INFLUENCE OF WORLD BANK ASSISTED FADAMA II PROJECT IN PROMOTING RUMINANT PRODUCTION AMONG FARMERS IN KADUNA STATE, NIGERIA

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AUGUST, 2018

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A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA, NIGERIA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER DEGREE IN AGRICULTURAL EDUCATION

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AUGUT, 2018

DECLARATION

I declare that this thesis has been written by me in the Department of Vocational and Technical Education under the supervision of Prof. B.I. Okeh and Dr. M.O.Ayorinde. All consulted works have been duly acknowledged in the text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at this or any other institution.

_____ _____

DalhatuWambaiMUSA Date

M.SC/EDUC/10357/2007-2008

P15EDVE8089

CERTIFICATION

This dissertation titled Influence of World Bank Assisted Fadama II Project in promoting Ruminant production among Farmers in Kaduna State by Dalhatu Musa Wambai meets the regulations governing the award of Master of Science in Agricultural Education of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This dissertation is dedicated to the memory of my late parents Mal. Musa Wambai and MalamaRabi'atuDalhatu, and to my lovely wife, Talatu Usman.

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Firstly, I thank Almighty Allah who gave me the opportunity to carry out this study. I express my sincere gratitude and appreciation to my humble supervisors in persons of Prof. B.I.Okeh and Dr. M.O. Ayorinde who despite their tight schedules promptly encouraged me by constructively correcting the draft of the work with patience and objectivity.

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The researcheralso appreciates the management of Federal College of Education, Zaria, for approving myrequest for further study and helping me to complete it successfully. May Allah reward you all abundantly, ameen. The researcher is also grateful to hiscolleagues in Federal College of Education Zaria namely Mal. Abubakar Abdullahi, Dr. B.I Balogun and Mr. Joshua Yohanna and others who aretoo numerous to mention here for their encouragement, cooperation and support in different forms.

My wife Talatu Usman and our children from Samira to the last born Rabi'a have beena source of inspiration to me. I appreciate you all for bearing with me during the course of my work. Once again, may Allah bless you all ameen.

ABSTRACT

The study was conducted to determine the influence of World Bank Assisted Fadama II in promoting ruminant production among farmers in Kaduna state, Nigeria. To enable the researcher achieve the purpose of the studythree research questions were generated and answered, also one null hypothesiswas formulated and tested at 0.05 level of significance. Descriptive ResearchDesign was adopted for this study. The area of the study was Kaduna state. The population for the studyconsisted of 400 participants and non participants of the project. The samplefor the study consisted of 400 respondents comprising of 240 participants and 160non participants selected by proportionate sampling technique.Structured questionnaire was the instrument for data collection. The instrument wasvalidated by two senior lecturers in the Department of Vocational and TechnicalEducation, Ahmadu Bello University and three other Chief Agricultural Officers in KADP.The reliability of the instrument was obtainedusing Spearman Brown Reliability Test. A reliability coefficient of 0.81 wasobtained. Qualitative analysis and quantitative analysis were employed in thestudy. The standard deviation, mean and z-test statistics were employed to analyzethe data collected. Among the major findings of this study was that significant differences existed where participants realized higher income than non participants.Also, the study revealed that as a result of the Fadama project services, skills havebeen acquired to an average level in animalproduction practices. Results revealed that participants acquiredhigher levels of skills when compared with non participants in the areas of animal production. The differences were significant, itwas an indication that the project impacted positively on the participants.Theimplication of the findings is that the continued implementation of the Fadamaproject and its expansion to areas yet to benefit from it will enable more farmersacquiring relevant agricultural skills for the adoption of right practices.Theacquisition of these skills surely will translate into sustained increase inproductivity, income and standard of living of rural farmers in particular and thenation at large. Among the major recommendations based on the findings of thisstudy is that Government should encourage more rural farmers to participate inthe Fadama project.This could be achieved through aggressive multimediacampaign aimed at showcasing the dividend of the project no matter how smallthey may be. Also recommended is that all agricultural intervention projects inNigeria should adopt the Fadama II project's demand driven strategy inidentification and execution of project in our communities

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LIST OF ABBREVIATIONS

ADP	Agricultural Development Project
CDD	Community Driven Development
CSO	Civil Society Organization
EIG	Economic Interest Group
FCA	Fadama Community Association
FCT	Federal Capital Territory
FDP	Fadama Development Project
FGN	Federal Government of Nigeria
FMARD	Federal Ministry of Agriculture and RuralDevelopment
FUG	Fadama User Group
GDP	Gross Domestic Products
IFAD	International Fund for Agricultural Development
LDP	Local Development Plans
LGA	Local Government Area
LID	Livestock Industrial Development
LU	Livestock Unit
NFDO	National Fadama Development Organization
NFDP	National Fadama Development Project
NFSP	National Food Security Programme
NGO	Non-Governmental Organizations
PPFs	Program Participant Farmers
WAD	West African Dwarf(goats and sheep)

OPERATIONAL DEFINITION OF TERMS

The following words were operationally defined:

Browsing: To feed ruminants on plant material,especially the leaves of woody plants that is not growing close to the ground

Fadama User Groups: Beneficiaries of Fadama Project

Fisher folks: People who fish for a living

Pen: A place where working animals are kept and fed under restriction

Ruminant: Animal with four compartments of stomach

***Shaduf*:** A hand-operated water-lifter

CHAPTER ONE:

INTRODUCTION

1.1 Background to the Study

Fadama is a physiographic environment whereshallow ground water occurs in alluvial aquifers at a depth of 3-4m in flood plains or stream beds, for irrigation potentials and source of dry season grazing for ruminant animals. Fadama serves as the main source of fodder, together with crop residues and browsing of trees and shrubs (NFDO, 2003).The perennial fadama grasses are very valuable, providing nutrition to ruminant animals throughout the year. In the wet season, fadama are flooded and cannot be grazed but can be cut and fed to animals, especially goatskept in fenced house. The desire to realize the full potential of Fadama resources in Nigeria led to the design of the National Fadama Development Project (NFDP) in 1993, mainly funded by the World Bank, with counterpart funding by the federal and benefiting state governments (Abachi& Salamatu, 2004).

Earlier, Fadama Phase one(I) focused mainly on crop production and largely neglected downstream activities such as commodity processing, storage and marketing. The emphasis ofFadama Phase one(I) was on provision of bore-holes and pumps to crop farmers through simple credit arrangement aimed at boosting aggregate crop output (Akanya, 1989). The design of the Fadama Phase I did not allow for rural infrastructures such as access roads to ensure the efficient transportation of farm produce to markets. The project did not also take into consideration other resource users such as livestock producers, fisher folks, pastoralists, hunters and others. The focus on crop producers contributed to increased conflicts among users of Fadama resources. Increased crop production led to increased surplus but the project did not support post-harvest technology, contributing to reduced crop prices and increased storage losses (Ashafa, 2004).

The major productive sector under Fadama phase II were crops, livestock, agro forestry, fishing and fish farming (Fisher`s folk)(Ogunwale, 2005). Among the 23 local government areas (LGAs) in Kaduna state 10 of them were fully involved in the Fadama phase II Project. These were BirninGwari,Giwa, Kagarko, Kajuru, Kaura, Kubau, Lere, Makarfi, Soba and ZangonKataf Local Government Areas. The farmers apart from crop production also reared livestock like cattle, sheep, goat, poultry and kept fish for sustainable livelihood.

Livestock has historically been considered as one of Africa`s major economic resources in terms of livelihood of its populations, but has remained the stepchild of mining and crop production in terms of its contributions to trade and export. This is because livestock production is practiced locally and in a conservative way and hence, difficult to transfer from the traditional sector to modern production methods, especially in West Africa. Indeed, throughout most of this region majority of the ruminants, especially cattle are managed by a single ethnic group, the *Fulbe* who have largely retained pastoral system (Chikwendu, 2007).

The poor yields and extremely lowtake - off from traditional production systems have been a source of frustration to development initiatives from the early colonial period. A series of attempts to improve on traditional management through ranching and intensive production strategies have an unblemished record of failure (Abdullahi, 2003). The conclusion drawnby both non-governmental organizations (NGOs) and multi - lateral agencies such as the World Bank was that, sustainable livestock production would be a more likely route to success, through working with traditional pastoralists.

Before the advent of Fadama Project there was the introduction of Agricultural Development Projects (ADPs) sponsored by the World Bank in all the states including Kaduna State. Some selected LGAs where theADP was introduced included BirninGwari,

Soba and SamarunKataf LGAs, with headquarters in Kaduna. This was the major activity sponsored by the World Bank (Oladimeji,Osamu, &Sakagami, 2004).

Fadama Phase II was a follow-up to the implementation of Fadama Phase I and addressed its noted shortcomings. Fadama II's strategy represented a shift from public sector domination to a community driven development(CDD) approach.

The project activities focused on fadama users group (FUG) having common economic interest – termed economic interest groups (EIGs). This was one of the unique features of the project since studies have shown that collective action can help to overcome many problems that face poor farmers in production and marketing (Kato, Mogues,&Yahaya, 2007). Addressing one of the weaknesses of Fadama Phase I, Fadama Phase II also provided special preferences to groups of youths, women (especially widows), the physically challenged, the elderly and people with HIV/AIDS. The targeted groups can belong to any of the productive service sectors supported by the project. Since the project used a CDD approach, beneficiaries were given the chance to choose the kind of activities that they wanted to undertake (Arokoyo& Philip 2007).

However, there were some activities that the project did not support, such activities that could lead to degradation of natural resources or large-scale change of land use (NFDO, 2005). Under the CDD approach of Fadama II, all users of fadama resources were encouraged to develop participatory and socially inclusive local development plans (LDPs). Twelve States benefited under the World Bank Assisted Fadama Phase II.

