gender lines in Imo State, Nigeria. *Journal of Agriculture and Social Research (JASR) 3(1):13-28).*

Okezie, A. (2009). "Isusu Groups and their Performance in Mobilizing Credits for Micro Businesses" *Nigeria Journal of Economics, 49 (2), 112-148.*

Okojie, C.; Monye-Emina, A.; Eghafona, K; Osaghae, G and Ehiakhamen, J. O. (2010). Institutional Environment and Access to Microfinance by Self-Employed Women in the Rural Areas of Edo State NSSP Brief No. 14 International Food Policy Research Institute, Washington. DC.

Okpara, G. C, Ibeleme, S. N. O and Odionye, J. C (2013). Loan repayment performance of small holder oil producers in Nigeria: a credit rating approach. *Journal of Research in Economics and International Finance (JREIF), 2(5):88-96*

Okpara, G. C. (2016). Speculative Financial Bubbles, Volatility and the Nigerian Economy. 22nd Inaugural Lecture of Abia State University Uturu, Nigeria. 22nd June, 2016.

Olagunju, F. I. and Adeyemo, R (2007). Determinants of repayment decision among small holder farmers in southwestern Nigeria. *Pakistan Journal of Social Science*. *4(5):677-686.*

Ololade, R. A and Olagunji, F. I (2013). Determinants of access to credit among rural farmers in Oyo State Nigeria. *Global Journal of Science Frontier Research Agriculture and Veterinary Science. 13(2) 17-22.*

Omboi, B. M. O and Wanjai, P., (2011). Factors that influence the demand for credit among small-scale investors: a case study of Meru Central District, Kenya. *Research Journal of Finance and Accounting Vol 2 (2).* www.iiste.org (Online).

Oni, O. A, Oladele, O. I and Oyowole, I. K (2005). "Analysis of Factors Influencing Loan Defaults among Poultry Farmers in Ogun State." *Journal of Central European Agriculture 6(4): 619-624.*

Onubuogu. G. C., Chidebelu, S, A. N. D. and Eboh, E. C. (2013). Enterprise Type, Size and Allocative Efficiency of Broiler Production in Imo State, Nigeria. I*nt. J. Appl. Res. Technol. 2(6): 10 – 19.*

Onyenucheya, F and Ukoha, O. O (2007). Loan repayment and creditworthiness of farmers under the Nigerian Agricultural Cooperative Rural Dev. Bank NACRDB. *Agric. J.* 2(2):265-270.

Orebiyi J. S. (2002): Agricultural Loan Repayment Performance and its Determinants in the Rural Credit Markets of Imo State, Nigeria. *International Journal of Agriculture and Rural Development 3: 37-45*

Organisation for Economic Co-operation and Development (OECD). (2010). Facilitating access to finance: Discussion paper on credit guarantee schemes. Retrieved from http://www.ruralfinanceandinvestment.org/sites/default/files/45324327_pdf.pdf

Osabohien, R., Adeleye, N. G and Alvis, T. D. (2022). Agro-financing and Food Production in Nigeria. *Heliyon: A Cell Press Journal, 6(5), 1-8.*

O'Sullivan, A and Sheffrin, S M. (2003). *Economics: Principles in Action*. Upper Saddle River, New Jersey 07458: Pearson Prentice Hall. p. 512. ISBN 0-13-063085-3.

Pandey, A. (2022). Credit and financial access in Nepalese agriculture: prospects and challenges *The Journal of Agriculture and Environment 23, 56-70.*

Pandit, A., Pandey, N. K., Chandran, B. K. P. and Rana, R. K., (2007). Financing Agriculture: A Study of Bihar and West Bengal potato cultivation. *Indian Journal of Agricultural Economics, 62(3):340-349.*

Patil, S. M., (2000). Performance of Primary cooperative agriculture and rural development banks in Dharwad district. Ph.D. Thesis, Univ. Agric. Sci., Dharwad, Karnataka, India.

Philip, D., Nkonya, E. M, Pender, J. L and Oni, O. A. (2009). Constraints to increasing Agricultural Productivity in Nigeria. International Food Policy Research Institute Brief No. 4.

