THE IMPACT OF SELECTED MACRO-ECNONOMIC VARIABLES ON LIVESTOCK PRODUCTION IN NIGERIA, 1972 - I994

BY

MAHMOUD, mutasim mekki

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DEPARTMENT OF AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY, FACULTY OF AGRICULTURE, AHMADU BELLO UNIVERSITY, ZARIA, NIGERIA.

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DEDICATION

All my efforts and achievements in life including this research are dedicated to those to whom I owe everything, the two that saw me progress with all joy and patience. My loving Mother Asiya Mahmoud M. Nour (Mrs Mekki Mahmoud) and My dear Father Ustaz Mekki Mahmoud Elrasheid.

To the souls of my Late grandfathers, late Elhaji Ibrahim Majzoub and late Dr. Abu-Obieda Majzoub. May their souls rest in peace.

DECLARATION

I hereby declare that this thesis has been written by me and that it is a record of my research work. It has not been presented in any previous application for a higher degree. All quotations are indicated and the sources of information are specifically and fully acknowledged by means of references.

Signature — Date: 9-10-98

The above declaration is confirmed

Dr. Phillip, Dayo
Chairman,
Supervisory Committee — Date: 9-10-98

CERTIFICATION

This thesis entitled "THE IMPACT OF SELECTED MACROECONOMIC VARIABLES ON LIVESTOCK PRODUCTION IN NIGERIA 1972-1994" by Mahmoud, Mutasim Mekki, meets the regulation governing the Degree of Masters of Science (Agric.Econs) of Ahmadu Bello University, Zaria and is approved for its contribution to scientific knowledge and literacy presentation.

Dr. Dayo O.A. Phillip
Chairman, Supervisory
Committee

9-10-98
Date

Prof. James O. Olukosi
Member Supervisory
Committee

9-10-98
Date

Head of Department.
Dept of Agric. Econs. &
Rural Sociology.

9-10-98
Date

Dean,
Post -graduate School

2/11/98
Date

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ABSTRACT

Livestock sector plays a tangible role in the Nigerian economy, even though, it is still far from attaining self sufficiency. Thus government instituted a series of macroeconomic policies designed to improve the production of this sector. This study was carried out to determine the effect of exchange rate on livestock production over time, to assess the effect of other selected macroeconomic variables (interest rate, money supply, inflation rate, wage rates, producer prices and import levels of livestock items) on livestock production and to estimate the elasticities of livestock production with respect to the selected macroeconomic variables.

The regression results revealed a positive relationship between livestock production and each of the policy variables (exchange rate, interest rate, wage rates, producer price and import level of livestock items) though the interest rates' coefficient is not significant. Also a negative insignificant relationship exists between livestock production and each of the macroeconomic variables, money supply and inflation rate.

The elasticities of livestock production with respect to each of the policy variables-exchange rate, interest rate, money supply, inflation rate, wage rate, producer prices and import level of livestock items was found to be 0.0696, 0.112767, - 007323, - 0.063678, 0.362937, 0.437438 and 0.22085

respectively indicating that varying the level of the policy variables by one unit will lead to increase in the livestock production by the corresponding amount of elasticities.

TABLE OF CONTENTS

CONTENTS PAGE

Title page..... i

Dedication..... ii

Declaration..... iii

Certification..... iv

Acknowledgement..... v

Abstract..... vii

Table of Contents..... ix

CHAPTER ONE

1.1 Introduction..... 1

1.2 Problem Statement..... 3

1.3 Objectives of the Study..... 4

1.4 Justification of the Study..... 5

1.5 Hypotheses..... 6

1.6 Organization of the Study..... 6

CHAPTER TWO

2.0 Literature Review..... 8

2.1 Nigerian Livestock Sector..... 8

2.1.1 Importance of Livestock..... 8

2.1.2 Livestock General problem..... 9

2.1.3 Livestock policy..... 10

2.2 Highlights of the Structural Adjustment Programme (SAP)..... 13

2.2.1 Objectives, policies and programmes..... 13

2.2.2 Main elements of the current adjustment programme..... 13

2.2.3 Core policies involved in SAP..... 14

2.2.4 Measures adopted by the government in pursuing SAP objectives..... 14

2.2.5 Objectives of the Second-Tier Foreign Exchange Market (SFEM)..... 15

2.3 The relationship between exchange rate and livestock production..... 16

2.4 The relationship between interest rate and livestock production..... 19

2.5 The relationship between inflation rate and livestock production..... 23

2.6 The relationship between money supply and livestock production..... 24

2.7 The relationship between wage rates and livestock production..... 25

2.8 The relationship between producer prices and livestock production..... 26

2.9 The relationship between import levels of livestock items and livestock production..... 27

CHAPTER THREE

3.0 Methodology..... 29

3.1 The Study Area..... 29

3.2 Data Collection..... 30
3.3 Analytical techniques..... 30
3.3.1 Multiple regression..... 31
3.3.2 Multicollinearity..... 32
3.3.2.1 Types of multicollinearity..... 33
3.3.2.2 Implication of multicollinearity..... 33
3.3.2.3 Test for multicollinearity..... 33
3.3.2.4 Correction for multicollinearity..... 35
3.3.3 Autocorrelation..... 35
3.3.3.1 Implication of autocorrelation..... 35
3.3.3.2 Test for autocorrelation..... 36
3.3.4 Measurement of livestock elasticities with respect to the selected macroeconomic variables... 38
3.3.4.1 Linear functional form..... 38
3.3.4.2 Double-log functional form..... 38

CHAPTER FOUR

4.0 Findings and Discussion..... 40
4.1 The effect of exchange rate on livestock production..... 40
4.2 The impact of other selected macroeconomics variables on livestock production..... 42
4.3 The impact of interest rate on livestock production..... 46
4.3.3 The impact of money supply on livestock production.. 47
4.3.4 The impact of inflation rate on livestock

production..... 48
4.3.5 The impact of wage rates on livestock production... 49
4.3.6 The impact of producer prices on livestock production..... 50
4.3.7 The impact of import levels of livestock items on livestock production..... 51

CHAPTER FIVE

5.0 Summary, Recommendations, Limitation of the study and conclusion..... 53
5.1 Summary of the findings..... 53
5.2 Recommendations..... 55
5.3 Limitation of the study..... 57
5.4 Conclusion..... 57
References..... 58
Appendix I..... 62
Appendix II..... 62
Appendix III..... 64

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Agriculture is the mainstay of the Nigerian economy. It accounted for an average of 66.7 percent of the Gross Domestic Product (GDP) in the sixties, but by 1975 its share had declined to 17.3 percent. The Livestock sub-sector contributes significantly to the Nigerian economy. By 1981, Livestock contributed over 5 percent of the country's GDP and over 20 percent of the agricultural GDP (Lamorde, 1993).

By the mid-seventies the erstwhile dominant position of agriculture and Livestock had been taken over by the petroleum sector, which accounted for 93.6% of export earnings in 1976 and as much as 97.3% in 1980. This has thus relegated the share of agriculture and livestock in Nigeria's exports from 70% in the early seventies to a mere 5.3% in 1975 and as low as 2.2% in 1982 (Federal Republic of Nigeria, Ministry of budget and Planning, 1980).

The oil boom of the 1970's (1973-1974) and early 1980's (1979-1980) which led to a sharp increase in foreign exchange earnings and government revenue, had pervasive effects on the growth and development pattern of the Nigerian economy. The boom affected not only the investment, production and consumption pattern but also the socio-cultural values, political aspiration, style of economic management as well as the policies and programs that were implemented over the years

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(Federal Republic of Nigeria, Ministry of budget and Planning, 1990).

The oil oriented policies coupled with the lack of diversity in the export base has left Nigeria extremely vulnerable to external shocks and vagaries of weather. The imminent economic problem which started in 1978 reached crisis proportion in 1983 - 1984 when the oil market plummeted. Since then things had been on the downward trend with the receipts from oil exports decreasing by about 50% in 1986 compared to 1981 as a result of the fall in prices, (Federal Republic of Nigeria, Ministry of Budget and Planning, 1990). It had thus become impossible to maintain the tempo of economic activity and economic well being in the country. The situation was compounded by the reduced access to the foreign capital market due to the country's reduced credit worthiness.

While these developments occurred, the exchange rate of naira was continuously on the decline. This had adverse consequences on efforts to rationalize the use of limited foreign exchange earnings and encourage more inward looking strategies that will require less foreign exchange and greater domestic resources. The exchange rate policy that allowed the naira to appreciate during the oil boom turned the terms of trade against agriculture and Livestock. The substantial volume of food import depressed the prices of home products which faced rising production cost due to increased cost of inputs.

Government embarked on a series of macro-economic policies designed to keep the economy away from oil dependence and put it steadily and firmly on the course of diversification, based mainly on local production of needed goods and services.

1.2 PROBLEM STATEMENT

Animals mainly livestock provide a major source of protein which is an indispensable component of a healthy diet. In Nigeria most people's intake of animal protein is far less than their nutritional requirements. This is because production of livestock is not sufficient to meet the local demand. The situation is getting more aggravated by time as the observed rate of population growth is greater than the rate of increase in livestock production. A number of macroeconomic variables are responsible for this poor growth.

An unstable exchange rate has always been persistent. This results in distorted prices of both local products and imports. Also it has an adverse effect on production, consumption, import and export. Thus impeding the smooth development and continued growth of livestock production. Another factor is money supply in circulation which have always been in the increase triggering inflation and suppressing investment and production. The pricing policies and incentives that were used by the government failed to achieve their objectives because producers continued to

receive prices that were lower than the prices that were tenable in the world market.