These were Adamawa, Bauchi, Gombe, Federal Capital Territory, Imo, Kaduna, Kebbi, Lagos, Niger, Ogun, Oyo and Taraba states. Fadama II was designed to operate for six (6) years (2004-2010) with a goal of contributing to sustainable agricultural production and uplifting the standard of rural dwellers. Actual implementation did not begin until September, 2005 (Gimba, Audu, Atiyong, &Chikwendu, 2007).

. Maize, sorghum, millet, Rice, cowpea, potatoes, yams, soybeans, ginger, tomatoes, and sugarcane were the major crops produced by fadama farmers. The farmers also reared animals like: cattle, sheep, goats, poultry and kept fish (Mkonya, Philip & Pender, 2007).

For livestock keepers, Fadama areas have traditionally provided access to water and dry season fodder, which is critical for the survival of their animals. Fadama lands are a critical resource for about 2/3 of the national cattle population or about 10million heads of cattle, which produce annually about 150,000 tons of meat.

The design of Fadama II has incorporated a paradigm shift from the traditional public sector dominated/supply-led development approaches of the past to a private sector-led, demand-driven strategy. Through this process, communities would decide on which advisory services and infrastructures they need to enable them attain development goals they set for themselves based on their own effort. The consensus so reached would be articulated in Local Development Plans (LDPs) drawn up at the level of the fadama community associations (FCAs).

The project promotes development in agricultural livestock (mostly ruminants) and aquaculture, as well as development in such other areas as hunting, beekeeping, wildlife conservation and downstream activities including processing and marketing. About 25% of livestock keepers benefitted with the project through forming groups as a means of organizing to defend group interest. The project specifically financed the establishment of resting points, at intervals of 100km, stock routes, construction of water points, veterinary clinics, grazing grounds and supplementary feed storage facilities. (NFDO, 2003).

Livestock production (especially ruminants) is concentrated in the Sudan and Northern Guinea savannas in the semi-arid zones in the hands of pastoralists who hold over 90% of the nation's livestock population. Transhumance is still a major feature of pastoral production. This production strategy has been occasioned by the seasonal alteration in the

availability of fodder and water especially in the major livestock producing areas, as well in the avoidance of trypanasomiasis in the high risk areas.

The Nigerian livestock industry constitutes a very important national resource with great deal of untapped potentials. The larger ruminants are particularly important in increasing and improving crop and livestock production through the use of those animals as sources of farm and off-farm power, notably their use for animal traction. However, since most of the large ruminants are fed at or even below maintenance for a considerable part of the year productivity (growth rate, calving rate and milk yields) is low and morbidity and mortality rates high(Adams, 2002).

Nigeria's ruminant population is predominantly found in the arid, semi-arid and the sub-humid zones of the country. These zones contribute about 30.4%, 27.3% and 19.5% of livestock units (LU), respectively, (1 LU =250kg). Due to the high rainfall and vast land for forage production in contrast with the low vegetation cover in the drier zones, the sub-humid zones have a higher potential for ruminant production. The potential can be put into productive use.

1.2 Statement of the Problem

Improving the quality of life in the rural areas and reducing the level of poverty is a major problem in Nigeria. Many people in Kaduna State consume mostly cereals and other starchy foods to almost total absence of proteins, such as meat, eggs, fish, and dairy products. For instance, the per capita consumption of protein in Nigeria was about 52 grams per day as compared with 105 grams in developed countries (Kato, *et, al,* 2007).

Most of the poor people in Kaduna State live in the rural areas and are usually poor in resources. A resource poor farmer is one that farms on a modest piece of land which may not belong to him and rears small number of livestock with family labor. Such resource poor farmer with these problems lack funds to purchase inputs, and he uses low level of

technology which results into low sustainability of livestock production. Such farmer lacks collateral and has no access to loans from financial institutions and as such the poverty is further increasedin terms of smallness of operation and poor output. (Chikwendu, 2007)

The CDD popularity has been promoted for its potential to develop projects and programmes that are sustainable and responsive to local priorities. The CDD empowers local communities to manage and govern their own developmental programmes, and are better targeted towards poor and vulnerable groups. The sustainability of donor-supported CDD and their effectiveness in targeting the poor and the vulnerable is a problem that attracts many scholars. Emphasis of the policy implications should be on strategies that can be used to ensure sustainability of similar projects and improved targeting of the poor farmers who use local tools.

However, very little has been known of the Fadama programme performance indicated by effects on livestock farmers' livelihood. The prevailing question on how far has the Fadama Development Project contributed to the improvement of ruminant production in Kaduna state could not be answered as there exist no available literature written by any author on that. For this reason therefore, a significant gap has been created which eventually this studyhas filled. The assumption is always that proper and objective investigation of the socio-economic impact of a programme would provide the required information on performance of the programme. This study therefore assessedthe influence of the Fadama phase II Project on ruminant production level and income.

1.3 Objectives of the Study

The general objective was to determine the influence of World Bank assisted Fadama II Project in promoting ruminant production by farmers in Kaduna state, while the specific objectives were to:

1) Identify the socio-economic characteristics of Fadama II project on farmers' level of ruminant production and income.

2) Determine the socio-economic and institutional factors influencing ruminant production in Fadama II project and

3) Identify major constraints encountered by participants of the Project.

1.4 Research Questions

The followings research questions were asked to guide this study:

1. What are the socio-economic characteristics of Fadama II project on farmers' level of ruminant production and income?
2. What is the influence of socio-economic characteristics and institutional factors influencing ruminant production in Fadama II project?
3. What are the major constraints encountered by the participants of the project?

1.5 Research Hypothesis

The following hypothesis was stated for the study.

There is no significant difference in the income levels of participants and non participants ofFadama II programme.

1.6 Significance of the Study

The study will benefit rural livestock farmers in Kaduna state. The study will also be significant to higher institutions of learning and to the entire public.

1.7 Basic Assumptions of the Study

The following assumptions were made for this study:

1. Adequate financial assistance and knowledge on modern farming techniques are parts of activities used at rural areas in promoting farmers' ruminant production.
2. Modern techniques and financial support that promote ruminant production can also lead to farmers' skill acquisition in farming business.

1.8 Delimitation of the Study

This study focused on the influence of World Bank on promoting ruminant production by farmers through Fadama II Development Project in some selected Local Government Areas of Kaduna state. The study was delimited to four Local Government Areas in Kaduna state because they were among the ten Fadama II beneficiaries. These were Giwa, Makarfi, Soba and ZangonKataf Local Government Areas.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Relevant literatures were reviewed under the following sub-headings:

2.1 Theoretical Framework

2.2 Conceptual Framework

2.3 Agricultural Intervention Projects in Nigeria

2.4 The Concept of Fadama and National Fadama Development Project

2.4.1The Organizational Structure of National Fadama Development Project

2.4.2The Organizational Structure of State Fadama Development Project

2.4.3Functions of Facilitator in The Fadama Project

2.5 Need for Programme Appraisal

2.6 Agriculture, Nigerian Economy and Rural Development

2.7 Impact Analysis/ Impact Assessment

2.8 Animal Production Practices

2.9 Review of Related Empirical Studies

2.10 Summary of Reviewed Literature

2.1 Theoretical Framework

Theory is a set of abstract and logical compositions, which attempts to explain relationship between phenomena based on certain assumptions about realities, (Ndagi, 1999). Furthermore, theoretical frameworks are general principles put forward to explain facts and events of social reality in the society. The Theoretical Framework for this study is Social Change Theory with specific emphasis on the influence of World Bank onlivestock production under fadama II project. Influence is defined as the act of power of causing an effect or change without use of direct force or authority.

World Bank intervention stage started with the project inputs which generated certain project outputs that were made available to project participant farmers (PPFs). On the other hand, it will be assumed that Non-Project Participant Farmers (NPPFs) could benefit indirectly from the project output. Effective use of the project output by the PPFs generated certain project effects. The study assessed the influence of fadama project on the rural livestock farmers and both independent and dependent socio-economic variables of the programme participants for farmers were compared. Data for the comparison were collected with the use of survey model. The model was used to collect data from the PPFs and NPPFs on their basis of perception about the activities of fadama II project before and after. (Faye I. & Sutherland J. 2000)

Subsistence agriculture is the dominant occupation of rural Nigerians characterized by low-land and labour productivity. Yet Nigeria has a potential comparative advantage of production of a variety of livestock both ruminants and non-ruminants. As a basis for this the country is endowed with underground and surface water reserves, rich pastures and favourable agro-ecological conditions in the country's flood plains with alluvial deposit called fadama.

2.2 Conceptual Framework

Socio-economic characteristics of farmers

National Fadama Development Project delivery system being techno-social science cannot be dismissed from the socio-cultural and economic environment that the target audience (farmers) as long as the providers are operating. According to Henry (1998) the role of socio-economic factors in improving farmers' efficiency was widely acknowledged. Farmers' age in correlation with farming experience has significant influence on the decision making process of farmers with respect to risk aversion, adoption of new agricultural innovation and other production related decision. Farmer to farmer interaction is reinforced

thereby resulting to technology adoption and dissemination among farmers within and outside the community.

Nielsen, (1998) posits that although economics of sub-saharan Africa were essentially based on agriculture, for over thirty years the region has faced a structural food deficit whereby it could not keep pace with population growth. For farmers one's geographic and socio-economic location determines the particular configuration of hardship to be faced. Traditional mode of production system of rural households were geared for subsistence and were generally sustainable under conditions of low population pressure and isolated markets.

However, this balance is increasingly stressed into marginal lands. Expansion into marginal areas brings increased risk of farm production failure, environmental degradation and loss of bio-diversity thereby reducing both productivity and sustainability of agricultural system over time (Arokoyo& Philip, 2007). The regression analysis portion of the model showed that male farmers were more active than female farmers. The sex as an intervening variable had a negative coefficient and was significant. The other significant variable was age which indicates that the older the farmer, the more efficient he or she will be (Ogundele, 2004). The independent variables considered were farmers' level of livestock production standard of living, and expansion of the production. The independent variables considered were household size of the respondents, marital status, and access to credit of the respondents.