Principles for Responsible Investment (2013). Retrieved from http://www.unpri.org/areas-of-work/implementation-support/piif/what-is-inclusivefinance/

Professional Banker (2009). The Five C's of Credit. *Risk Management Association Journal Philadelphia. 91(8): 34-37.*

Rahji, M. A. Y. (2000). An analysis of the determinant of agricultural credit approval/loan size by commercial banks in south western Nigeria. In: Oladeebo, J.O. and Oladeebo, O.E. (2008). Determinants of Loan Repayment among Smallholder Farmers in Ogbomoso Agricultural Zone of Oyo State, Nigeria. *Journal of Social Sciences, 17: 59-62*.

Rahji. M. A. Y and Adeoti, A. I (2010) Determinants of Agricultural Credit Rationing by Commercial Banks in South-Western, Nigeria. *International Research Journal of Finance and Economics ISSN 1450-2887 Issue 37*

Rahji, M. A. Y and Fakayode, S. B (2009). A Multinomial Logit Analysis of Agricultural Credit Rationing by Commercial Banks in Nigeria. *International Research Journal of Finance and Economics, 24:2450-2887.*

Rajput, A. M. and Verma, A. R., (2005). Credit financing of Regional Rural Banks in Agricultural sector in Hoshangabad district of Madhya Pradesh. *Indian Journal of Agricultural Economics, 60(4):360-361.*

Reddy, V. R., Chiranjeevi, T., and Syme, G. (2020). Inclusive sustainable intensification of agriculture in West Bengal, India: Policy and institutional approaches. *International Journal of Agricultural Sustainability, 18(1), 70–83.*

Rengarajan, V., and Sushmitha, R. (2024). Agricultural loan utilization and repayment behaviour among farmers in Thanjavur. *International Journal of Creative Research & Thoughts, 12(3), 181-186*

Ripple, W. J, Newsome, T. M, Wolf, C, Dirzo, R, Everatt, K.T, Galetti, M, Hayward, M. W, Kerley, G. I. H, Levi, T and Lindsey, P.A (2015). Collapse of the world's largest herbivores. Sci Adv. 1: E1400103.

Rui, L., and Xi, Z., (2010). Econometric analysis of credit constraints of Chinese rural households and welfare loss. Applied Economics, 201, 42, 1615-1625. Taylor & Francis 1615 http://www.informaworld.com

Saddiq, N. M. (2012). Socio-Economic Factors Influencing Adoption of Recommended Cotton Production Practices by Farmers in Zamfara State, Nigeria. Unpublished M.Sc Thesis, Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria, Nigeria.

Saka, K. A and Aladelusi, K. B (2022). Commercial bank financing and development of crop production in Nigeria. *Malaysian E-Commerce Journal (MECJ), 6(1), 09-13.*

Samal, P and Rath, N. C. (2005). Analysis of credit use by farmers in rainfed areas of coastal Orissa. *Indian Journal of Agricultural Economics, 60(3), 379-386.*

Scholtens, B and van Wensveen D. (2003). The Theory of Financial Intermediation: An Essay on What it Does (Not) Explain. SUERF Studies, No. 2003/1

Sebopetji, T. O. and Belete, A. (2009). An Application of Probit Analysis to Factors Affecting Small-Scale Farmers' Decision to Take Credit: A Case Study of the Greater Letaba Local Municipality in South Africa, *African Journal of Agricultural Research, 4(8), 718-723.*

Seluhinga, N.S. (2023). Factors Influencing Smallholder Farmers' Inclusion to Formal Financial Services. *Tanzania Journal of Agricultural Sciences, 22 (2): 434-443*

Seyoum, S (2018). Analysis of Prevalence of Malaria and Anemia Using Bivariate Probit Model. Ann. Data. Sci. 5(2):301–312

Shaw, E. (1973). Financial Deepening in Economic Development. New York: Oxford University Press.

Silong, A., and Gadanakis, Y. (2020) Credit sources, access and factors influencing credit demand among rural livestock farmers in Nigeria. *Agricultural Finance Review, 80 (1). pp. 68-90.*

Singh, S., Manjeet, K. and Kingra, H. S., (2007). Institutional agriculture credit in Punjab: Growth and inadequacies. *Indian Journal of Agricultural Economics, 62(3):367-368.*

Sivatharshika, B. and Thayaparan, A. (2019). Credit Worthiness and Repayment Performance Among Small – Holder Farmers in Sri Lanka: Application of Probit Model. *European Journal of Marketing and Economics*. *Vol 2, Issue. ISSN 2601-8667.*

Srivastava, S. K. and Singh, L. R., (2005). Inefficient functioning of financial institutions: A major constraint on agricultural credit flow. *Indian Journal of Agricultural Economics, 60(3):377-378.*

Stavárek, D., Vodová, P. (2010). Analýza dlouhodobých vazeb na èeském trhu úvìrù. E+M Ekonomika a management, no. 3, pp. 83–95.