Other macro-economic variables that may have tangible impacts on livestock production includes interest rate, inflation rate, wage rates and import levels of livestock items. The interest rates used failed to channel money towards the target producers and thus had little impact on increased production. Inflation rate was continuously in the increase, reducing purchasing powers and having negative impact on production. The wage rates was always too low to attract skilled labour and provide incentive for increased output. The government failed to protect the local industry from foreign competition. Livestock items were imported, decreasing the demand for the local products, thus creating a disincentive to the local producers and resulting in a negative impact on them.

By 1986 SAP was introduced to revive the unproductive sectors of the economy. Unfortunately most of the policies of SAP failed to achieve their set objectives.

1.3 OBJECTIVES OF THE STUDY

The general objective of the study is to determine the impact of selected macroeconomic variables (mainly exchange rate) on cattle production.

The specific objectives are:

1. To determine the effect of exchange rate on livestock

(cattle) production over time.

2. To assess the effect of other selected macro-economic variables (interest rate, money supply, inflation rate, wage rates, producer prices and import levels of cattle items) on livestock production.
3. To estimate elasticities of livestock production with respect to the selected policy variables.

1.4 JUSTIFICATION OF THE STUDY

Livestock in Nigeria produces a major part of the animal protein and milk requirements of the local population of the country. Although a lot is produced locally, livestock and their products are still imported to meet the local demand. Despite the abundant natural resources and the various attempts of the government to increase livestock production, this sector is still far from attaining self sufficiency to the nation and producing surplus for exportation and earning of hard currency.

To attain this noble aim a lot of research must be conducted to highlight the weaknesses, pinpoint the problems and recommended feasible solutions and viable areas of expansion. One of this major factors that affects agricultural production in general is the macro-economic policies of the state. Most of these policies have been designed to increase agricultural production in general. It is very important to investigate the specific effects of these economic policies on

livestock production. This will help in the formulation of more viable policies. This research is intended to study the specific effect of some of the most important monetary & fiscal policies, namely - exchange rate, interest rate, money supply, inflation rate, wage rate, producer price and import level of livestock items - on livestock production.

This research is of paramount importance for the formulation of useful recommendation and conclusion that will aid producers and policy makers to greatly improve this sectors.

1.5 HYPOTHESES

The following null hypotheses were tested;

1. There is no relationship between exchange rate and livestock production.
2. There is no relationship between livestock production and each of the policy variables.
3. The elasticities of livestock production with respect to each of the policy variables is equal to zero.

1.6 ORGANIZATION OF THE STUDY

This thesis is organized into five chapters. The first chapter covers the introduction, statement of research problem, objectives, justification of the study and finally the derived hypotheses.

Chapter two is devoted to the literature review relevant

to the study, while chapter three is the methodology to be used in achieving the stated objectives.

Chapter four discusses the results obtained and the last chapter covers the summary, recommendations, limitation of the study and conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1 NIGERIAN LIVESTOCK SECTOR

2.1.1 IMPORTANCE OF LIVESTOCK

Both domesticated and wild animals are essential to the rural way of life. They fuel peoples' imagination and cultures and play a fundamental role in balancing diets, fertilizing the environment and providing a means for small farmers to supplement their incomes. Fully controlled livestock land can also be beneficial for sustained management of natural resources.

The livestock sector contributes tangibly to the Nigerian economy. As in many other sub-Saharan countries of Africa, livestock accounted for as much as one fifth of Nigeria's GDP, providing income, employment, food, farm energy and manure, fuel and transport. Livestock fulfills many roles for a substantial number of people in the country (Nuru, 1986).

The livestock industry is a major source of government revenue, for example, through taxation and export earnings from hides and skins. Yet, planners and economists often underestimate the contribution of livestock to GDP. Their role as a source of farm power in the northern savanna zone and as a source of organic manure to boost crop production as well as their efficient utilization of otherwise unusable plants to produce meat, milk and other products are often not considered (Nuru, 1986). For example, the manure outputs of cattle and

sheep have been estimated at 1368 Kg/head/year and 284 Kg/head/year respectively (Hendy, 1977). These outputs are a major contribution to the soil fertility.

The majority of households in both savanna and the sub-humid zones of Africa own some livestock, be it cattle, sheep and/or goats, in addition to poultry. These animals contribute substantially to the quality of the human diet as well as to the household economy (Nuru, 1986).

By 1993 the total Nigerian livestock was estimated at 13.9 million cattle, 22.1 million sheep, 34.5 million goats, 3.4 million pigs, 90 thousand camel and 150 million poultry. These population figures put Nigeria as the third largest producer of livestock in sub-sahara Africa and the largest in the ECOWAS sub-region (Lamorde, 1993).

Despite this large population of livestock, animal protein in Nigerians diet continues to decline. The average figure for Nigeria is only 7.5 gm/head/day compared to North America 66, Western Europe 39, and Eastern Africa 11 gm/head/day (Lamorde, 1993).

2.1.2 LIVESTOCK GENERAL PROBLEMS

The general problems of livestock production, apart from the difficulty of organization, includes the shortages of various categories of manpower, inadequate extension activities due to shortage of trained personnel, inadequate marketing facilities and market information, shortage of

grazing areas and water supply, tsetse fly infestation in the central southern regions of the country, lack of adequate credit facilities specially for small scale producers. In addition to inadequate supply, high cost and poor quality of feed and other inputs and the dominance of nomadic herdsmen in the industry using traditional production techniques (Federal Republic of Nigeria, Fourth National Plan, 1981).

2.1.3 LIVESTOCK POLICY

The Government policy for the livestock sector from the colonial era to date have not witnessed any significant change. The major interest of the government's intervention was to achieve higher levels of livestock production. In the early years of livestock research development and to a certain extent up to now, African pastoral systems are considered to be relatively unproductive. Their Breed of animals were regarded as poor without any form of reference to ecological niche under which they were raised and their unrestricted global orbit for grazing.

The primary objective of the government has always been to increase livestock production and thus make more beef and dairy products available to the urban consumers (Nuru, 1986). The history of animal production is synonymous with the history of National Veterinary Research Institute established in 1924. This is primarily due to the fact that the primary attention of the colonial livestock policy focused on animal

health and disease control (Lamorde, 1993).

The Grazing Reserve Law, passed in 1965 specifically prohibited the opening up of new farms within the areas which were to be gazetted for grazing under the act. This law covering the ten northern states of Nigeria, made it legal to reserve land for the livestock sector. The aim behind that, according to the 1982 annual report of the federal livestock department, is to search for longer term solutions to problems posed by nomadic pastoralism and the dwindling range land reserve arising from increased arable cropping activities nationwide. At the same time benefits arising from sedentarization as such would include reduction of conflicts between pastoralist and cultivators, greater ease in supply of inputs and services, the development of schools, hospitals and other facilities which could be anticipated around the settlement and the possible emergence of more commercial animal husbandry (Livingstone, 1985).

By 1980, over 2.3 million hectares of land had been acquired by various state governments. These grazing reserves were hampered by huge demands for compensation by land owners (Lamorde, 1993). The National Livestock and Meat Authority was established in 1971 to operate abattoirs, cattle farms and whole sale meat markets and to produce the supplementary feeds for livestock. It traded in livestock, hides and skins, controlled and regulated the inter-state activities of traders in livestock and their products.

The period between 1975 and 1985 which coincided with the oil boom era witnessed a relaxation of the previous livestock trade policy. Between 1974 - 1977 import restrictions were removed and tariff rates reduced. Customs duties on livestock products fell in the range of 10% - 30% this was short lived as a result of the sudden change in oil market between 1978 - 1979.

The Federal Government established the Nigerian Livestock Production Company (N.L.P.C) in 1976 to improve credit and technical services for the development of Mokwa and Manchock fattening centers. Various diary processing plants were set up to encourage diary industry. Among these were Madara limited, Vom, Nigeria Diary Company in Kaduna and Minna Diary plants. These were short lived and the plants folded up (Lamorde, 1993).

In 1978 the Agricultural credit Guarantee Scheme (A.C.G.S) was established to guarantee loans granted by commercial and merchant banks for agricultural purposes and livestock. Cattle producers who contribute about 80% of the total domestic meat consumed annually, received only 6% of the total loans. Over 85 - 87% went to poultry production due to short interval between loan advance and repayment (Lamorde, 1993).

In 1986 SAP was introduced to reduce dependence on the oil sector, imports, and to encourage other sectors' productions.

2.2 HIGHLIGHTS OF SAP

By the time the Structural Adjustment Program (SAP) was introduced in 1986, the country was on the verge of economic collapse. Far reaching economic reform was, therefore, inevitable.

2.2.1 OBJECTIVES, POLICIES AND PROGRAMS

1. To restructure and diversify the productive base of the economy in order to reduce dependence on the oil sector and on import
2. To achieve fiscal and balance of payment viability over the period.
3. To lay the basis for a sustainable non-inflationary or minimal inflationary growth.
4. To reduce the dominance of unproductive investment in the public sectors, improve that sector's efficiency and enhance the growth potential of the private sector.

2.2.2 MAIN ELEMENTS OF THE CURRENT ADJUSTMENT PROGRAM

1. Strengthening of demand management policies
2. Adoption of measures to stimulate domestic production and broaden the supply base of the economy.
3. Adoption of a realistic exchange rate policy through establishment of a Second - Tier Foreign Exchange Market (SFEM)
4. Rationalization and restructuring of tariff regime in

order to attain promotion of industrial diversification.