Socio-economic status

This is social and economic attainment of an individual in a society. It shows social and economic status somebody occupied in a society. Socio-economic factors in improving farmer' efficiency was widely acknowledged.

Production input support and component

This was created in the year 2009 in order to bridge the gap occasioned by food shortage. The sub component intervened through the provision of inputs. It was to provide subsidized inputs to farmers thereby lessening the farmers' cost of production and ultimately affording them increased output as well as income on a sustainable basis.

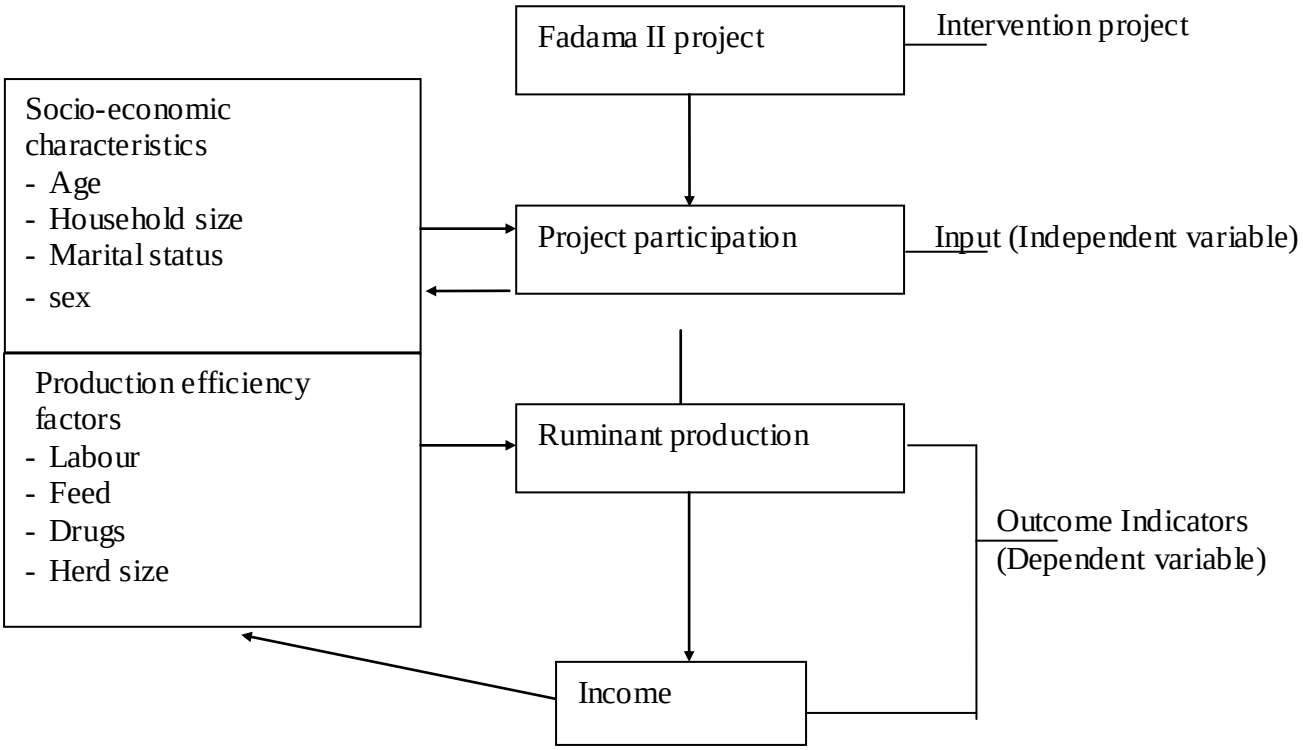


Fig. 1 Conceptual model showing intervention variables and output indicators

2.3 Agricultural Intervention Projects in Nigeria

Several Agricultural development Programmes have been executed in Nigeria.Adeniyi et al (2004) identified well over fifteen (15) project initiated by the FederalGovernment of Nigeria before and after independence. They include Farm settlementschemes (1956), Agricultural Credit Guarantee Scheme (1972), AgriculturalCooperatives (1972 to date), Operation Feed the Nation (1976), River Basindevelopment Authorities (1976-1977), Agricultural Development project (1975), GreenRevolution (1980) Farm Insurance Schemes (1987 to date), Directorate for Food Roadsand Rural Infrastructures (1986-1993) Extension services and Agricultural

Education,Agricultural subsidies, Quarantine services, etc.In 1959, government established the farm settlement schemes to improveagricultural production. Adeniyi et al observed that before independence, there was nodefinite programme aimed at improving the systems of farming. The main objectives ofestablishing the farm settlement scheme included to develop a modern system offarming so as to attract youths into farming as a noble profession; bring about ruraldevelopment and arrest the drift of youths to the urban area in search of white collarjobs; help solve the problems of unemployment among school leavers; develop anextension approach which will increasingly accelerate agricultural development;discourage the existing land tenure system; and bring about revolution in the methodsof agricultural production. The scheme was widely criticized for recruiting mainlyyouth who were not ready for hard work, total dependence on government funding,negative attitudes to work by settlers, poor training at the farm institute, poor feasibilitystudies, and inflated cost of running the farm due to poor monitoring among others. Itwas widely criticized for not being geared towards meeting the needs of small scalefarmers as should have been the case and so failed to increase the nation's foodproduction significantly. The poor outing of the Farm Settlement Scheme necessitatedthe establishment of the Agricultural Development Projects (ADPs)The (ADPs) started in 1975 and was partially financed by the World bank. TheADP's were set up to develop crop, animal and mechanical technologies for farmersthrough the use of extension workers. The ADPs which were located at major townsand cities can be adjudged as the only agricultural programmes in Nigeria which havesurvived successive governments. They are now used alongside Project CoordinatingUnits (PCU) of Federal Ministry of Agriculture to coordinate other agriculturaldevelopment programmes for example the River Basins and the Fadama project. In1976, the Federal Government of Nigeria ushered in yet another AgriculturalDevelopment initiative tagged Operation Feed the Nation (OFN) which succeeded inawakening the interest of many Nigerians in Agriculture (Adeniyi et al,

2004).Between 1976 and the end of the 1980's The federalgovernment of Nigeria launched, funded and piloted theoperation feed the Nation (OFN), the National Acceleratedprogramme for food production and the Green Revolution.

This period also saw the creation of the mass mobilizationfor social and Economic recovery (MAMSER), theDirectorate for Food, Roads and Rural Infrastructure(DFRRI) the programme of Better life for Rural women,and National Directorate for Employment ……" (Olisa andObiukwu, 1991)Precisely on April 14, 1980, the Green Revolution came on board. It was a callfor increased agricultural production through a radical modernization of the nations'agriculture. The provision of facilities such as improved seeds, fertilizers, pesticides,herbicides, irrigation, agricultural credits, appropriate machines, agro-service centres,improved markets, improved pricing policy efficient transportation and communicationwere the main focus of the scheme.Adeniyi et al (2004) recalled that in order to obtain higher levels of production,the government provided farmers with farming input which was made possible byembarking on certain programmes namely the National Accelerated food productionProgramme and Seed Multiplication Centres which provided seeds and seedling underthe Green Revolution Programme. It is on record that during the period under review,the Federal Government set up a tractor hiring scheme where it purchased tractors forresale to farmers at subsidized prices or for hire to farmers who had no money to buythem. The Green Revolution and related programmes under it which were enumeratedabove came to a halt for reasons which may bother on inadequate funding and poorimplementation strategies. Some of these initiatives for example the AgriculturalDevelopment Projects (ADP) and the National Directorate of Employment have beensustained till date without much success stories while some were scraped. The RiverBasin Development Authorities (RBDAs)were set up and executed from 1976 with theobjective to harness the countries water resources and optimize Agricultural resourcesfor

self sufficiency in food production through the provision of water for irrigation anddomestic water supply, improvement of navigation, hydro- electric power generationfacilities and fisheries project. Other objectives of the RBDAs included engenderingbig plantation farming and encouraging the establishment of industrial complexes thatcould bring the private and public sectors into joint business partnership. The Nigeria'sRBDAs were largely failures as it could achieve the all important mandate of ensuringthat farming especially that of arable crops is practiced at all seasons. The FadamaProject, Nigeria's second attempt to harness her water resources was established in1993 to be executed in phases 1, 2 and 3. Adeolu and Taiwo (2004) reported that one ofthe suggested ways of reducing poverty is utilizing the endowment of the poor as afactor to be harnessed for poverty reduction which in the case of Fadama dwellersconsists of large expanse of floodable plains or wetlands which favour diversity ofagricultural activities. There is no doubt that the Federal Government of Nigeria haslaunched and implemented several Agricultural programme to improve the standard ofliving people, Evbuomwam as cited by Okoh (2008) maintained that agriculturalpolicies remain critical in reversing the poverty trend. It is axioms noted by manyscholars that only good agricultural policies should be capable of promoting economicgrowth and improve the living condition of the poor (Birdsall 1995, Pinship andPanmdja 1999, LEISA 2001, Okoh 2000). These policies to work must also favour theacquisition and adoption of sustainable skills for it to survive on the long run. Theplurality of objectives of Nigerian Agricultural Development Programmes has no doubtlimited their success level and this may have influenced Government decision to onceagain set up projects specifically saddled with the responsibility of harnessing theresources of lowly flood plains called the Fadama.