Stevens, R. D and Jabara, C. L (2000). Agricultural Development Principles: Economic Theory and Empirical Evidence. Baltimore & London: John Hopkins University Press 1988, xxxi +478 pp.

Stiglitz, J. E., and Weiss, A. (1981). Credit rationing in markets with imperfect information. American Economic Review 71 (3): 393–410.

Studenmund, A. H. (2011). Using Econometrics: A Practical Guide (6th ed.). Pearson.

Sun, L and Ho, P (2018). Formalizing informal homes, a bad idea: The credibility thesis applied to China's extra-legal housing. Land Use Policy, 79, 891–901.

Swain, R. B (2002), "Credit Rationing in rural India", *Journal of Economic Development* Vol. 27, No.2.

Tagoe, N; Nyarko, E and Anuwa-Amarh, E. (2005). Financial challenges facing urban SMEs under financial sector liberalization in Ghana. *Journal of Small Business Management*. *Vol 43:331-343.*

Tang, S., Guan, Z and Jin, S. (2010). Formal and Informal Credit Markets and Rural Credit Demand in China. Selected Paper prepared for presentation at the Agricultural and Applied Economics Association 2010 AAEA, CAES and WAEA Joint Annual Meeting Denver, Colorado July 25-27, 2010.

Tedeschi, L. O, Callaway, T. R, Muir, J. P and Anderson, R. (2011). Potential environmental benefits of feed additives and other strategies for ruminant production. R Bras Zootec. 40:291–309.

Tedeschi, L. O, Fox, D. G and Tylutki, T. P. (2003). Potential environmental benefits of ionophores in ruminant diets. *Journal of Environ Qual*. *32:1591–1602.*

Teye, E. S., and Quarshie, P. T. (2022). Impact of agricultural finance on technology adoption, agricultural productivity and rural household economic wellbeing in Ghana: A case study of rice farmers in Shai-Osudoku District. *South African Geographical Journal, 104(2), 231–250*

Thanarathnam, J. J., (2006). Working of Primary Agriculture Co-operative Bank: A case study. *Southern Economist, 45(9):29-34.*

Thorton, P. K. (2010). Livestock production: recent trends, future prospects. Philosophical Transactions of the Royal Society of Biological Sciences, 365(1554), 2853-2867. Doi:10.1098/rstb2010.0134

Topor, D. I., Ionescu, C. A., Fülöp, M. T., Căpușneanu,, S., Stanescu,, S. G., Breaz,, T.O., Voinea, C. M and Moldovan, I.A. (2024). Factors that influence bank loans for agriculture in Romania. *Journal of Infrastructure, Policy and Development. 8(1): 2886.*

Udechukwu, D and Onduku, B (2021). Promising Prospects in Livestock Farming. leadershiponline.com

Udoh, E. J. (2008). Estimation of Loan default among beneficiaries of a State Government owned Agricultural Loan Scheme Nigeria. *J. Cont. Europe. Agric*. *9(2): 343-352.*

Ugbajah, M.O., (2011) Gender Analysis of the structure and effects of Access to financial services among Rural farmers in Anambra State, Nigeria. *Journal of Agricultural Science, 2 (2): 107-111.*

Ugwuanyi, W. N (2012) "The Nigerian Financial System" – 4th Edition, Enugu: John kens and Willy Publication Nig. Ltd

Ugwu, J. N, Mbah G. O, Chidiebere-Mark, N, Tim-Ashama A, Ohajianya D. O and Okwara M. O (2017). Technical Efficiency of Swamp Rice Farmers in Ebonyi South Agricultural Zone, Ebonyi State, Nigeria; *DOI: 10.18488/journal.68/2017.4.1/68.1.1.6*

Ukwuaba. I. C., Owutuamor, Z. B. and Ogbu, C. C. (2020). Assessment of Agricultural Credit Sources and Accessibility in Nigeria. Review of Agricultural and Applied Economics ISSN 1336-9261, Vol. XXIII, Issue 2, 2020: 3-11 RAAE doi: 10.15414/raae.20

Wabwire, J. M. (2021). Socio-Economic Factors and Utilization of Formal Financial Services among smallholder Farmers in Kenya. *Editon Cons. J. Econ. Dev. Stud.,* 3(1), 177-188.