5. Progressive trade and payment liberalization
6. Reduction of complex administrative control and fostering reliance on market forces
7 Adoption of appropriate pricing policies for public enterprise and
8. Rationalization and commercialization/privatization of public sector enterprises.

2.2.3 THE CORE POLICIES INVOLVE MEASURES TO;

a. Correct for the serious over valuation of the naira through the setting up of a viable Second-Tier Foreign Exchange Market coupled with adjustments to the official rate aimed at a convergence of the two rates as soon as possible.
b Overcome the observed public inefficiencies through improved public expenditure control programs and the rationalization of parastatals.
c. Relieve the debt burden and attract a net inflow of foreign capital.

2.2.4 In pursuit of these objectives, the following measures among others, were adopted by the government;

1. A two-tier foreign exchange market for determining the exchange rate of naira was introduced. The Second-Tier Foreign Exchange Market (SFEM) was to provide a venue for the foreign exchange transaction of the private sector.

The first-tier rate applied to Government Foreign Exchange transaction and it was determined in relation to the SFEM rates. The two-tier arrangement operated for 9 months after which both the SFEM and first - tier rate converged.

In all, the most controversial element of the SAP is the SFEM sub-program. The introduction and operation of SFEM seems to be the nucleus around which the other elements of SAP revolved.

.2.5 Objectives of the Second-Tier Foreign Exchange Market (SFEM) include the following:

a. Achievement of a realistic exchange rate for the naira through the interplay of market forces.

b Achievement of a more efficient allocation of resources through the substantial reduction, if not elimination, of fraudulent and wasteful foreign exchange transactions.

c. Stimulation of domestic - based production, agriculture in particular.

d. Promotion of exports along with the foreign currency domiciliary accounts scheme and other measures.

e. deregulation and liberalization of exchange and trade controls.

f. Enhancing Nigeria's competitiveness in the individual financial market, for funds to finance growth and development.

2.3 THE RELATIONSHIP BETWEEN EXCHANGE RATE AND LIVESTOCK PRODUCTION

It is generally acknowledged that the impact of changes in the exchange rate on resource allocation, balance of payment position, internal and external terms of trade, the inflation rate and many other economic variables can be quite substantial. This is particularly true in an economy like Nigeria where the foreign trade to GDP ratio is high. An upward adjustment in the exchange rate could, for instance, lead to the channeling of resource into export and import substituting activities (Abdullahi, 1987).

It is also usually contended that the external payments problems faced by developing countries is a reflection of the fact that their currencies are overvalued. This overvaluation results in a series of misallocation of resources for both domestic and external uses; in addition, it makes it unattractive to produce for the export market and to substitute for these goods that are imported (Bernnet, 1983).

Diakasavvas & Kirkpatrick (1990) stated that "overvalued real exchange rate undermine exports, harm agriculture and generate capital outflows in least developing countries (LDC). The real exchange rate plays a discernible role in the profitability of tradable - both exportable and importable-in agriculture and livestock and provide a long-term signal for the allocation of resource among various sectors. It is through real exchange rate that trade policies affect the agricultural sector.

On the other hand, devaluation by raising the prices of traded goods relative to non-traded goods should lead to more investment in the traded goods sector (since the local prices of imports and exports will increase), thus expanding exports and imports competing goods. Consumption will tilt towards non-traded goods, leading to a fall in import and a reduction on domestic consumption of exportable, thereby improving the trade balance (Wagacha, 1985).

Khan (1987) says "exchange rate action to improve international competitiveness and increase the incentives to produce tradable goods is of the centerpiece of any adjustment efforts. Since devaluation is simultaneously an expenditure reducing and expenditure - switching policy, it affects both domestic absorption and domestic supply and thus contains elements of both demand management and structural policies".

The demand side and supply side aspects of devaluation have been discussed extensively. According to Guitian (1976) in a country where excess real domestic demand shows up in a current account deficit, a devaluation will increase the level of foreign prices measured in domestic currency terms and thus, in the domestic economy the prices of tradable goods relative to non-tradable goods. On the demand side the effect of devaluation on domestic absorption is unambiguously negative. The rise in the price level reduces the real value of the private sector financial assets and also of those factor incomes whose nominal values do not rise

proportionately with the devaluation. On the supply side however, devaluation will boost output if the prices of domestic factors of production rise less proportionately to the domestic currency prices of final output in the short-run.

Lapan & Enders (1978) stated that "balance -of- trade disequilibrium is caused by wealth imbalances between the nations, therefore the primary effects of a devaluation must act to create an excess demand for wealth in devaluing nations and an excess supply of wealth in the revaluing ones. To the extent that individuals view domestic and foreign assets as substitutes, the re-distributive effects of a devaluation will be reduced so that exchange rate policies will be of little value in correcting deficits or surplus in the trade account. As the volume of trade is one of the major determinants of the degree of asset substituting between equally risky asset, we would expect that the degree of openness of an economy and the efficacy a devaluation with that economy are negatively related".

Boyer (1977) has investigated both impact and long run effects of a devaluation for an economy which starts in full equilibrium. He has shown that the change in the price variable in the short run are within narrower or wider limit than are derived when portfolio consideration are not included, depending upon whether the economy is creditor or debtor in foreign currency denominated assets. In addition, on the flow side the paper demonstrated that the current account

moves into surplus, whereas the capital account goes into deficit while the debt service account moves in an indeterminate fashion, although it is very likely to worsen in terms of foreign currency.

Baccara & Nsenguyuwa (1995) say "While it is widely accepted that in the long-run a depreciation of the real exchange rate will improve the current account and stimulate economic activity, there is a growing consensus that devaluation can have in the short-run contradictory effects on output.

Atta - El-Manan (1992) concluded that though there is a positive correlation between exchange rate and agricultural production, but he recommended a stable exchange rate. According to him, the adoption of floating exchange rate system triggers inflations.

2.4 THE RELATIONSHIP BETWEEN INTEREST RATE AND LIVESTOCK PRODUCTION

Modern economic thinking generally acknowledges the important role of interest rate policy as a demand management technique to achieve both internal and external balance and ensure the efficient allocation of financial resources in an economy. Interest rates influence the demand and supply of investable resources and the decisions of economic agents to invest or to consume. They are at the center of any policy that the monetary authorities may choose to undertake to influence business conditions and economic activity. They

affect exchange rate and capital movement as well as inflation (Leite & Sandarajan, 1990).

Interest rate policy is one of the important instruments of macro-economic management. The rate of interest performs several functions in an economy. It is a reward for saving, affecting how an income earners allocates his income between present and future consumption. The structure of the interest rates governs the distribution of saving once accumulated, among different assets, financial and real. Interest policy has effects on the savings - investment processes and through them on the development and diversification of financial assets, the capital intensity of productions, and the rate of growth of output (Khatkhate, 1986).

The primary role of interest rates is to help the mobilization of financial resources and to ensure the efficient utilization of such resources in the promotion of economic growth and development. Interest rate affects the level of consumption on one hand and the level and pattern of investment on the other hand. They are crucial in financial intermediation which involves transferring funds from surplus units in an economy to deficit units. In general, interest rates are useful in gauging financial market conditions and they are a major tool of monetary policy (CBN, 1996).

Despite the importance of this variable, many countries have chosen to maintain interest rates at unrealistic levels. A large number of developing countries have traditionally

followed a policy of low and unchanging interest rates. These policies are normally the result of three factors (a) the desire to increase the level of investment, (b) the desire to improve the allocation of investment among sectors (c) the desire to keep financial costs down so as to avoid possible inflationary effects of interest liberalization (Leite & Sandarajan, 1990).

The belief that low interest rates stimulate investment and growth has been vigorously attacked by Mckinnon (1981). He has shown that if real interest rates are reduced below market equilibrium levels, demand for investment will no doubt increase, but actual investment will decrease since at low interest rates insufficient savings will be generated to finance these investments. Moreover, the excess demand for investment will require the rationing of existing resources among all competing investors willing to borrow at that rate. Where there is rationing and controlled lending rates, it is unlikely that financial intermediaries will choose to provide funds according to a ranking of rates of return on investment. Most likely, other factors such as the capacity to provide collateral and political influence will also play an important part in the financial intermediaries decisions. Consequently, a policy of low interest rates not only inhibits investment, but also tends to reduce the average rate of return on investment below the maximum attainable rate (Leite & Sandaranjan, 1990).

Ladman (1978) states that "Low interest rates do not result in small scale farmers demanding more loans, rather the converse is true.

Attempts to improve the allocation of resources is also an important factor behind the use of low interest rate policies by many countries. These countries are convinced that selective reduction of interest rates to preferred sectors of the economy will significantly improve the allocation of resources. Available evidence tends to contradict this assumption. In most cases in which this hypothesis was tested results showed that the effect of selective credit policies on growth and investment is minimal. The key problem is that of the fungibility of money which makes it very difficult to ensure that funds are in fact used for their original purposes (Leite & Sandarajan, 1990).

There remains disagreement in the literature, however, on the actual effects of interests rate policy on saving, investment and the rate of growth of output. Some empirical studies show that significantly negative real interests rate do not always have the adverse effects on economic growth predicted by most conventional theories. Others have found no direct relationship between the real interest rate and the level of saving or between the real interest rate and the level of investment (Khatkhate, 1986).