2.4 The Concept of Fadama and National Fadama Development Project

Kolawole and Scoones (1994) defined Fadama as a Hausa word meaning theseasonal flood or floodable plains along major rivers and depressions on the adjacentlow terraces. In a

similar conceptualization, World Bank (2003) defined Fadama asriver valley areas which are seasonally flooded or have high water table for all or alarge part of the year. The Fadama concept is an age- old tradition in Hausa landwhere land that gets flooded on seasonal basis allows for the growth of a variety ofcrops under small scale irrigation farming system (Akpoko, Banta, Kudi& Usman 2008).From the fore going, Fadama can succinctly be referred to as wetland or termused to describe depressed and water-logged areas which are predominant along majorriver courses and its tributaries. It was the drive to ensure that farming especially crophusbandry is practiced in and out of season to meet people's demand that the FadamaProject was initiated to harness the nation's water resources.According to the Project Coordinating Unit (PCU) of the Federal Ministry ofAgriculture and the National Fadama Development Office (NFDO), the Fadamaproject is designed to be executed in three phases. The objectives of the first phaseinclude to finance the provision of shallow tube wells in Fadama land for small scaleirrigation; simplifying drilling technologies for shallow tube wells/wash bores;construction of Fadama infrastructure; organization of Fadama farmers for irrigationmanagement, cost recovery and better access to credit marketing and other services;and providing vehicles, pumps and other equipment.The second phase of the project is intended to stimulate poverty-reducing growth in theFadama; empower local communities to play an active role in their own developmentand take charge of their own development agenda; sustainably increase the incomes ofthe Fadama users; and reduce conflict among Fadama users groups. (NFDO, 2003)Finally at the last and concluding phase the project objective include theenhancements of growth in sectors other than oil in order to achieve increased foodsecurity, reduces poverty and create employment and improved opportunities in ruralareas (NFDO, 2008).

2.4.1 The Organizational Structure of National Fadama Development Project

In order to achieve the various objectives of the Fadama project in theparticipating state, the Executive Committee NFDEC was inaugurated as the highestpolicy making body constituting of the Executive Minister of Agriculture asChairman. At the National level we have the project coordinating unit PCU and theNational Fadama Development Office NFDO. The National Fadama DevelopmentOffice is however answerable to the Project Coordinating Unit. Structurally, theproject coordinating unit consists of sub-programmes namely Communication andInformation Technology (C.I.T), Administration, Rural Institution Development(R.D), Monitoring and Evaluation (M&E) Programme Development and Planning(PDP), Adaptive Research (AR), Engineering and Finance. National FadamaDevelopment Office consists of the four units namely Measurement and Evaluation,Procurement, Community Development and Gender Affairs, and Project Accountsection.The heads of Units of the Fadama II projects include a Monitoring andEvaluation Specialist, Procurement Specialist, Community Development and GenderSpecialist and Project Accountant. Each unit perform assigned duties as specified intheir job description for example the measurement and evaluation unit monitors theactivities of the project, the procurement unit assists the beneficiaries to acquire cheapand high quality productive assets through bulk purchases. The communitydevelopment and gender unit mobilizes the people to form Fadama CommunityAssociations (FCAs) and the various Economic Interest Groups (EIGs) under them.This unit also helps to ensure balance in gender integration level by mobilizing womenwho are most times denied equal access when compared with their male counterpartsin past interventions. Finally, the accounts unit headed by the Project Accountantmakes fund available for the day to day running of the project services ensuring thatdue process is followed. These units reports to the Project

Coordinator who in turnreports to the Project Coordinating Unit of the Federal Ministry of Agriculture.

2.4.2 The Organizational Structure of State Fadama Development Project

In each participating State and the Federal Capital Territory eight (8) KeyOfficers form the Project Management team. They include the project coordinator,Monitoring and Evaluation Officer, Community Development Officer, EnvironmentalManagement Officer, Communication Officer, Procurement Officer and Members ofthe Project Implementation Unit. These are assisted by support staff and forty (40) Project Facilitators.The project component which isdivided into five (5) are designed to address specific areas of concern to meet theproject objectives.

2.4.3 Functions of a Facilitator in the Fadama Project

In executing the Fadama Project, Facilitator where recruited and trained toperform a number of roles which include to understand the way of thinking, thetraditions and the dynamics of the Fadama community so that he or she can follow theappropriate approach for the facilitation process; stimulate local initiatives, motivatethe Fadama users groups/Fadama Community to take charge of their own developmentagenda, transfer information and know-how; use and promote participative procedures;use a positive approach to encourage and motivate the members; and to help theFadama Community Association (FCA) to make decisions for themselves. TheAGFacilitator should never try to substitute himself/herself for beneficiary, FCA memberbut rather to facilitate their having to make decision collectively; ensure that theparticipation process can provide a voice to traditionally vulnerable groups; interact andask questions in other to help the FCA members develop a thinking process wherebythey take all the relevant aspects of an issue into account before they arrive at a decisionand subsequently mobilize consensus around priorities and the actions which needed tobe taken to execute decisions reached; and keep respect for the Fadama

communitymembers appropriate language, behavior and dressing at all times. (NFDO, 2003)The Facilitators are to play the role of extension agents in the AgriculturalDevelopment Projects (ADP) and so their function and challenges will no doubt be thesame. Feeder, Willett and Zijp in Okoh (2008) observed that in developing countries,where people are still bound by tradition, they will understandably be afraid of costlyrisks and will not take them until they have been convinced that the new methods aresafe to play and will not violate their values. They suggested that for the extensionist orFacilitator, their concern is solely to educate the farmers to realize that innovations willbenefit them and their family and as the farmers come to this realization, they willadopt new practices which will translate into increased level of productivity.

2.5 Need for Programme Appraisal

In realization of the benefit of appraisal in any development program, Gilbonsand Schroeder in Ochu (1991) reported that appraisal of a program measures the effect(impact) of work planned and carried out, help Agricultural educators, extensionofficers, farmers and administrators to answer question like "which planned activitiesdid we do or not do? How much did this cost? What is the result of this work? What didthose involved in the program learn and where they closer to their main goal. Theyobserved that two way communications could only occur between the scientists andfarm families where adequate field and country-level appraisals of agriculturaldevelopment programmes occur. Honest and open appraisal of community projectsprovide small scale farm families a real voice in the process of change and growth; andhence, progress towards material goals and other objectives could thereby assessed.Scrivens, Stake in Ochu (1991) noted that a full scale appraisal of any programresults in a story supported by statistics and profiles. Such appraisal show whathappened, as well in perceptions and judgment that different groups and individualshold by objective means. In addition, appraisal reveals the merits and shortcomings,including

generalization for the guidance of subsequent programs. The basic roles ofappraisal, they stressed, centre on programme development, improvement, try out,investigation or diagnosis, verification, data collection and processing in order arrive atworthwhile conclusion about the programme achievements.The attainment of desired outcome of any programme, Tyler, Harington and

Johnson in Ochu (1991) noted depends largely on the establishment of clear goal.Proper goal establishment involves a variety of resources to provide thefarmers/students and programme planners with much information as possible for asound decision. They emphasized, therefore, if individual or groups intend to study anydevelopmental or educational programme systematically and intelligently, theindividual must be sure of the goals and objectives aimed at. Programme designers andassessors and policy makers at large, should establish clear goals and objectives inorder to ensure programme effectiveness. Thorndike and Hagen, Onyike in Ochu(1991)reported clearly that established statement of aims and objectives of anyeducational/developmental programme constitute the broad frame of reference whichguides programme planners and policy makers and assessors. Hence, goaldetermination, form one of the main basis for appraisal.Commenting on the importance of good programme execution and administrationin the realization of the national goal of food sufficiency, Montgomery, Howell, Koppelin Ochu (1991) observed that the execution and administration of AgriculturalDevelopment Programme in most countries often follow or exhibit bureaucratictendencies which include resistance to change, rigid adherence to rules and regulations,reluctance to delegate authority, target mentality; which imply indifference to efficiencyand purpose behind rules and regulations, strict adherence to traditional relationshipswhile desiring to appear modern; and xenophobia and nepotism.The importance of good programme implementation has been stressed. Thoseinvolved in programme execution, however, should as much as possible delegateauthority so as to divest themselves

of a lot of academic concepts, preoccupation withenforcement of bureaucratic regulations, and peripheral activities and roles. The factorslargely isolated management from other members, and thus, render them inaccessible toother cardre of personal equally involved in the execution of the programme designedto foster agriculture, rural and urban development of the Nation.This justifies the impact appraisal of the National Fadama Project considering thewhooping sum of US$144.94 that is involved out of which US$69,600,000 million isto be provided as counter fund by International Development Association throughWorld Bank and African Development bank as reported in the Development CreditAgreement (DCA). (NFDO, 2003)

This implies that the Federal, State and local government are to work out formula forthe provision of the balance of US$75.34 million which is expected to be deposited intothe project account before accessing the bank loan. The study on impact of Fadama IIproject on skill acquisition in agricultural practices will reveal the outcome or changesin project beneficiaries that are attributable to the intervention which makes the projectappraisal a necessity.

2.6 Agriculture, Nigerian Economy and Rural Development

Agriculture, the science of husbanding crops and animals in its widest senseencompasses cultivation of land, growing and harvesting of crops / forest trees on theone hand, and breeding, raising, dairying and marketing of crop and animal produce onthe other. Farming in developed countries like Europe is generally of mixed typeinvolving variety of crops and livestock products. Mediterranean nation of Europe aredominated by wheat, olives, grapes, and citrus fruits production, Western Europeengage in dairying and meat production, while Eastern Europe countries like Peninsulaand Ukraine, wheat production reigns supreme. Smith, Leec, Robert and Derek (2008)observed that Europe as a whole is noted for its great output of wheat, barley, oats, rice,corn, potatoes, beans, peas and

sugar beets including dairy and beef cattle, largenumbers of pigs, sheep, goats and poultry. The United States has the best crop land inthe world because of her endowment with favorable climate, soil and water condition.

The United States is the largest producer of corn, soyabeans, and sorghum and ranks second in the production ofwheat, oats, citrus fruits and tobacco. The United States isalso a marginal producer of sugar cane, potatoes, peanutand sugar beef. It ranks fourth in the world in cattleproduction and second in hog. The total annual value offarm output increased from $55 billion in 1970 to $ 207 in2002. (Watts, 2008)

However, with this effort, Agriculture in the USA still contribute 1% of thegross National gross domestic product producing and employing only 2% of the workforce (Watts, 2008). With countries gaining independence from colonial masters,African economy became divided into two major sectors which include Agriculture andmanufacturing. Oil palm, cocoa, rubber, coffee, cotton, tobacco, peanuts, sisal etc aremajor export crops while cassava, yam, rice, millet, maize, etc are major food cropproduced at subsistence level. Cattle, sheep, goat, pig, poultry, rabbit are also producedin Africa. However, Newman et al. (2008) lamented that despite being the mostAgriculture-based continent in the world, Africa does not produce enough food to feedits people.