Vasconcelos, J. T, Greene, L. W, Cole, N. A, Brown, M. S, McCollum III, F. T and Tedeschi, L. O. (2006). Effects of phase feeding of protein on performance, blood urea nitrogen concentration, manure nitrogen: phosphorus ratio, and carcass characteristics of feedlot cattle. *Journal of Animal Science*. *84:3032–3038.*

Vasconcelos, J. T, Tedeschi, L. O, Fox, D. G, Galyean, M. L and Greene, L. W. (2007). Review: feeding nitrogen and phosphorus in beef cattle feedlot production to mitigate environmental impacts. *Prof Anim Scient. 23:8–17.*

Wiboonpongse, A., Sriboonchitta, S., and Chaovanapoonphol, Y., (2006). The demand for loans for major rice in the Upper North of Thailand. Contributed paper for presentation at the International Association of Agricultural Economics Conference, Gold Coast, Australia, August 12-18, 2006. http://ageconsearch.umn.edu/bitstream/25303/1/cp060396.pdf

Wikipedia (2024). GPS Coordinates of Imo State. Retrieved from www.wikipedia.com on October 2024.

Wilcox, R. R., (1997). Comparing the slopes of two independent regression lines when there is complete heteroscedasticity. *British Journal of Mathematical and Statistical Psychology*, 50:309-317.

World Bank. (2022). Nigeria Livestock Productivity and Resilience Support Project: Waste Management Plan. Retrieved from http://documents.worldbank.org/curated/en/099140203252240203

World Bank. (2009). Expert meeting on managing financing risk in agriculture. Retrieved from http://siteresources.worldbank.org/EXTARD/Resources/336681-1252501755087/Joburg_proceedings.pdf

World Census of Agriculture (WCA) (2020). (PARA 8.5.3).

World Food Program and IFAD. (2011). Weather index-based insurance in agricultural development: A technical guide. Retrieved on August 2021 from http://www.ifad.org/ruralfinance/pub/WII_tech_guide.pdf

Xiao, J. J, Chen, C, Sun L. (2015). Age difference in consumer financial capability. *International Journal of Consumer Studies. 2015: 398(4):387-395. doi 10.1111/ijcs.12205*

Yawson, D. O; Arma, F. A; Afrifa, E. A and Dadzie, S. K. N. (2010). Ghana's fertilizer subsidy policy: early field lesson from farmers in the central region. Journal of Sustainable Development in Africa. (Vol 12, No 3, 2010).

Yusuf, T. M., Tiamiyu, S. A. and Aliu, R. O. (2016). Financial analysis of Poultry Production in Kwara State, Nigeria. *African Journal of Agricultural Research*, Vol. 11(8), Pp. 718-723.

Zeller, M. and Sharma, M. (2000): "The Demand for Financial Services by the Rural Poor." IFPRI, Policy Brief No. 1.

Zheng, Y.; Ho, P (2020). Unpacking the paradox of insecure housing rights in China: Urban residents' perceptions on institutional credibility. Cities, 97, 102485.

APPENDICES

APPENDIX 1

QUESTIONNAIRE

Department of Agricultural Economics,
School of Agriculture and Agricultural Technology,
Federal University of Technology,
Owerri.

Dear Sir/Madam,

I am a research student of the above-named department. I am presently carrying out research on the "Comparative analysis of Financing Livestock Production by Formal and Informal Financial Institutions in Imo State, Nigeria."

Please kindly provide the required information on the following questionnaire items to the best of your knowledge to enable me to achieve the objectives of the study.

This study is purely an academic work and your sincere answers/contributions will be treated confidentially. I therefore request your cooperation.

Thanks.

Yours sincerely,

Olumba, Ujunwa Miriam

Name of Farm …….

Location of farm …….....