2.5 THE RELATIONSHIP BETWEEN INFLATION RATE AND LIVESTOCK PRODUCTION:

Inflation is said to occur when the general level of prices rises rapidly, and persistently over a period of time. This is undesirable to the public and policy makers. From the point of view of the public, inflation causes uncertainty about future prices. This affects decisions on expenditure, savings and investments, and causes mis-allocation of resources. It also allows substantial redistributions of income and wealth from savers to borrowers. To the policy makers, inflation hampers savings and investment. These factors explains why policy makers put in lots of efforts to reduce inflation (Fakiyesi, 1996).

Unexpected inflation or uncertainty over future rates of inflation, may lead to a climate of business opinion that is unfavorable to capital formation. It is stated that unexpected inflation results in inadequate liquid assets to finance investment. Uncertainty, on the other hand, may lead to excess liquidity and an unwillingness to take risks with a reduced time horizon and a concentration of capital formation on short lived projects. It may do so, but there is no firm evidence to suggest that inflation has infact had this effect. The opposing argument that inflation encourages investment because it increases the certainty of gain through the appreciation of the monetary value of the asset seems at the least equally plausible. There is no clear evidence that inflation affects the rate of economic growth (Blyth, 1977).

Erratic fluctuation in the rate of inflations are always harmful for the economy, not only because of the shifts in the distribution of income and wealth it causes, but because it causes an unavoidable uncertainty. Money no longer functions as a unit of account in the way it should and the allocation of the means of production is as a result disturbed. Thus entrepreneurs prefer investments with a short payback period (Visser, 1974).

2.6 THE RELATIONSHIP BETWEEN MONEY SUPPLY AND LIVESTOCK PRODUCTION:

Money supply determines aggregate demand. This seems very much a monetarist argument. However it is not here being presented in the monetarist sense that, for a constant income velocity, the raising of the 'money barrier' permits the expansion of output. More simply, it is being argued that an expansion of money supply would make credit available for the purchase of goods in an inelastic supply, the foreign exchange for meeting the cost of imports being already contained in the argument supply of money (CYR, 1981).

The monetary policy which controls primarily business credit may be self defeating. For if demand rises relative to credit, and if credit is related to supply then inflation will be aggravated and growth reduced. This would occur when bank credit is drawn out of the private sector to finance government deficits, inflation and real production can thus be sensitive to the way the money supply is controlled and who

get the increase in it (Morely, 1971).

There is no denying the link between money supply and inflation. Chhibber (1991) studies of Ghana and Zimbabwe revealed that excess real monetary balances had a significant and positive effect on inflation.

An excess supply of money would result in an excess demand for goods and services which would cause rising prices and/or a deterioration of the balance of payments position. On the other hand, an inadequate supply of money could induce stagnation in the economy thereby retarding growth and development (CBN, 1996).

2.7 THE RELATIONSHIP BETWEEN WAGE RATES AND LIVESTOCK PRODUCTION:

Economist studying wages in under developed countries have been unable to explain their findings of rising real wages in modern industry except by resort to a political explanation. Increases in real wages are said to be the result not of market forces, but of the economically irrational factors such as strong union and government policies to gain working class support. There is an alternative theory in the literature of economic development which states that within a certain range, higher wages result in higher labour productivity (Fai & Chiang, 1966). Therefore, it may be profitable for employers to pay higher wages which will contribute to better health and hence greater worker efforts. Furthermore, higher wages help motivate performance at higher

levels of efficiency because the worker feels that he or she is being paid more equitably for efforts put forth (Horowitz, 1974).

The Zimbabwe study which was done by Chhibber (1991) reveals the presence of wage push inflation brought about by surge in nominal wages legislated by the government after independence in 1981. As these wage increases were not based on underlying growth in labour productivity they could not be sustained. The resulting inflation wiped out the nominal wage increase and restored real wages to their trend levels.

2.8 THE RELATIONSHIP BETWEEN PRODUCER PRICES AND LIVESTOCK PRODUCTION;

Government in many countries of sub-saharan Africa manipulate agricultural and food prices to achieve a variety of economic, social and political objectives. The multiple objectives of price policy and the various instruments employed to influence prices often create a negative incentive environment for agricultural producers. Unlike the situation for crops, the magnitude of the effects of price intervention policies on the efficiency of livestock production, trade and investment is often not fully appreciated (Williams, 1993).

Although there are several objectives of investors pricing policies, the many different objectives pursued can be summarized under four headings: stabilization and inflation control, government revenue generation, self-sufficiency and export promotion. The stabilization objective takes two forms

price-and income - stabilization. With respect to the former the aim is to minimize erratic price fluctuations with a view to achieving both consumer and producer price stability. The income stabilization on the other hand is basically producer oriented. Another reason for intervention derives from the common desire to achieve self-sufficiency in livestock products. The nutritional importance of meat and milk is often cited as the rationale for this objective (Williams, 1993).

The Nigerian commodity Marketing Board (CMB) adopted a policy of fixing producer prices that were lower than the average world market price of the various commodities. This serves as a dis-incentive to increased agricultural production (Olukosi & Isitor, 1990).

2.9 THE RELATIONSHIP BETWEEN IMPORT LEVELS OF LIVESTOCK ITEMS AND LIVESTOCK PRODUCTION.

It appears that increasing dairy imports have increased the total supply of milk and dairy products in importing countries, thereby halting upward trends in prices or even lowering them. In the face of declining or stagnant prices, producers can be expected to cut back on dairy production and shift their resources to more profitable alternative products. Thus, the overall effect of decreased prices must be interpreted as hampering dairy farmers output and income potential as well as reducing their economic welfare. It should also be stressed that there is possibly a circular effect: imports depress local production and this generate ever more demand for imports (Von Massow, 1984).

In the field of livestock import policy six objectives are common. These are to meet certain milk and meat consumption targets, to generate tariff revenue, to protect producers against world markets competition, to save foreign exchange; to stimulate domestic livestock development; and to realize the benefit of free trade (Von Massow, 1984).

It may not be immediately clear how government can develop domestic livestock sector other than by reducing imports and increasing domestic price. However, the livestock development objective can be pursued positively by a channelled increase in import. Two major strategies emerge: the first strategy is based on the assumption that livestock production needs a minimum level of marketing channels and processing facilities to get off the ground. Where production is scattered and insignificant, livestock imports can help create infrastructure and stimulate demand at the same time. The second strategy is based on the same fundamental assumption but includes the concept of using revenue from sales for investments (Von Massow, 1984).

It must however be admitted that the literatures reviewed in this work may not be generally applicable to Nigeria, given the peculiarities of livestock production in the Nigerian setting, but can provide useful information for future policy guidelines and research design.

CHAPTER THREE

METHODOLOGY

3.1 STUDY AREA:

Nigeria is a vast country lying in West Africa between 3.5^0 N and 14.5^0 N Latitude and 3^0 E and 14^0 E Longitude. This specific location explains the diversity in environment, culture, cultivation and human practices (Udo, 1970).

Nigeria is equally blessed with favorable and varied climatic condition. The climate is equatorial and semi-equatorial in nature. These are characterized by the high humidity and substantial rainfall. There are two seasons in Nigeria the wet and dry seasons. The wet seasons lasts from April to October while the dry season lasts from November through March (F.O.S., 1996).

Temperature, rainfall and soils vary, thus the Nigerian people are unevenly distributed over the country (Legum, 1965).

The complex nature of the environmental condition provides the bases for the great variety of agricultural enterprises pursued in different parts of the country. The complexity in the situation is illustrated by the fact that variation in cropping pattern and farming practices are not confined to differences in broad ecological zone alone, but also occur within the same ecological zone environments (Agboola, 1979).

3.2 DATA COLLECTION

The study is totally based on secondary data. Data and information were collected from the Central Bank of Nigeria (CBN), Federal Livestock Department, Federal Office of Statistics (F.O.S), The Nigerian Agricultural and Cooperative Bank (N.A.C.B), and various livestock research institutes and development Agencies such as:

* National Animal Production Research Institute (NAPRI) Shika, ABU, Zaria.
* Institute for Agricultural Research (I.A.R), Samaru, ABU, Zaria.
* National Agricultural Extension Research and Liaison Services (NAERLS), ABU, Zaria.
* International Livestock Center for Africa (ILCA), Kaduna.
* Federal Ministry of Agriculture and Natural Resources (MANR), Abuja.

Data for the period 1972 to 1994 were collected on the annual average exchange rate, annual interest rate for lending to agriculture, annual money supply, annual inflation rate, annual average public services wage rates for grade level one, annual average market price, annual import levels of cattle items and annual aggregate cattle output.

3.3. ANALYTICAL TECHNIQUES

The following analytical tools were used in achieving the objectives:

3.3.1: MULTIPLE REGRESSION

Multiple regression analysis was used to determine the impact of exchange rate on livestock production. The equation is

$$Y = f\ (Y_{t-1}, X_1)$$

where:

Y = annual aggregate livestock production

Y_{t-1} = lag variable of aggregate livestock production

X_1 = annual average exchange rate

Also multiple regression analysis was used to determine the effect of the selected macro-economic variables (interest rate, money supply, inflation rate, wage rates, producer prices, and import levels of cattle items) on livestock production. The equation is;

$$Y = f\ (X_2, X_3, X_4, X_5, X_6, X_7).$$

where

Y = annual aggregate cattle production (tones)

X_2 = annual interest rate

X_3 = annual money supply (₦ 1,000,000)

X_4 = annual inflation rate

X_5 = annual average wage rates (₦)

X_6 = annual producer prices (₦/live wt)

X_7 = import level of cattle items

The annual livestock production was collected from FOS

and it was measured by counting the total number of cattle in Nigeria and multiplying by the average cattle weight i.e converted into tones. Market prices (₦/live wt) were used to reflect producer prices, and the real wages in the public sector for grade level 01 were used as the index for rural wage rates. This is because the difference between the real wages in the public sector for grade level 01 and rural wage rates is negligible.