In Nigeria specifically, it is on record that before the 1970's, Agriculturecontributed about 75% of the nation's export earnings. In the past, Nigeria's majorexport crops were cocoa, oil palm, rubber and cotton which are now sold mainly locallywhile sorghum, millet, corn, yams and cassava which are principally cultivated as foodfor growers are now sold for cash. Commenting on the place of Agriculture in general,Adeniyi, Udeogalanya, Abdulahi and Iheukwumere (2004) stated that man'sdependence on Agriculture is unique because Agriculture not only provides food butalso creates employment opportunities, feed the industrial sector as well as provideincome and foreign exchange through export trade. There

is no doubt, therefore, thatAgriculture is the mainstay of the economy of many developing nations of the world.Agriculture provides food for human beings and this is the most important of the rolesthat it plays worldwide. According to Iwena (2008) it is only through Agriculture thatman can feed. Adeniyi et al (2004) commenting on provision of food as one of the rolesplayed by Agriculture stated that Agriculture provides man's food requirement forgrowth, good health and increased productivity. They further added that large quantities of food items are obtained from agriculture for example rice, maize, sorghum, millet,cassava, yam, vegetables, fruits, fish, meat, milk, eggs etc. It is undisputable to statetherefore that a well fed population will be dominated by people who are not onlyenergetic but economically productive. The role of food production is one whichAgriculture has played, is playing and will continue to play, but should it fail in thisresponsibility, life on earth will gradually cease. It is also out of the proceeds fromAgriculture that domesticated animals are fed. Ubakamma, Eruchalu, Ezeani, andOkafor (1999) noted that Agriculture provides feed for animals which converts the feedinto animal protein for human consumption. Food in the form of plant and animalproducts is what healthy living entails.Agriculture as the provider of most industrial raw material is another colossalrole played by Agriculture in the nation's economy.

> *"Agriculture provides the raw material need of many localindustries. In Nigeria the most important Agricultural rawmaterials used by industries are palm oil, palm kernel,cocoa, rubber, tobacco, groundnut, cotton, hides and skin"(Adeniyi et al, 2004).*

The presence of these essential raw material no doubt are great catalyst to thelocalization of industries which makes use of their products. Clothing and foot wears,drugs/medicine, papers, tyres, processed foods, soaps, etc are examples of finishedproducts from these industries. These raw materials and their derivatives are yet to havealternatives and if Agriculture is not adequately funded as it is in Nigeria today,industries like the textile mills, beverage manufacturers, sugar industries,

cosmeticindustries, milk processing industries, paper mills, breweries, tanning industries, etc allwill have to find alternative source of raw material if they are to exist.

The raw materials used in many industries are often plant andanimal materials. For instance, timber produced from varioushardwood and softwood trees is used for constructing buildings,vehicle bodies, furniture, industrial equipment, tools, matchsticketc……. Certain species of trees for example rubber (Heveabrasiliensis) produce milk fluid called latex and is processed intorubber used in making tyres, elastic band, raincoats… Some treesfor example gum Arabic (Acacia Senegal) produce gum used inbounding paper. (Adelekan&Taiwo 2004)Farmers also make income in local and hard currencies from their Agriculturalproceeds which provide them means of diversifying their businesses. In line with theabove Ubakamma et al (1999) noted that farmers make money from sale ofAgricultural products such as yam, cassava, maize, farm animals and their products.Agriculture therefore provides a means livelihood they concluded. Engaging people inmeaningful livelihood occupation is one role of Agriculture that cannot be overemphasized. At world level Agriculture provides employment for millions of peopleand here in Nigeria it is the highest employer of labour.Adelekan and Taiwo (2004) quoting the Federal Ministry of Agriculture statedthat in Nigeria, Agricultural activities provide direct employment for about 25% of thecountry's economically active population. It is of course believed that more than theabove percentage is indirectly involved in marketing activities and when summed upaccount for over 50% of the population. The above deduction is therefore anunderstatement when placed side by side the assertion below:

> *"Agriculture provides employment for about 75% of theworking population in Nigeria who either works directly onthe farm or indirectly in the primary and secondaryindustries which utilize Agricultural raw materials asinputs". (Adeniyi, et al 2004)*

It is for these reasons that one can safely say that though the nation rely on theproceeds from crude oil to generate money to meet her needs, with the beneficiariesless than 10%, a much greater proportion of the population, over 70% to be precise willhave to seek solace in Agro and Agro-related businesses thereby making Agriculturetruly the people's economic mainstay. Agriculture therefore will continue to be a majorinstrument for achieving the much needed rural development in Nigeria.Maguire (2000) commenting on Agriculture and rural development stated that"rural development is a complex process that demands sustainable production,agricultural natural resource management, institutions, infrastructures, health,education, markets, finance, policy and local Government to succeed. Most times, aplace is classified rural if the population of the area should be about 20,000 people orbelow and in addition characterized by depression and deprivation of the people livingin it, and also degradation of their environment.Stressing on the need for balanced development and its attendant consequencesif neglected, the third national development plan analyzed it thus: "Every developingcountry is now conscious of the need for balanced development" (Olisa and Obiukwu, (1992). A situation where some parts of the country are experiencing rapid economicgrowth while other parts are lagging behind can no longer be tolerated. Another aspectof balanced development is the relative development of rural and urban areas. In thepast, the rural areas have lagged behind the urban areas in development resulting inincreasing disparity between the standard of living in the rural and urban areas and inmass migration of population from the former to the later. This situation which wasreported over thirty years ago still exists today. There is need therefore to direct ruraldevelopment policy objectives towards enhancing quality of life in the rural areas.Towards achieving improved rural life, Olisa and Obiukwu (1992) stated that themajor instrument is still Agricultural improvement aimed at increasing yield per unitarea of land, through the dissemination of improved input such as high yieldingseedlings, machinery and fertilizers,

improved storage and market practices. It is toachieve self reliance in food production, increase per capital income and foreignexchange earnings, provide industrial raw material and employment opportunities toour teaming population that integrated rural-urban development has become necessary.

This has become necessary because to solve the problems of the cities, those of the rural dwellers must be solved first. Food and Agriculture Organization (FAO) in Olisaand Obiukwu (1992) reported thus:

> *"At least 700 million people live in poverty in rural areas ofdeveloping world. And, available evidence suggests, manyof them are becoming poorer. The rural poor areheterogeneous group, including small scale farmers,landless, the nomads, pastoralists and fishermen. But theshare common disabilities, limited assets, environmentalvulnerability and the lack of access to public services andamenities, especially education and medical facilities"*

If all the agricultural and industrial projects initiated in Nigeria from 1959thrived till today, the country would have recorded substantial food surplus and themuch needed positive changes for the rural dwellers. Olisa and Obiukwu (1992)observes that instead, the present picture of the rural population is one of economicpoverty, malnutrition, poor infrastructure, acute shortage of staple food items, poormedical facilities, persistence of local endemic diseases which reduce the quality oflabour force, dependent and deprived rural women folk and unproductive subsistenceAgriculture to name a few disabilities. A major contributor of the cheerless picturestated above is that rural development has long been seen as a goal to be achieved inisolation instead of in combination with one another. Rural development approach issaid to be integrated when it is designed to carry along human and material factors thatare relevant to rural development.

In his own submission, Aduku, (2007) stressed that the efficient developmentand management of water resources of the Nation is key to the sustainable socioeconomicdevelopment of the Nation for poverty alleviation, jobs creation, food andself sufficiency. This by implication means Nigeria can salvage her dwindling economyby putting appropriate strategies in place to harness her water resources.It is important to note that element involved in rural development are mutuallyrelated and presence or absence of one affects the efficiency of others towardsachieving the overall goal. A practical example is the establishment of Agriculturalsettlement schemes involving hundreds of families without complementary necessitiesas a medical centre, school, motorable road, a police post, a post office, a bank and soon. This perhaps contributed to short life span of the Farm Settlement Scheme operatedin 1959. The Fadama II project is people oriented, equipped with rural infrastructurecomponent that provides complementary necessities of life, though, with a compulsorycontributory quota of 10% by the benefitting communities.

2.7 Impact Analysis / Impact Assessment:

Impact as explained by the Organization for Economic Cooperation andDevelopment (OECD) in Alkali(2010) is the positive or negative, primary orsecondary, long term or short term effects produced by a development intervention,directly or indirectly intended or unintended. Emmanuela, Gine and Markus in Alkali(2010) defined an impact as the difference between outcomes with a program and thosewithout it. The United Nations Development Program UNDP (2003) defined impact asthe overall long-term effects of an intervention resulting from a program or project thatare assessed with reference to the development objectives or long term goals of thatprogram or project. The UNDP publication further stated that impact is the long term orultimate result attributed to a development intervention in contrast with output andoutcome, which reflects more immediate results from the intervention. Impact putsuccinctly is the direct or indirect, negative or positive

consequences of actions orstimulus resulting from reactions or responses of the recipients which could manifestduring and/or after the actions and reactions. The determination of impact of policiesand programs on target population is brought to bear through a process called impactanalysis which is often times referred to as assessment.

Impact analysis and assessment are interchangeably used though analysis andassessment do not mean the same thing. Sanginga (1999) stated that impact analysisdeals with the investigation of the changes that occurred or likely to occur in peopleslife as a result of a project or programme. The author further explained that it tries tofind out how far the introduction of a technology has been successful in meeting thesocio-economic objectives, and how well agricultural technologies have satisfied theneeds and aspirations of households and other units in the target population. It thereforehelps to determine the nature and quality of services provided by a given intervention inthe areas of skill acquisition, productivity and income generation. This explains whyimpact analysis studies covers social, economic and environmental dimensions mosttimes it is been mentioned unless the coverage is delimited to a certain area(s) ofconcern. Analysis involves breakdown of components of an activity in order to measureand be in a position to make judgmental statements which is known as assessment.