Autonomous Community……

Please tick (√) the correct answer

A. SOCIO-ECONOMIC CHARACTERISTICS OF LIVESTOCK FARMERS

Sex
Male ( )
Female ( )

Age ( )

Marital Status
Single ( )
Married ( )

Level of Education
No formal education ( )
Primary ( )
Secondary ( )
Tertiary ( )

Household Size
1-4 ( )
5-8 ( )
9-12 ( )
13-16 ( )

Which Livestock Category do you rear?
Ruminants
Cattle ( )
Sheep ( )
Goat ( )

Non-ruminants
Poultry ( )
Piggery ( )
Rabbit ( )

Farming Experience (Years)
1-5 ( )
6-10 ( )
11-15 ( )
16-20 ( )
21-25 ( )

What is the average monthly income you make from your farm? ₦.....

	Yes	No
Are you a member of any farmers' Cooperative Society		
Do Extension Agents visit your farm?		
Did you have any formal training in livestock farming?		
Do you have access to credit from any financial institution?		

B. FORM OF FINANCE AND SOURCES OF FINANCING

From which source(s) do you get finance for your business?

Sources	Thick	Please provide the name of the financial institution
Formal sources		
Commercial Banks		
Microfinance Banks		
Insurance Companies		
Informal sources		
Cooperative Societies		
Esusu		
Money lenders		
Personal Savings		

C. FINANCIAL CREDIBILITY OF LIVESTOCK FARMERS

Amount of credit applied for (₦)	
How long did your application stay before you received the credit?	
Amount of credit gotten (₦)	
Interest rate (₦)	
Period of credit (months)	
Did you pledge any collateral?	
If "yes" what did you pledge as collateral?	
What is the value of the collateral?	
How much is the monthly repayment (₦)	

Where you able to pay back the credit within the specified period?	
If "no" how many months were left unpaid?	
What was the reason for your default?	
How much did you realize from your farm since taking the credit?	

D. FACTORS MILITATING AGAINST LIVESTOCK FINANCING

What are the problems you encounter while trying to secure credit?

Factors	**Thick**
Lack of credit facilities/insufficient credit	
Years of membership/account holding	
Monthly Savings deposits	
Insufficient collateral	
Ineligibility resulting from improper documentation	
Lack of consistent cash flow	
Lack of personal guarantor	

APPENDIX 2

RESULTS OF ANALYSIS

1 . probit Financial_Credibility_Informal Age Gender Maritalstatus Education YearsofExperience Incom > CooperativeMembership periodofcredit

Iteration 0: log likelihood = -41.053906
Iteration 1: log likelihood = -21.13131
Iteration 2: log likelihood = -20.398711
Iteration 3: log likelihood = -20.375944
Iteration 4: log likelihood = -20.375866
Iteration 5: log likelihood = -20.375866

Probit regression

Number of obs	=	60
LR chi2(11)	=	41.36
Prob > chi2	=	0.0000
Pseudo R2	=	0.5037

Log likelihood = -20.375866

Financial_Credibility_Informal	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Age	-.0001183	.0246063	-0.00	0.996	-.0483458	.0481091
Gender	1.705367	.6440419	2.65	0.008	.4430679	2.967666
Maritalstatus	-.5235331	.5758195	-0.91	0.363	-1.652119	.6050524
Education	.2462209	.1057199	2.33	0.020	-.0390138	.4534281
YearsofExperience	.052603	.0309247	1.70	0.089	-.0080083	.1132143
Income	-2.60e-07	3.30e-06	-0.08	0.937	-6.73e-06	6.21e-06
Interestrate	-.0317649	.0296497	-1.07	0.284	-.0898773	.0263474
Householdsize	-.4265993	.1533341	-2.78	0.005	-.7271286	.12607
Livestocksize	.0276655	.0097351	2.84	0.004	.008585	.046746
CooperativeMembership	1.906953	.7179598	2.66	0.008	-.4997775	3.314128
periodofcredit	.2914743	.1044563	2.79	0.005	.0867437	.4962048
_cons	-1.801619	1.347332	-1.34	0.181	-4.44234	.839103

2 . probit Financial_Credibility_Formal Agef Genderf Maritalstatusf Educationf YearsofExperiencef In > ksizef CooperativeMembershipf periodofcreditf

Iteration 0: log likelihood = -35.764442
Iteration 1: log likelihood = -20.34287
Iteration 2: log likelihood = -16.358485
Iteration 3: log likelihood = -15.918744
Iteration 4: log likelihood = -15.913554
Iteration 5: log likelihood = -15.913548
Iteration 6: log likelihood = -15.913548