For both multiple regression analyses t-statistics were carried out for each of the coefficient to determine its level of significance. F-statistics were also conducted to determine the overall significance of the equations.

The coefficient of multiple determination R^2 and adjusted R^2, (R^{-2}) were computed and used to determine the overall effects of the independent variables on the dependant one.

Five functional forms; linear, semi-log, double log, exponential and square root functions were fitted for the regression analysis. A lead equation based on the value of t-statistics, F-statistics, R^2 and R^{-2}, were selected for interpretation.

Since time series data were used autocorrelation and multicollinearity might exist.

3.3.2 MULTICOLLINEARITY

Multicollinearity is a linear relationship holding among the observed values of the regressors (x's) - if so, the

parameter vectors p is not estimable (Goldberger, 1964).

3.3.2.1. TYPES OF MULTICOLLINEARITY.

There are two types of multicollinearity, that is exact and approximate multicollinearity. However, in practice an exact linear relationship is highly improbable, but the general interdependence of economic phenomena may easily result in the appearance of approximate multicollinearity in time series of regressors (Goldberger, 1964).

3.3.2.2 IMPLICATIONS OF MULTICOLLINEARITY

In multicollinearity matrix (X'X) would be singular, so that it would have no inverse. Multicollinearity may produce large standard errors of the coefficients, their population values will be very uncertain and it will be difficult to reject very diverse hypotheses concerning them. It is entirely possible to have a relationship that fits very well - R^2 can be very high - while no coefficient tests to be significantly different from zero. The prevalence of multicollinearity is to be emphasized, as is the inherent obstacle it introduces, reliable estimates of the coefficients may not be made from the sample itself. The sample is poor in terms of independent movement of the regressors, and we should not expect to obtain estimates of their independent effects from that sample (Goldberger, 1964).

3.3.2.3. TEST FOR MULTICOLLINEARITY

Pair-wise correlation were used to measure the

association between the variables. Correlation coefficient (r) gives the degree of association between any two variables under consideration. The correlation coefficient varies from zero to one (perfect positive correlation) and from zero to minus one (perfect negative correlation). The coefficient (r) can be viewed as a measure of the ability to predict one variable (Y) from the knowledge of another variable (X) (Palumbo, 1977).

The variables used are:

Y = annual aggregate cattle production (tones)

X_2 = annual interest rate

X_3 = annual money supply (₦ million)

X_4 = annual inflation rate

X_5 = annual average public services wage rates for grade level one (₦)

X_6 = annual producer prices (₦)

X_7 = import level of cattle items

According to Baldev Raj & Aman Allah (1981) the following measures can serve as guidelines for detecting multicollinearity.

i high significant F-statistics combined with high insignificant t-statistics.

ii. high value of R^2 coupled of low values of partial correlation coefficients.

iii. To check the determinant of the matrix $x' D^{-1} x$ - if it is close to zero, we say that there is a problem of multicollinearity. But this is not a good measures since

the determinant value can be changed by changing the unit of measurement.

3.3.2.4 CORRECTION FOR MULTICOLLINEARITY

Correction for multicollinearity was made by deflating the independent variables (X's) by the (X) that has the highest correlation with others. Therefore, the formula used is;

$$Y=f(\frac{X_2}{X_5},\frac{X_3}{X_5},\frac{X_4}{X_5},\frac{X_6}{X_5},\frac{X_7}{X_5})$$

According to Hossain (1974) the coefficient of the wage rates (x_5) can be determined by using the formula,

$$\beta_5=1-(\beta_2+\beta_3+\beta_4+\beta_6+\beta_7)$$

where

$\beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ are coefficient of (X_2, X_3, X_4, X_5, X_6 and X_7) respectively.

3.3.3 AUTOCORRELATION

When the model is estimated from time series relating to variable X_{it} and Z_{it}, it often happens that there is stoichastic dependance of greater or lesser extent among the successive errors e_{t+1}, e_{t+2} (Malinvand, 1966).

3.3.3.1 IMPLICATION OF AUTOCORRELATION.

The variance covarience matrix of regression coefficient becomes larger than usual. This affect t- statistics and force us to accept the null hypothesis while its wrong.

$$t = \frac{\beta}{\sqrt{var\beta}}$$

since variance β increase, t - will decrease and hence type II error exist.

3.3.3.2 Test for autocorrelation

Durbin-Watson test statistics (d) was used to test for autocorrelation. Durbin-Watson test is a special distribution that has been determined for a particular ratio involving residuals which does allow a statistical test for whether or not the disturbance are significantly autocorrelated. It is based on Von-Neumann ratio of the mean square of successive differences to the variance of the least squares residuals (Murphy, 1973).

The statistics is; $d = \sum_{t=2}^{T} (e_t - e_{t-1}) / \sum_{t=1}^{T} e_t^2$

and called Durbin-Watson test statistics. Its distribution is

tabled for selected values of the number of observations T and number of exogenous variables including the intercept k (Murphy, 1973).

The typical value of (d) if no autocorrelation is present is found to be approximately two. Similarly, upper and lower limits on the range of (d) can be determined to be four and zero respectively for cases for perfect negative and positive autocorrelation (Murphy, 1973).

The residual from least squares regression can be used to calculate (d), and the calculated (d) - value can be compared to the upper (d_u) and lower (d_l) critical values for (d) from the Durbin-Watson table . The result are interpreted in table (1).

Table 1 Conclusion for the use of Durbin-Watson (d) statistics.

Value of calculated d	Conclusion
$d < d_l$	Positive autocorrelation
$d > 4 - d_l$	negative autocorrelation
$d_l < d < d_u$ $(4-d_u) < d < (4-d_l)$	indeterminate
$d_u < d < (4-d_u)$	No autocorrelation

Values of (d) sufficiently close to zero or four indicate autocorrelation while values close to two indicate independence. A drawback to the use of (d) statistics is the existence of the conclusive region. For (d) values in this region, the econometrician must still be concerned with the

possible presence of autocorrelation (Murphy, 1973).

3.3.4 MEASUREMENT OF LIVESTOCK ELASTICITY WITH RESPECT TO SELECTED MACRO-ECONOMIC VARIABLES.

The responsiveness of livestock production to changes in each of the macro-economic variables were measured. Since five functional forms were used for the regression analysis and a lead equation was selected for interpretation, light should be shed on how the elasticities of the selected functional forms were measured.

3.3.4.1. Linear functional form

The general formula for the linear functional form is;

$$Y = a + b_1X_1 + b_2X_2 + --- + bn\,X_n + e$$

The elasticity was measured according to the following formula;

$$Ep = \frac{MPP}{APP} = bi \cdot \frac{X_i}{Y} \qquad \text{(Olayide \& Heady, 1982)}$$

where

Y = average livestock production

$X_1, X_2 --- X_n$ = average of policy variables

$b_1, b_2 --- b_n$ = coefficients to be estimated

a = intercept

e = error term

3.3.4.2. Double-log function;

The double -log function is in the form;

$$Y = a \; x^{b1}_{1} \; x^{b2}_{2} \; x^{b3}_{3} \text{ --- } x^{bn}_{t}$$

The logarithmetic transformation of it is as follows

$$\text{Log } Y = \log a + b1 \log X_1 + b_2 \log X_2 + \ldots + b_n \log X_n$$

This function has some unique characteristics which are very useful in empirical analysis. The partial elasticities are equal to each of the parameters b_i, that is to say, the coefficients are direct elasticities (Olayide & Heady, 1982).

CHAPTER FOUR

FINDINGS AND DISCUSSION

4.1 THE EFFECT OF EXCHANGE RATE ON LIVESTOCK PRODUCTION

To determine the impact of exchange rate on livestock production, multiple regression technique was carried out. Linear, semi-log double-log, exponential and square root functional forms were fitted to the same series of exchange rate and livestock production data. The linear functional form was however selected as the equation of best fit based on the magnitude of the coefficient of multiple determination R^2, the adjusted R^2 (R^{-2}), significance of the t-value and the over all significance of the F-value.

The results of the estimated linear production function are presented in Table 2.

Table 2: Regression coefficients of the linear function

Variables	Parameter estimated	t-value
Intercept	310855	2.862*
Y_{t-1}	0.654791	4.909*
x_1	14,292	1.760**

R^2 = 0.7549, R^{-2} = 0.7304, Durbin Watson(d) = 1.64
F-value: 30.803 which is significant at 0.0001% level
* t-value which is significant at 1%
**t-value which is significant at 10%

Test of significance was carried out to ascertain whether the regression coefficient was significantly different from zero.

From Table 2, the adjusted R^2, R^{-2}, for the linear function was 0.7304 percent. This implies that 73.04 percent of the total variation in the dependent variable (Livestock production) was explained by the variation in the explanatory variables. This portrays a high degree of association between the independent and dependant variable. The F-statistics was 30.803 which is highly significant at (0.0001 percent level) indicating that, the independent variables were collectively important in explaining variation in the dependent variable. Durbin-Watson (d) test was carried out to test for autocorrelation and found to be 1.64. Therefore, positive autocorrelation is suspected.