Impact assessment studies is based on the theory that project intervention executedwithin a community must have either positive or negative impact to the concernedcommunity and sometimes beyond. For example, in a guide to economic impactanalysis, Shane (2010) citing the City of Sacramento, California document oneconomic impact analysis states that economic impact is based on the theory thatmoney flowing into a local community from outside sources benefits that area.Benefits, they added include new jobs and revenue. Impact analysis first strives toidentify the cause of the impact and measures the benefits to the community that wouldnot have occurred without the project

or activity in question. Shane noted thateconomic impact analysis studies the possible effects of an economic developmentproject or investment, estimating the possible returns to a business or community. Theanalysis, Hall continued, provides decision makers with a basis for deciding thefeasibility of an activity or investment. These returns in relation to Agriculturalintervention projects like the Fadama could be viewed in terms of impact on theacquisition and use of needed skills for sustainable Agricultural practices to achievethe much needed increases in productivity, income and standard of living.

World Bank in Alkali (2010) noted that impact analysis help to assess thechange that can be attributed to a particular intervention, such as a project or policy,both intended ones, as well as ideally the unintended ones. In contrast to outcomemonitoring, which examines whether targets have been achieved, impact evaluation isstructural to answering the following questions: how would participant's well-beinghave changed if the intervention had not been undertaken? White as cited by Alkali(2010) stated that in order to understand what would have been project participant'sconditions without the intervention there has to be a counterfactual analysis. Counterfactual analysis is the determination of what would have happened if the interventionwas not put in place. It compares what actually happened and what would havehappened in the absence of the project intervention which could be achieved to a greatextent using a comparism group. Alkali (2010) further explained that counterfactualmeasure what would have happened to beneficiaries in the absence of the intervention,and impact is estimated by comparing counterfactual outcomes to those observed underthe intervention. According to the Wikipedia free encyclopedia, the key challenge inimpact Evaluation is that the counterfactual cannot be directly observed, but must beapproximated with reference to a comparison group. Impact analysis studies should ensure validity and this is a major problem faced by the researcher.

Entrepreneurs are motivated to adopt technical, advisory or extension services bythe actual or perceived benefits (Idisi&Ebukiba, 2010). In Agricultural and foodsecurity pursuits, even the so called rural farmers view the likely increased incomes andoutputs from any innovation as the motivating force. According to the United NationsEnvironment programme UNEP (2002) in their environmental impact assessment(EIA) training manual, impact analysis/ assessments are systematically determinedeffects of individual, group (organizational), local, state or national action usuallypredicted or measured during or after intervention. Impact analysis and assessment ofintervention are most often broadly discussed under environmental impact assessmentwhich most often is intended to include social, economic, cultural and healthparameters. These parameters, the manual further added can include effects on humanhealth and safety; flora, fauna, ecosystem and biological diversity; soil, water, air,climate and landscape; use of land, natural resource and raw material; protected areasand designated sites of scientific, historical and cultural significance; heritage, recreation, amenity asset; and livelihood, lifestyle and well being of those affected bythe proposal. Concluding, UNEP (2002) further documented that impact or effect canbe described as a change in an environmental parameter which results from a particularactivity or intervention. The publication further stated that change is the differencebetween the environmental parameter with the project compared to that without theproject.

2.8Animal Production Practices

Poor management system reduces the quantity and quality of animal productsand this has heightened the need for improved and sustainable animal managementsystems. Stall feeding has been advocated in areas with high livestock populationdensity. Paudel and Tiwari in FAO (1992) recommended that it is essential to considercomplete stall feeding in order maximize manure production. Similarly, the authorselaborated that animal production could be improved by timely supply of food andwater without wastage while straws as livestock

feed can be improved in quality bytreatment with urea, and by the practice of ensiling or otherwise preserving the summersurplus of grass and agricultural by products which could then be consumed during thefood scarcity period of winter.

The National Fadama Development Project manual NFDO (2003) manual notedthat livestock rearing could result to surface water contamination and soil erosion andtherefore suggested reduction in concentration of livestock through regulation ofnumber animals to be concentrated. The publication also reported that issues like overfishing could be mitigated through regulation and enforcement of recommended meshsizes, harvest rates and season of capture.In animal productions sustainable Agricultural practices according to Paudel andTiwari in FAO (1992) are those that promote systems in which there is efficient use ofnatural resources based on an understanding of the interrelationships within theprevailing ecosystem. These practices as reported by FAO may involve arable croppingsystem for example the three strata forage systems; food feed intercropping; relaycropping; and integrated pig-ducks-fish-vegetable system:

> *…..three strata forage system involves a first stratum ofgrasses and ground legume, second stratum of shrub legumesand a third stratum of fodder trees. Food-feed intercroppingstrategy is to integrate within the rice cropping pattern(intercropping and relay cropping) other feed producing cropsand forage crops without reducing the area of the land in usewhich aims to provide sustainability through involving thecomplementary role of crops and animals and also theutilization of appropriate forage crops provides fodder andcrop residue which are valuable both to ruminant and nonruminants……in relay crop a second crop is planted into thefirst before harvest which can extend the supply of feed,possibly throughout the year (Devendra and Pun, 1992).*

Devendra and fuller(1979) reported a sustainable system, which is widelypracticed in South East Asia and China which involves the integration of pigproduction with fish farming,

duck keeping and vegetable production. The systeminvolves the use of pond, which not only meets the needs of fish but also pig, duck and vegetable production. Sustainable practices involving tree cropping system for example integratedAnimal & tree crop and alley cropping have also been advocated. The advantages ofintegrated Animal and tree cropping system could include increased fertility throughrecycling of nutrients, weed and shrub control, reduced use of herbicides, reducedfertilizer wastage, provision of shade, easier management of plantation and distinctpossibilities of increased crop yields and animal product from the land. Alley croppingwhich is purely an Agro forestry practice has advantages which include maintenanceand promotion of soil fertility, supply fuel wood and also contribute to the developmentof all year round feeding system.

Devendra and pun (1992) report submitted that sustainable animal production isdependent on the choice and application of appropriate practical technologies whosesuccess to a large extent depends on size of land holding. On animal disease control anumber of techniques can be used to avoid or minimize contact with diseases orimprove resistance of animals to diseases. These measures according to World Bank(1995) report include good husbandry and sanitary measures, vaccination, breeding forresistance and vector control.These approaches will help to ensure good management and feeding practice,improve resistance of animals to disease and minimize or eliminate disease carriers.Different types of disease can be controlled by different methods.

On a more specific note, the publication of UOC (1997) stated that managementplanning in livestock husbandry will include enterprise calendar of operation, stockflows, labour needs, herd production record and land use plan to give the managercontrol and means of monitoring progress towards goals.In animal selection, the publication continued, capabilities and constraints suchas feed and forage source, landscape, climate, skill of manager must be consideredbefore selection. Feed cost can be kept to a

minimum by monitoring animal conditionsand performance and understanding seasonal variation in feed and forage quality onfarm plus optimal use of farm generated by- products. Reproduction will entail use ofgood quality germ plasm to improve herd performance, use of good genetic stock andadapting reproduction seasons to fit the climate and source of feed and forage to reducehealth problem and feed cost. Proper grazing management is also advocated which willinvolve adherence to stocking rate or carrying capacity and compromising between theconvenience of tilling large unfenced field and the fencing need of livestock operation.Livestock production systems that disperse stock in pasture so that wastes are notconcentrated and do not overwhelm natural nutrient recycling processes is beingadvocated in place of confinement of livestock within an area. Commenting on soilerosion by livestock, Harry (2008) noted that measures to reduce the risk involveprotecting the riparian zone by providing livestock fencing at vulnerable bank sides andthat cattle access to drinking in waterways should be managed to minimize disturbanceto the banks. Harry further stated that consideration should be given to the provision ofseparate drinking supplies away from waterways and concluded by revealing that anadded advantage of fencing off waterways is the reduced risk of contamination byfaecal micro-organism".

The World Bank (2003) manual of implementation of the Fadama projectsummarized best of sustainable practices to be observed in the project execution. Sustainable agriculture is rooted in two-fundamental principles, firstly, isthe basic understanding that changing from conventional high input practice toalternative practices required long term system review of agriculture. This means thatsustainable farm practices are not quick fixes for example instead of arresting animmediate problem (pests, diseases or weeds) with application of chemical, alternativesustainable approaches will employ techniques that will create environment where theweed, pest or disease can be minimized. Secondly, sustainable farm practices areinformation-based approaches that seek to enhance and harness the natural ecology ofthe

farming landscapes. This principle recognizes the responsiveness of sustainablepractices toward natural cycles and biological interaction being an integrated system ofpractices that promotes soil and plant health. Sustainable Agriculture and otherlivelihood skills have for long translated into sustainable development in somecountries.

Other livelihood skills have been identified within the Fadama regions of Nigeriaapart from Agriculture. This includes hunting, weaving, knitting, hat making, honeyproduction and snailery. However, for the purposes of this study attention will given tomicro livestock (snail farming, bee keeping) and hunting as representative of othersources of livelihood within the Fadama region. Heliciculture (snail farming) andApiculture do not exert as much negative impact on the ecosystem as do crop andanimal management practices. Specifically, natural resources like soil, water and airquality are by no significant measures affected, and as a result, the environmentalfriendliness of these livelihood practices (snail farming and apiculture) will limit theecological and environmental considerations of their sustainability to their suitability inFadama region. On bees for example, it has earlier been noted that the most significantcontribution of bees is not the production of honey, but the role they play in thepollination of plants while snails help feed on some household waste and also assist insoil aeration and organic matter decomposition. Based on the foregoing, possession ofrequisite skills and economic indices of sustainability will be utilized as the determinantfactors for sustainability of snail farming and apiculture, while considerations will begiven to hunting with regard to ecology and environment because of the obvious impactof game on crops and vegetation at large.