Probit regression

Number of obs	=	60
LR chi2(11)	=	39.70
Prob > chi2	=	0.0000
Pseudo R2	=	0.5550

Log likelihood = -15.913548

Financial_Credibility_Formal	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Agef	.0163753	.0505275	0.32	0.746	-.0826569	.1154074
Genderf	-.100519	.682917	-0.15	0.883	-1.439012	1.237974
Maritalstatusf	-.1015824	.284473	-0.36	0.721	-.6591392	.4559745
Educationf	-.0288105	.0633142	-0.46	0.649	-.152904	.095283
YearsofExperiencef	.0803467	.0892017	0.90	0.368	-.0944854	.2551788
Incomef	8.85e-06	2.96e-06	2.99	0.003	3.05e-06	.0000146
Interestratef	-.1954951	.1057637	-1.85	0.065	-.4027883	.011798
Householdsizef	-.5300836	.242267	-2.19	0.029	-1.004918	-.055249
Livestocksizef	.0086803	.004818	1.80	0.072	-.0007628	.0181235
CooperativeMembershipf	-.8340874	.730787	-1.14	0.254	-2.266404	.5982289
periodofcreditf	.207577	.0708406	2.93	0.003	-.0687319	.346422
_cons	1.317556	1.920635	0.69	0.493	-2.44682	5.081931

Statistics/Data Analysis

1 . probit Financial_Credibility_Formal Agef Genderf Maritalstatusf Educationf YearsofExperiencef In > ksizef CooperativeMembershipf periodofcreditf

2 . margins,dydx(*)

Average marginal effects — Number of obs = 60
Model VCE : OIM

Expression : Pr(Financial_Credibility_Formal), predict()
dy/dx w.r.t. : Agef Genderf Maritalstatusf Educationf YearsofExperiencef Incomef Interestratef Hou CooperativeMembershipf periodofcreditf

Formal Sources	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
Agef	.0024098	.0074171	0.32	0.745	-.0121275	.0169471
Genderf	-.0147925	.1002882	-0.15	0.883	-.2113538	.1817688
Maritalstatusf	-.014949	.0417699	-0.36	0.720	-.0968164	.0669184
Educationf	-.0042398	.0092277	-0.46	0.646	-.0223258	.0138462
YearsofExperiencef	.0118239	.0126364	0.94	0.349	-.012943	.0365909
Incomef	1.30e-06	2.99e-07	4.35	0.000	7.16e-07	1.89e-06
Interestratef	-.0287693	.0134322	-2.14	0.032	-.0550959	.0024428
Householdsizef	-.0780079	.0276628	-2.82	0.005	-.1322259	-.0237898
Livestocksizef	.0012774	.0006265	2.04	0.041	.0000494	.0025054
CooperativeMembershipf	-.1227455	.1040838	-1.18	0.238	-.3267459	.0812549
periodofcreditf	.0305473	.006597	4.63	0.000	-.0176174	.0434773

3 . probit Financial_Credibility_Informal Age Gender Maritalstatus Education YearsofExperience Incom > CooperativeMembership periodofcredit

4 . margins,dydx(*)

Average marginal effects — Number of obs = 60
Model VCE : OIM

Expression : Pr(Financial_Credibility_Informal), predict()
dy/dx w.r.t. : Age Gender Maritalstatus Education YearsofExperience Income Interestrate Households periodofcredit

Informal Sources	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
Age	-.0000221	.0045949	-0.00	0.996	-.0090279	.0089837
Gender	.3184716	.0906306	3.51	0.000	.1408388	.4961044
Maritalstatus	-.0977681	.1052226	-0.93	0.353	-.3040006	.1084645
Education	.0459809	.0164259	2.80	0.005	-.0137868	.0781751
YearsofExperience	.0098234	.0051792	1.90	0.058	-.0003276	.0199745
Income	-4.86e-08	6.16e-07	-0.08	0.937	-1.26e-06	1.16e-06
Interestrate	-.005932	.0053481	-1.11	0.267	-.0164141	.0045501
Householdsize	-.079666	.0209125	-3.81	0.000	-.1206537	.0386783
Livestocksize	.0051664	.0013105	3.94	0.000	.0025979	.007735
CooperativeMembership	.3561171	.103217	3.45	0.001	-.1538156	.5584186
periodofcredit	.0544319	.0142651	3.82	0.000	.0264729	.0823909