The selected regression equation is therefore

$$Y = 310855 + 0.655791\ Y_{t-1} + 14292\ x_1$$

The regression results indicate that exchange rate is significant at 90.63 percent confidence level in explaining variation in livestock production. At (0.0937) level of significance a one percent increase in exchange rate has 14292 tones increase in livestock production. This positive relationship comes in conformity with Atta Elmanans' (1992) study, which revealed a positive relationship between exchange rate and Agricultural production. This result leads to the rejection of the first hypothesis which state that "there is no relationship between exchange rate and livestock production". The lag variable (Y_{t-1}) was introduced to create stability and improve the model.

The elasticity of livestock production with respect to exchange rate was calculated and found to be 0.0696. This indicates a small (0.0696) responsiveness of livestock production to a unit change of exchange rate. This also signifies that exchange rate if used alone as a policy may not be able to boost livestock production to the desired level. Thus in order to achieve tangible results it must be coupled with other policies and incentives. This result also nullifies the third hypothesis which states that "the elasticity of livestock production with respect to exchange rate is equal to zero".

4.2 THE IMPACT OF OTHER MACRO-ECONOMIC VARIABLES ON LIVESTOCK PRODUCTION

Here we will examine the impact of interest rate (x_2), money supply (x_3), inflation rate (x_4), wage rate (x_5), producer price(x_6) and import levels of cattle (x_7) on livestock production.

Pair-wise correlation was used to detect for multicollinearity. The results are presented in Table 3.

Table 3; Correlation coefficient between the variables

	Y	X_2	X_3	X_4	X_5	X_6	X_7
Y	1.00						
	(0.01)*						
X_2	0.90684	1.00					
	(0.0001)*	(0.0)*					
X_3	0.66614	0.66763	1.00				
	(0.0005)*	(0.0005)	(0.0)*				
X_4	0.37958	0.48695	0.69794	1.00			
	(0.0744)*	(0.0184)*	(0.0002)*	(0.0)*			
X_5	0.64539	0.64328	0.98387	0.73528	1.00		
	(0.0009)*	(0.0009)*	(0.0001)*	(0.0001)*	(0.0)*		
X_6	0.67156	0.64458	0.99500	0.69686	0.98025	1.00	
	(0.0005)*	(0.0004)*	(0.0001)*	(0.0002)*	(0.0001)*	(0.0)*	
X_7	0.33279	0.22110	-0.35028	-0.42944	- 0.38071	-0.34576	1.00
	(0.1208)*	(0.3107)*	(0-1013)*	(0.0404)*	(0.0731)*	(0.1061)*	(0.0)

* Figures in parenthesis are the level of significance of the various correlation.

From Table 3, it is clear that wage rates (X_5) has a very high correlation with money supply (X_3), inflation rate (X_4) and producer prices (X_6). Also there is a very high correlation between money supply (X_3) and producer price (X_6) indicating the presence of multicollinearity. A further test for multicollinearity was made. The results are presented in Table 4.

Table 4: T-Statistics of the independent variables for the various functional forms

	T - statistics of the independent variables						F-statistics
	x_1	x_3	x_4	x_5	x_6	x_7	
Linear	(3.88)*	(-0.173)	(-0.898)	(1.033)	(0.217)	(2.995)*	(25.991)***
Semi-log	(2.44)**	(-0.042)	(-1.0239)	(0.548)	(0.301)	(0.424)	(17.556)***
Double-log	(2.652)**	(-0.011)	(-1.423)	(0.784)	(0.177)	(0.703)	(21.359)***
exponential	(-0.003)	(-0.769)	(0.151)	(0.993)	(0.054)	(-0.514)	(11.956)***
Sq-root	(0.021)	(0.816)	(0.985)	(-1.02)	(1.003)	(0.02)	(15.812)***

* t-statistics which is significant at 1% level
** t-statistics which is significant at 5% level
*** F-Statistics which is significant at 1% level

From Table 4, it is clear that, there is a very high level of significance of F-statistics combined with a very high level of insignificance of t-statistics indicating the presence of multicollinearity.

To reduce multicollinearity to an acceptable level the model was transformed by deflating the independent variables with the wage rate (x_5) as earlier explained in chapter three.

To determine the impact of the explanatory variables (interest rate (x_2), money supply (x_3), inflation rate (x_4), wage rates (x_5), producer prices (x_6) and import level of livestock items (x_7)) on livestock production multiple regression techniques were used.

Linear, semi-log, double-log, exponential and square root functional forms were fitted to the same pool of explanatory variables (X_2, X_3, X_4, X_5, X_6 and X_7) and livestock production

data. The double-log functional form was however selected as the equation of best fit based on the magnitude of the coefficient of multiple determination, R^2, (R^{-2}), the significance of the t-value, the overall significance of the F-value and the correct sign of the parameters. The results of the estimated double-log production function are presented in Table 5.

Table 5: Regression coefficients for the double-log production function.

Variables	Parameter estimates	t - value
Intercept	8.838829 (1.6394)*	(5.392)** (0.688)
Log x_2	0.112767 (0.1638)*	0.688
Log x_3	-0.070323 (0.1037)*	-0.678
Log x_4	-0.063678 (0.0714)*	-0.89202
Log x_6	0.437438 (0.1168)*	(3-745)**
Log x_7	0.220859 (0.1033)*	(2-139)***

R^2 : 0.8441, R^{-2} 0.7983, D.W. (d) = 2.085

F-value 18.415 which is significant under (0.0001)
*Figures in the parentheses are the standard error of the parameter.
** t- value which significant at 1% level
*** t- value which significant at 5% level

Tests of significance were carried out to ascertain whether the regression coefficients are significantly

different from zero.

From Table 5 the adjusted R^2, ($\bar{R}^2$), was 0.7983 percent. This implies that 79.83 percent of the total variation in the livestock production was explained by variation in the explanatory variables. This also indicates a high degree of association between the independent and dependent variables. The F - statistic was 18.415 which is highly significant at 0.0001% level implying that the independent variables were collectively important in explaining variation in the dependant variable. Durbin-Watson (d) test was carried out to detect for autocorrelation. The obtained (d) of 2.085 indicated lack of autocorrelation.

The selected equation is therefore;

$$\ln Y = 8.838829 + 0.112767 \ln x_2 - 0.070323 \ln x_3 - 0.063678 \ln x_4 + 0.362937 \ln x_5 + 0.437438 \ln x_6 + 0.220859 \ln x_7$$

The intercept was found to be highly significant (at 0.0001% level). This means at zero level of all the independent variables there will be 8.838829 tones of livestock production.

4.2.1 THE IMPACT OF INTEREST RATE ON LIVESTOCK PRODUCTION.

The coefficient on interest rate was found to be highly insignificant. That is, the risk of rejecting the null hypothesis (Ho:$x_2 = 0$) while it is true is very high. However,

it has a positive relationship.

The high level of insignificance can be attributed to many factors. Though agriculture including livestock constitute a preferred sector in the government policies and a concessional interest rate below the average interest rate was set for it, the high risks involved in this sector made banks reluctant to lend out money to farmers and nomads thus impeding their production. Only small amount of loans go to cattle production despite the capital intensive nature this sector. Also most of the livestock is in the hands of small scale nomads who seldom resort to the formal institution for financial support. Another factor is that, the continuous movement of nomads from one place to another combined with their low level of education and poor extension services made them ignorant about the importance of bank loans.

The elasticity of livestock production with respect to interest rate was found to be 0.112767, i.e the responsiveness of livestock production to one percent variation in interest rate is 0.112767 tones. This result leads to the rejection of the third hypothesis which states that "the elasticity of livestock production with respect to interest rate is equal to zero".

4.2.2 THE IMPACT OF MONEY SUPPLY ON LIVESTOCK PRODUCTION

The regression results revealed that, money supply (x_3) and livestock production (Y) were negatively correlated but

with a high level of insignificance (0.5068% level). That is, the risk of rejecting the null hypothesis (Ho : $x_3 = 0$) while it is true is very high. The possible explanation for its insignificance is that, most of the livestock is in the hands of the Fulanis, who live simple lives depending totally on their animals for food. They seldom sell their animals, if at all they do, it is to meet their urgent needs. Their style of living saves them a direct dependence on money supply.

The elasticity of livestock production with respect to money supply was found to be (-0.070323), indicating a negative responsiveness of livestock production to a unit variation of money supply. The possible explanation for this negative relationship is that, high money in circulation triggers inflation and thus hampers production. This result does not agree with the third hypothesis which states that the elasticity of livestock production with respect to money supply is equal to zero.

4.2.3 THE IMPACT OF INFLATION RATE ON LIVESTOCK PRODUCTION.

The regression results revealed a negative and insignificant relationship between inflation rate and livestock production (0.0703% level). The possible explanation for this high level of insignificance is that, the style of living of a nomads saves them a direct contact with inflation rate. This negative relationship may be due to as explained by Fakiyesi (1996) that inflation causes uncertainty about future

prices. This in turn affect the decision on expenditure, savings and investment, and causes mis-allocation of resources. To the policy makers, inflation hampers growth and development of an economy as it discourages savings and investment.

The elasticity of livestock production with respect to inflation rate was found to be (- 0.070323). indicating a negative responsiveness of livestock production to a one percent increase in inflation rate. This results leads to the rejection of the third hypothesis which states "the elasticity of livestock production with respect to inflation rate is equal to zero".