2.9 Review of Related Empirical Studies

Studies assessing impact of agricultural programmes on productivity, incomeand standard of living of beneficiaries abound with a few focusing on sustainability ofskills that result in increased productivity. Abdulahi (2003) carried out a study entitled“assessing the

impact of the Sokoto Agricultural and Community Development Project(SACDP'S) Micro-Credit Scheme on the welfare of beneficiaries". The study sought tofind out using empirical evidences the impact of SACDP/IFAD's micro-credit schemeon productivity/income of beneficiaries; the impact of the loan on employmentgeneration; the impact of the loan on the expenditure pattern of beneficiaries; and theimpact of the loan on gender equality. The researcher adopted descriptive researchdesign. The population sampled was 180 respondents drawn from nine localgovernment areas identified for intervention by the project with each local governmentarea represented by a village. Structured questionnaire was used as instrument for datacollection. Statistical tools employed for data analysis included frequency counts,percentages, mean and t-test. The findings of this study revealed that there was increasein total assets of beneficiaries as a result of increase in productivity/ income ofbeneficiaries. The study also revealed increased savings among male and femalebeneficiaries and generation of employment for many people noting that more malesparticipated in the scheme. Abdulahi also found out that the role played by Non-Governmental Organization and other international agencies like IFAD in creditdisbursement to small uncollateralized poor seem to have fared better as compared tothe Government Agencies established for that purpose and also reported generally thatthe loan facility impacted positively on their beneficiary. He recommended firstly thatthe failure of the formal financial sector to meet the needs of the majority of the poorcalls for thorough investigation on whether or not Government should abstain fromdirect financing of micro credit and secondly the need to make additional enquiries onwhether or not the beneficiaries of micro credit utilize the additional income to addressother aspects of poverty.

There is a relationship between this study and the present study in that both areimpact studies of agricultural interventions seeking to establish how the programmesfared in areas of productivity and income generation. There exist a gap to be filledbecause this study focused

only on output while the present study is concerned withacquisition of requisite skills in ruminant production that are sustainable which may have led to increasedlivestock production. It is in order to ascertain how the Fadama Users Associationsee their role and the extent to which they actually performed it that Akinola and Atala(2004) conducted a study entitled "Role Perception and Performance of Fadama Users'Associations (FUAs) under the National Fadama Development Project 1 in Kano andKaduna State. The study was aimed at reiterating the expected roles of FUAs under theNational Fadama Development Project (NFDP) arrangement; examining the roles theyactually perceived as their responsibilities; examining the roles they actually performedduring the period of the study; and determining the level of congruency between roleperception and performance of FUAs in the study areas. The study adopted descriptivesurvey research design. The population for the study was 43 randomly selected FUAsrepresenting 14% of the total number of FUAs registered in the two states under study.Primary data was collected through the use of structured interview schedule whilesecondary data were collected from Agricultural Development Project (ADP) offices inthe two states in other to identify the FUAs' roles. Descriptive statistics were used toanalyze the farmers' perception of their roles and the extent to which these wereperformed while ranking techniques was used to determine the level of congruencybetween role perception and role performance of the FUAs.

The study reviewed that majority of the Fadama Users' Association (FUAs)poorly perceived their role and so poorly participated in the management and decisionmaking of the project with the authority. The result is that the FUAs could not exerttheir influence, nor, contribute their indigenous creativity in shaping the decisions onmatters affecting their livelihood. They therefore recommended that workshops shouldbe organized at ward levels by extension agents of Agricultural Development projects(ADPs) to educate the FUAs to

have proper perception of their role so as to get theirknowledge inputs at all stages of the project implementation.

The relationship between this study and the present study is that both studies arefocused on the performance of the World Bank Fadama projects though at two differentphases/dimensions and also the fact that an understanding of the roles of thebeneficiaries as sought by the first study must have acted not only as the springboard onwhich the second phase took off but also a major contributor to the resounding successof the project in some states.There exists a gap to be filled because the research was a foundational study thatprovided some explanatory variables for success or failure of the project in due course.It was not designed to cover the major objective of the project which is to sustainablyincrease ruminant productivity/income of beneficiaries through the impartation of requisite skills.Adeolu and Taiwo(2004) studied the impact of the National Fadama facility inalleviating rural poverty and enhancing Agricultural Development in south westernNigeria. The purpose of this study was to assess the impact of the Fadama facility onthe participants in terms of their income, access to necessary enabling facilities andgeneral well-being. The researcher adopted descriptive research design. Altogether 100participants were randomly selected for interview. There was a baseline studyconducted by the Osun state Agricultural Development Project against which the stateof well being of the participant was compared after over six years of operation of theproject. Structured questionnaire and interviews were used as instruments for datacollection. Statistical tools employed for data analysis included frequency counts,percentages, mean and stochastic frontier function model which was used to ascertainthe level of efficiency of the participants. Results obtained from the study showed thatthe farm income obtained from Fadama cultivation increased about three times from#13,368.00 at baseline to #38,918.00 in the current season. The researchers thereforerecommended firstly that there is need to consciously encourage the youths into

theFadama farming through wide publicity of the potential of the facility in improving thewelfare of the participants and secondly that the training aspect of the programme needto be enhanced to enable the participants tap the most out of the project. Theresearchers therefore concluded that the Fadama project has the potential of alleviatingrural poverty.

This study is related to the present study because both are impact studiesfocusing on the Fadama project with particular attention to rural dwellers. Howeverthere exist a gap in this study in that the study focused on the end and not the means toan end, simply put, the study was centered on farmers output, income and well beingneglecting the sustainability or otherwise of skills adopted by the farmers.

Akpoko, Banta, Kudi and Usman (2008) conducted their own study on analysisof the impact of the National Fadama Development project II (NFDP II) in alleviatingpoverty among farmers in Giwa Local Government Area of Kaduna State. The specificpurposes of this study were to assess the extent to which participation in the programmehas enhanced the production efficiency of farmers; the impact of the programme on thesocio-economic status of the farmers; and identify the problems associated with theFadama programme in the area under study. The researchers adopted descriptiveresearch design. The population sampled was 60 Fadama farmers drawn from 4 localgovernment areas identified for the study with each local government area representedby a village from where 15 farmers were randomly selected. Structured questionnaireand personal interviews were used as instruments for data collection. Analytical toolsemployed for data analysis included frequency counts, percentages and stochasticfrontier production functions which incorporates technical efficiency model with usingthe maximum likelihood estimation (MLE). The findings of this study revealed thatfarmer's efficiencies are positively and significantly correlated with years of irrigationfarming, number of visits by extension agents, level of education, household size andownership of water pump; and that the programme had positive impact on theparticipating

farmers in income generation, enhanced access to farm input at subsidizedrate and increased training and knowledge of participants. They thereforerecommended that the scope of programme should be widened to incorporate otherFadama communities as a result of the success of the programme.

This study is related to the present study because both are impact studies centredon the Fadama project phase II and addressing the issue of poverty which is the majorobjective of sustainable Agriculture. However there exist gap in this study in that thestudy was limited to socio-economic context of the intervention with regard toparticipating farmers. There is need to look at the suitability of practices adopted forsustained socio-economic growth within the context sustainable livelihood practicesand codes of good agricultural conduct.

Okoh (2008) worked on the effects of Edo State Agricultural DevelopmentProject (EDADP) on improvement of rural farmers. The specific purposes of the studywere to determine the effect of EDADP on the farming practices of the rural farmers;find out the effects of the programme services of EDADP on farmers agriculturaloutput in crop production; determine the effect of EDADP on farmers income; and theeffect of adoption of modern farm technologies on farmers standard of living. Thestudy was carried out using a descriptive survey design. The population sampled was360 contact farmers and 108 extension staff which resulted to a total sample of 468.Questionnaire was the sole instrument for data collection. Data collected from therespondents were analyzed using mean, standard deviation and t- test statistics at 0.05level of significance. The study revealed that farmers have adopted the new farmingtechnologies introduced by the ADP, which included the application of fertilizers totheir crops, adoption of crop rotation, use of improved varieties of crops like maize,rice and cassava. Okoh recommended firstly that the rural farmers should befinancially aided both in cash and in kind especially with fertilizers, improved seeds,seedlings, insecticides, herbicides and other farm inputs and secondly that the farminputs should be

supplied at the appropriate time since it is counterproductive to supplythe inputs when the farming season is over.

This study is related to the present study because both looked into impact oreffect of agricultural intervention on rural farmers with particular reference to moderntechnology, productivity, income generation and standard of living. There exists a gapin this study in that the study was centered on adoption of technologies that can lead toincreased output without giving consideration to which practice is adjudged sustainableand which practice is not. This study was focused on farmers output, income and wellbeing and not ruminant production or otherwise of skills adopted by the farmers as in thepresent study.

A study conducted in Niger State by Jirji, Tanko and Ogundeji (2010)examined the impact of Fadama II Project on income of tomato farmers using theparticipating and non participating farmers approach. The study sought to ascertain theimpact the project has exerted on the income and livelihoods to form the fulcrum forpolicy formulation and evaluation. The researchers adopted descriptive survey researchdesign. The population for the study was 160 respondents comprising of 80 fromFadama II participating LGAs, and 80 from non participating LGAs. Structuredquestionnaire was used as instrument for data collection. Analytical tools employed fordata analysis included production function analysis and Chow's analysis of covariance.

The study revealed that the project exerted a positive and significant impact on theincome of the farmers and recommends improvement in irrigation facilities,introduction of improved varieties of tomatoes, strengthening relevant research andextension as well as formation of organized farmers associations.The two studies are related because both are impact studies that centered on theFadama project phase II and also, both adopted the beneficiaries and non beneficiariesmodel of impact analysis with focus on income generation which is a major facet ofsustainable Agriculture. However there exist gap in this study

because it was focusedon income generation among crop farmers and could not cover livestock aspect and the sustainabilitycontext of livelihood practices.