4.2.4 THE IMPACT OF WAGE RATES ON LIVESTOCK PRODUCTION:

The coefficient on wage rates was calculated to be 0.36293%. Also the t-statistics was calculated to be 2.121125 which is significant at 0.05 percent level. This means that wage rates is significant at 95% confidence level in explaining the variation in the livestock production. This result shows that a one naira increase in wage rates has 0.362937 tones increase in livestock production. This could be possibly explained by the fact that higher wage rates attract more people to the business, creates incentiveness to those working and increase the skills of the labour force by attracting experts and experienced workers. This is in line with the findings of Fai & Chiang (1966). They state "within

a certain range higher wage rates result in higher labour productivity". This positive result leads to the rejection of the second hypothesis which states "there is no relationship between wage rates and livestock production".

The elasticity of livestock production with respect to wage rates was found to be 0.362937, which implies that the responsiveness of livestock production to one Naira change in wage rates is 0.36293 tone. This result leads to the rejection of the third hypothesis which states "the elasticity of livestock production with respect to wage rates is equal to zero".

4.2.5 THE IMPACT OF PRODUCER PRICES ON LIVESTOCK PRODUCTION.

The coefficient on producer price was found to be 0.437438, which is significant at 0.01 percent level. This means that, at 99% confidence level a unit increase in producer price has 0.437438 tones increase in livestock production. This positive relationship may be due to the fact that, high prices encourage producers to supply more livestock products, and thus strive to increase their production. This findings is in line with Kalifa and Simpson (1978) in their study of the Bagara tribes of Western Sudan. They stated that "traditional cattle owners respond normally to the price incentives and behave like economic men". This result rejects the second hypothesis which states "there is no relationship between producer prices and livestock production".

This result contrasts the findings of Low et al. (1980) who concluded that the Swazi cattle are held as store of wealth, and are therefore sold to meet cash needs rather than to maximize profit. Given this behavior it is shown that, whilst cattle owners may appear to respond positively to price incentives because of their natural preference to sell in higher priced markets, the overall supply response to price will be negative. Also Carlish & Randag (1970) concluded an inverse price supply relationship.

The elasticity of livestock production with respect to producer price was found to be 0.437438. This indicates that, when other explanatory variables are held constant, increasing the level of producer prices by one unit would increase the livestock production by 0.437438 tones. This result rejects the third hypothesis which states "the elasticity of livestock production with respect to producer price is equal to zero".

4.2.6 THE IMPACT OF IMPORT LEVELS OF LIVESTOCK ITEMS ON LIVESTOCK PRODUCTION.

The coefficient on the import levels of livestock items was found to be 0.22086 which is significant at 0.05 per cent levels. This indicates that the import levels of cattle items is significant at 95% level in explaining variation in livestock production. Contrary to the expectation it was discovered that import of livestock items was positively correlated to livestock production in Nigeria. This may be

attributed to the fact that importation included hybrid varieties which when crossed with the local breeds results in increase productivity. Another factor is the importation of medicines and vaccines which help in maintaining the animals healthy and thus boost production. This result contrasts the findings of Von Massow (1985). His study revealed that, the development of local milk production appears to be hampered by competition through diary imports. Also this result rejects the second hypothesis which states "there is no relationship between livestock production and import levels of livestock items".

The elasticity of livestock production with respect to import levels of livestock items was found to be 0.23086. This indicates that, when other explanatory variables are held constant, increasing the level of import of livestock items by one unit would increase livestock production by 0.22086 tones. This result opposes the third hypothesis which states that "the elasticity of livestock production with respect to import levels of livestock items is equal to zero".

CHAPTER FIVE

SUMMARY, RECOMMENDATIONS, LIMITATION OF THE STUDY AND CONCLUSION

5.1 SUMMARY OF THE FINDINGS

The impact of the selected macroeconomic variables on cattle production were carried out. Multiple regression analysis was used to determine the effect of exchange rate on livestock production. The linear, semi-log, double-log, exponential and square root functional forms were used. Based on the coefficient of multiple determination R^2, the adjusted R^2, R^{-2}, the overall F-value and t-value, linear functional form was selected as the best fit for interpretation. The results revealed that, there is a positive relationship between exchange rate and livestock production; that is, a one percent increase in the exchange rate has 14292 tones increase in livestock production. Also the elasticity of livestock production with respect to exchange rate was found to be 0.0696, indicating a small responsiveness of livestock production to one percent variation in exchange rate.

Multiple regression analysis was carried out to determine the impact of the selected macro-economic variables, which are, interest rate (x_2), money supply (x_3), inflation rate (x_4), wage rates (x_5), producer prices (x_6) and import levels of livestock items (x_7), on livestock production (y).

Pairwise correlation was used to detect for multicollinearity. It was found that there is very high

correlation between wage rate (x_5) and each of the policy variables: money supply (x_3) inflation rate (x_4) and producer price (x_6). Also there is a very high correlation between money supply (x_3) and producer price (x_6). Thus indicating the presence of multicollinearity.

Durbin-Watson (d) - test was carried out to detect for autocorrelation. It was found that Durbin-Watson (d) equal to 2.085, indicating no autocorrelation.

Linear, semi-log, double-log, exponential and square root functional forms, were carried out. Based on the value of the coefficient of multiple determination R^2, adjusted R^2, R^{-2} the overall F-value and the t-value, double-log functional form was selected as the best to fit for interpretation.

The regression results revealed that, interest rate (x_2), money supply (x_3) and inflation rate were found to be insignificant. However, interest rate has a positive relationship with livestock production while money supply and inflation rate have a negative relationship with livestock production. Also it was found that, positive and highly significant relationship exist between livestock production and each of the variables wage rates (x_5), producer price (x_6), and import level of livestock items (x_7).

The elasticities of livestock production with respect to interest rate (x_2), wage rates (x_5), producer prices (x_6) and import levels of livestock items (x_7) were found to be -0.112767, 0.362939, 0.437438 and 0.220878 respectively. This

indicates that, when other explanatory variables are held constant, varying the level of increase of any of (x_5), (x_6) and (x_7) would increase livestock production by the corresponding value of their elasticity, while an increase in money supply and inflation rate would decrease the livestock production by the corresponding percentage of their elasticities.

5.2 RECOMMENDATIONS

Considering the important roles played by the livestock sector in the Nigerian economy and in view of the findings of this research, it was deemed necessary to make a set of recommendations. These are intended to help policy makers and political leaders in the formulation of suitable and appropriate economic policies which will promote the livestock sector to the desired level.

1. Continuous devaluation of the naira causes high money supply in circulation, which in turn leads to monetary inflation - High inflation distorts the pricing system and thus discourages livestock production. Hence, it is recommended that, continuous devaluation of the naira should be checked and fluctuation reduced too, as to make the naira predictable enough for planning and investment. Also efforts should be made to control money in circulation and curb inflation.
2. It was found that economic policies if worked separately do not produced significant development, therefore, it is

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recommended that economic policies and direct measures designed to raise livestock production should be closely coordinated if they are to provide maximum benefit to livestock sector.

3. It is also recommended that agriculture and livestock should continue to be considered as a favoured sector. The interest rate for lending to agriculture should be stabilized and kept at a suitable rate (not as low as used to be) to encourage investment in this sector. More funds should be granted to livestock research and extension services. Also attention should be paid to banking system malpractice, to ensure that only genuine livestock farmers obtain loans.
4. A suitable and appropriate pricing incentives and wage rates should be implemented to improve productivity and producer/s profitability. Also measures should be adopted to improve labour skills by training them.
5. Since local breeds are considered low yielding breeds, and some of the livestock vaccines are imported, Government should facilitate the importation of high yielding breeds and encourages cross breeding so as to improve the local production. Also, government should encourage establishment of local industries for the production of vaccines.
6. While the focus of this study has been on the impact of selected macro-economic variables on livestock production, it is fair to acknowledge that there are also structural impediments to increase livestock production in Nigeria. These

include climatic and diseases problems, inadequate infrastructure, feed resources and extension services. Lack of attention to these other factors can weaken whatever improvement is achieved in the area of economic policies. Thus simultaneously with governmental policies, investment in infrastructure, animal nutrition, disease control, improved support services, marketing and processing facilities are also necessary to achieve sustainable livestock production in Nigeria.

5.3 LIMITATION OF THE STUDY

1. Public services wage rate grade level one was used as an index for rural wage rates. This does not give an accurate result, because livestock producers respond to the index for rural wage rates and not public service wage rates.
2. Another limitation of the study is the use of market prices to reflect producer prices. Market prices are subject to forces of supply and demand and not to the official policies.

5.4 CONCLUSION

Though the livestock sector contributes significantly to the Nigerian economy, it is still far from bridging the gap of the animal protein deficiency in the country. It is believed that if the right macroeconomic policies are implemented in the right way this sector will witness a boost.

REFERENCES

Abdullahi, S.H. (1987) "Exchange rate adjustment in Nigeria: The problem the solution and the cost" a paper presented at the National Conference on the Second-Tier Foreign Exchange Market (SFEM) in the Context of Development Economy, Dept. of Econs., A.B.U., Zaria.

Agboola, S.A. (1979) Agricultural Atlas of Nigeria Oxford University Press pp 1-5.

Atta - EL-Manan, O. A. (1992) The effect of exchange rate on Agricultural production Unpublished M.Sc thesis, Dept. of Agric. Econs., University of Ibadan.

Baccara, B & Nsenguyuvva, F. (1995) "Short-term supply response to a devaluation: A model's implication for primary commodity exporting developing countries" - Policy Research Working paper 1424. The world Bank.

Baldev Raj, & Aman Allah (1981) Econometrics a varying coefficients approach, London, Groom helm Ltd. pp 166 - 171.

Bernet, K.M. (1983) "Exchange rate policy and external imbalance : The Jamaican experience 1973-1982" Social and Economic Studies vol 32, No.4 pp 51-71

Blyth, C.A. (1977) Inflation in New Zealand London, George Allan & Unwin PP 21 - 42.

Boyer, R.S. (1977) "Devaluation and Portfolio balance" The American Economic Review vol 67, No 2 pp 54-63

Carlish, K.R. & Randag, K.G. (1970) "Analysis of the factors affecting meat packaging development" in Change in Agriculture ed. Bunting, A.H. London, Gerald Duck Worth & co. Ltd.

Central Bank of Nigeria: Statistical Review Vol 6 No. 1 June 1995.

Central Bank of Nigeria (1996) CBN Briefs 1996 series, Research Department

Chhibber, Ajay (1991) "Africa's rising inflation: causes, consequences and cures", World Bank working Paper WPS 577.

Cyr, E.B.A. (1981)" Wages, Prices and balance of payments: Trinidad and Tobago: 1956 - 1976" In Social and Economic Studies Vol. 30 No.4 pp 111-133.

Diakosavvas, D. & Kirkpatrick, C. (1990) "The effects of trade and exchange rate policies on production incentives in agriculture" FAO Economic and Social Development paper 96.

Fakiyesi, O. M. (1996) "Further empirical analysis of inflation rate in Nigeria" In CBN Economic and Financial Review Vol 34 No.1 pp 489 - 499.

Federal Office of Statistics (FOS) (1996) Annual review of the Nigeria economy, Lagos

Federal Republic of Nigeria (1981) Fourth national plan (1981 - 1985) Lagos.

Federal Republic of Nigeria, Ministry of Budget & Planning (1990) Assessment and evaluation of the (SAP), Lagos.

Fai, J.C. H & Chiang, A.C. (1966) "Maximum speed development through austerity" in Theory and Design of Economic Development ed. Irma Adelman and E. Thorbecke, Baltimore, John Hopkin University Press PP 67 - 92

Goldberger, A.S. (1964) Econometric Theory New York, John Willy & Sons inc pp. 192-194.

Guitian, M. (1976) "The effects of change in the exchange rate on output, prices and the balance of payments" Journal of International Economic pp 65-74.

Hendy, C.R.C (1977) "Animal production in Kano State and the requirement for further study in Kano close settlement zone" Land Resource Report 21 , ODM London.

Horowitz, Grace (1974)" Wage determination in a Labour surplus economy : The case of India" in Economic Development and Cultural Changes Vol. 22 No.4 pp 666-672.

Hossain, M. (1974) " Farm size and productivity in Bangaladish Agriculture: A case study of pulpur farms" The Bangaladish Economic Review Vol. 11 No. 1 pp 469-500.

Khalifa, A.H. & Simpson M.C. (1972) "perverse supply in nomadic societies" Oxford Agrarian studies 1, pp 47-56.

Khan, M.S. (1987) "Macroeconomic adjustment in developing countries: A policy perspective". The Research observer, the World bank Vol. 2 No. 1pp. 31-32.

Khatkhate, Deena R. (1986)" Estimating real interest rates in LDS" Finance & Development vol. 23 No 2 pp 45-49.

Ladman, et al (1978) "The rural poor and the recent performance of formal rural finance markets in the Dominican Republic" Canadian journal of Agricultural Economics Vol. 26 No.1

Lamorde, A.G. (1993) "Technology transfer in livestock development, NVRI, Vom" a paper presented at CODRI Seminar NAERLS - ABU, Zaria.

Lapan H. & Enders (1978)" Devaluation, Wealth effects and relative prices" The American Economic Review vol. 68 No.4 pp 601-613.

Legum, C. (1965) Africa a hand book London, Anthony Blond Ltd. p.2.

Leite, S.P.& Sandarajan, V. (1990) "Issues in interest rate management and liberalization" IMF working paper.

Livingstone, J. (1985) Pastoralism: An over view of practice, process and policy A study prepared for the Human Resources Institution and Agrarian Reform, FAO.

Low, A.R.C. & Kemp. R. & Doran, M.H. (1980) " Cattle, Wealth and cash needs in Swaziland: price response and rural development implications" Journal of Agricultural Economics Vol. 31 No.2 PP 225 - 236.

Malinvand, E. (1966) Statistical methods of Econometrics Amsterdam, North Holland Publishing Co. pp. 389 - 395.

McKinnon, R.I. (1981) "Financial repression, liberalization and the LDS" in Grossman, S and Lundgerm, E. The world Economic order: Past and prospects, New York St. Martins press.

Morely, S.A. (1971) "Inflation and stagnation in Brazil", Economic Development and Cultural Changes Vol. 19 No.2 pp 184-203.

Murphy, J. L. (1973) Introductory Econometrics Ontario, Richard D. Irwin Inc. PP. 312-350.

Nuru, S. (1986) "Livestock research in Nigeria" Livestock system research in Nigeria's sub-humid zone. proceedings of the second ILCA NAPRI Symposium held on Kaduna, Nigeria, ed. Von Kanfman, Chapter, S.& Blench.

Olayide, S.O. & Heady, E.O. (1982) Introduction to Agricultural production Economics Ibadan, Ibadan University Press pp 33 - 37.

Olukosi, J. & Isitor, S. (1990) Introduction to Agricultural marketing and prices: Principles and applications Abuja, Living book series Gu publications p.51.

Palumbo, D.J. (1977) - Statistics in political and behavioral science New York, Columbia University Press pp 25-32.

Udo, R. K (1970) Geographical Region of Nigeria Ibadan University Press P.8.

Visser, H. (1974) The quantity of money London, Martin Robertson & Co. ltd. p. 274.

Von Massow, V.H. (1984) " Dairy import into sub Saharan Africa: Development and policies" LPU working paper No. 4 ILLC pp 26 - 32.

Von Massons, V.H. (1985) "Dairy import and import policy in Mali and their implications for the dairy sector in the Bamako area" ILCA LFU working paper No. 8.

Wagacha, M. (1985) "Adjustment under crisis conditions in Africa: IMF views and the African Monetary Fund concept" Africa Development vol 10 No. 1/7 pp 16-20.

Williams, T.O. (1993) "Livestock pricing policy in sub-Saharan Africa : objectives, instrument and impact in five countries " Agricultural Economics Vol 8, No. 22 pp 139-159.

APPENDIX 1

Year	Annual Livestock Production (tones) (Y)	Cattle's Market Prices(₦/Live wt) (X_6)	Livestock Imports (X_7)
1972	651,262	320	292,635
1973	574,569	354	319,835
1974	674,682	358	228,579
1975	536,005	369	139,246
1976	484,445	457	174,912
1977	626,496	560	234,838
1978	525,956	554	314,766
1979	690,478	582	346,925
1980	666,788	550	355,806
1981	717,419	612	414,573
1982	621,261	652	468,686
1983	633,401	650	238,174
1984	723,498	781	549,768
1985	1,474,419	777	687,371
1986	1,428,528	1,361	839,293
1987	1,421,172	1,488	711,702
1988	1,330,036	1,737	558,354
1989	1,395,794	2,625	423,269
1990	1,138,789	2,737	381,615
1991	1,234,666	3,867	395,000
1992	1,344,111	4,855	91,290
1993	1,457,101	8,598	205,058
1994	1,578,090	10,795	68,597

Sources: (i) Federal Livestock Department, Abuja
(ii) Federal Office of Statistics

APPENDIX ii

Year	(x_1) Exchange rate* (%)	(x_3)(N,000,000) Money supply*	(x_4) Inflation rate* (%)
1972	0.6579	1,161.3	3.2
1973	0.6579	1,414.0	5.4
1974	0.6293	2,156.2	13.4
1975	0.6152	3,622.4	33.9
1976	0.6266	5,278.9	21.2
1977	0.6466	7,057.5	15.4
1978	0.6052	7,699.5	16.6
1979	0.6027	9,857.4	11.8
1980	0.5469	14,397.4	9.9
1981	0.6052	15 584.1	20.9
1982	0.6731	16,894.0	7.7
1983	0.7506	19,368.9	23.2
1984	0.7672	21,600.5	39.6
1985	0.8924	23,818.6	5.5
1986	1.7323	24,592.7	5.4
1987	3.9691	29,994.6	10.2
1988	4.5367	42,780.3	38.3
1989	7.3651	46,222.9	40.9
1990	8.3469	64,902.7	7.5
1991	9.9095	86,152.5	13
1992	17,2984	128,283.7	44.5
1993	22,3268	192,458.6	54.2
1994	21.8861	267,759.8	55.275

* Source: CBN Statistical Review Vol. 6 No.1 1995.

APPENDIX III

Year	Interest rate* (x_2)	Real wages in the public Sector (₦/month)
1972	0.09	60.50
1973	0.09	62.00
1974	0.09	65.00
1975	0.09	66.5
1976	0.09	68.00
1977	0.09	70.00
1978	0.09	73.00
1979	0.09	76.50
1980	0.09	106.00
1981	0.09	125.00
1982	0.09	161.00
1983	0.09	164.50
1984	0.13	168.00
1985	0.13	171.50
1986	0.13	175.00
1987	0.16	178.50
1988	0.16	275.00
1989	0.16	312.00
1990	0.16	350.00
1991	0.16	410.00
1992	0.16	982.08
1993	0.16	1373.60
1994	0.16	1493.60

* Source: Nigerian Agricultural Cooperative Bank (NACB)
** Source: (i) FOS Review of the Nigerian Economy 1995 Edition
(ii) National Archives, Kaduna.