Idisi and Ebukiba (2010) conducted a similar study in Taraba state in which theycarried out a survey on "Beneficiary impact assessment of Fadama II on income andaccess to advisory services component of the programme. The study sought to ascertainimprovements in income level of Fadama farmers in Taraba state and to ascertainadvisory services available and level of patronage as a result of the programme. Theresearcher adopted descriptive research design. The population for the study was 450respondents comprising of 150 beneficiaries, 150 non beneficiaries living within thecommunity of beneficiaries and 150 non beneficiaries living outside the community ofbeneficiaries. Structured questionnaire, focused group discussion (FGD) and interviewswere major instrument used for data collection. Analytical tools employed for dataanalysis were the mean, propensity score matching, double difference technique andLarvene's F statistics.

The study confirmed the result of other researchers that there is a remarkableincrease in income of beneficiaries which spilled over to some extent to non beneficiaries living within the enclave. The study also revealed that demand drivenadvisory component of the programme is still at infancy stage of adoption and as aresult has not made any significant impact. They therefore recommended that theFadama III should lay more emphasis on income enhancing processes with the stateand local Governments picking interest in the paying off of advisory services bills.There exist relationship between the study and the present one in that both areimpact studies that focused on the Fadama project phase II and also, both adopted thebeneficiaries and non beneficiaries' model of impact analysis with variance in analyticaltools. Both works have income generation which is a major facet of sustainableAgriculture as a major concern. However there exist gap in this study because it

wasfocused on income generation and the scope could not permit it to delve into suitabilityof skills adopted in terms of their sustainability, which may have led to increasedproductivity/ income.

A critical look at the agricultural programme impact studies reviewed above showedclearly that they were focused on farmer's adoption of farm technologies (bothsustainable and unsustainable technologies), productivity, income generation andstandard of living. This study therefore seeks to bridge this research gap, by focusingon impact of Fadama II project on ruminant production skills acquisition amongrural farmers in Kaduna state. This work is a wholesome approachthat will, apart from its socio-economic concern, adds the dimension of the use of notjust skills but sustainable skills that will ensure food security in terms of meat production in Kaduna state and Nigeria as a whole.

2.10Summary of Reviewed Literature

The various studies reviewed have revealed the importance of ruminant production and livestock in general especially in Sub-Saharan region. In Nigeria rural farmers are target producers of foodstuffs and livestock despite their poor standard of living and subsistence type of farming. This is the result of conscious effort of various agricultural development programs initiated by government in collaboration with foreign donor agencies. Fadama project was introduced to assist rural farmers in crop and livestock especially ruminants, through provision of quality pasture and forages. Six empirical studies were reviewed and revealed that collective action through participation in various agricultural programs help to overcome most of the problems farmers may encounter. The studies also revealed that ruminant production is an important aspect in promoting the standard of living of rural farmers. The studies were analyzed using means, percentages, regression analysis, Z-test, gross margin analysis and some other forms of descriptive statistics. Similarities and differences between the reviewed studies and the current were also identified.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter presented the methodology under the following sub-headings:

3.1 Research Design

3.2 Population of the Study

3.3 Sample Size and Sampling Procedure

3.4 Instrument for Data Collection

3.4.1 Validation of Instrument

3.4.2 Pilot Study

3.4.3 Reliability of Instrument

3.5 Procedure for Data Collection

3.6 Procedure for Data Analysis

3.1 Research Design

The research design used was descriptive survey research design.

3.2 Population for the Study

The population for the study includedall the registered Fadama II project participants and non participants.

3.3 Sample Size and sampling Procedures

The sample size for the study was drawn from the sample frame of the registered World Bank assisted Fadama II project and the non registeredmembers.A stratified random sampling procedure was used to select 240 respondents from the sample frame of the registered participants from four local government areas of Giwa, makarfi, Soba and ZangonKataf. A Proportionate sampling was used for each local government area to select respondentsbecause of the closeness of the population size. Also, 160 non participants wererandomly selected from four local government areas proportionately. This gave a total sample size of400

respondents comprising both participants and non participants of Fadama II World Bank assisted project.

Table 3.3.1 Sample size for the study

Local Government Areas		**Sample size**	
Sample frame		**No. of Participants**	**No. of non-participants**
Makarfi	300	60	40
Giwa	230	60	40
Soba	175	60	40
ZangonKataf	135	60	40
Total	**840**	**240**	**160**

Source:*Kaduna State Fadama Development office (2007)*

3.4 Instrument for Data Collection

A questionnairecontaining section A, B and Cwas used as instrument to collect data. Each section consisted of questions based on research questions. Section 'A' comprised of respondents' bio-data, Section 'B' focused on farmers' livestock/crop production, income and socio-economic characteristics while Section 'C' contained questions on the major problems encountered by participants of the project.

3.4.1 Validation of the Instrument

In order to ensure the facevalidity of the instrument, the researcher gave the instrument to two senior lecturers who are experts in the field of Agricultural Education Section of the Department of Vocational and Technical Education, Ahmadu Bello University, Zaria as well as three other principals and specialists from Kaduna State Fadama Development Project. The instruments were restructured in line with their suggestions.

3.4.2 Pilot Testing

A pilot study was carried out in Soba town among 20 farmers located within the study area. These farmers were divided into two equal groups of participants and non participants. They were provided with Fadama II information, and questionnaire was administered to them.

3.4.3 Reliability of the Instrument

Equivalent form reliability method was used to determine the internal consistency of the respondents. The groups were further divided and the instrument was administered concurrently. The results were analyzed using Spearman Brown correlation coefficient to ascertain the reliability of the instrument. The reliability coefficient got was 0.81 which shows that the instrument was reliable (Dehejia and Wabah, 2006).

3.5 Procedure for Data Collection

Data were collected with the use of questionnaire. The questionnaire wasadministered by the researcher with the help of research assistants. Since most farmers cannot read and write in English, the instruments were read and translated in local language (Hausa). The research assistants with experience in data collection were chosen from staff of KADP. A period of one month was scheduled for the data collection exercise. The respondents were reached through the village headsthat assisted and mobilized them. Follow up visits were done by the researcher for respondents that were not available in the first visit. Some respondents were replaced because of incapability and death by others who were randomly chosen from the frame accordingly. The sessions were carried out in all the LGAs under research.

3.6 Procedure for Data Analysis

In analyzing the data collected, the bio-data of the respondents was analyzed using pie-chart and bar chart while descriptive statistics were used to analyze objectives 1, 2 and 3. Null hypothesis was tested using Z-test. The Z-test was selected because it involves dealing with problems relating to large sample when 'n'>30(Razaq&Ajayi, 2000). The null hypothesis was tested at 0.05 level of significance.

3.6.1 Multiple Regression Analysis

This was used toanalyze objective (i) that is to determine the influence of Fadama Phase II Project on farmers' level of livestock production and income. Regression Analysis is useful in estimating the contributions of each variable to the dependent variable to determine the best variable predictive of livestock production and income by farmers and effects (Razaq&Ajayi, 2000). The model is specified as:

$$Y = \beta_o + \beta_{o1}X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \text{----------} + \beta_{10}X_{10} + e.$$

Where:

Y = livestock output/income.

X_1 = Herd size (Numbers)

X_2 = Feed (kg)

X_3 = Labor(man-days)

X_4 = Drug (mg)

X_5 = Farmers' age (years)

X_6 = Level of education (Number of years in formal schooling)

X_7 = Household size (number in household)

X_8 = Amount of credit received (actual amount received ₦)

X_9 = Membership of association (years of membership of associations)

X_{10} = Extension contact (number of visits)

e = error term

3.6.2 Descriptive statistics

Descriptive statistics was used to achieve objective 1, 2 and 3 of the study. It involves the use of measures of central tendency such as mean, frequency distribution, graph, pie chart, coefficient of variation and percentages (Razaq&Ajayi, 2000).

3.6.3 Z- test Statistic

The Z-statistic was used to test hypothesis of the study.

The specific expression used to determine the z-statistic is as follows:

$$Z = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{S_1}{n_1} + \frac{S_2}{n_2}}}$$

Where:

Z = calculated z value

$\overline{X}_1$ = mean value of participants output/income

$\overline{X}_2$ = mean value of non-participants output/income

S_1 = standard deviation of participant output/income

S_2 = standard deviation of non-participants output/income

n_1 = sample size of participants

n_2 = sample size of non-participants (Razaq&Ajayi, 2000)

Decision rule:

The null hypothesis was rejected when the critical value was less than the Z- calculated value ($P< 0.05$) and the hypothesis was accepted when the critical value was greater or equal to the Z- calculated ($P\geq 0.05$).

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

In this chapter, the researcher presented the results of data collected for analysis and discussion. The presentation was done under the following headings:

4.1 Socioeconomic characteristics of the respondents

4.2 Influence of socioeconomic and institutional factors influencing Fadama II project farmers' Level of ruminant production

4.3 Input and Output level used in ruminant production

4.4 Constraints encountered by the participants of the project

4.1 Socioeconomic characteristics of the respondents

4.1.1 Age of the respondents

Data presented in Figure 2 represent the distribution of the respondents by their ages. Majority (51%) of the farmers were within 40-49 years with a mean of 52 years. This implies that, the farmers are strong, agile, and active and can participate adequately in farming activities. The age distribution is expected to have positive influence on the respondent's participation in ruminant production. Abdullahi (1995) argued that age, in correlation with farming experience, has a significant influence on the decision making process of farmers with respect to risk aversion, adoption of improved agricultural technologies, and other production-related decisions. It has also been found to affect the rate of household adoption of innovations, this finding is in line with Richard (1997) noted that age may be associated with accumulation of skills, more experience and accumulation of assets thereby allowing the household to diversify into more remunerative non-farm activities while maintaining small ruminant and food production for own consumption.

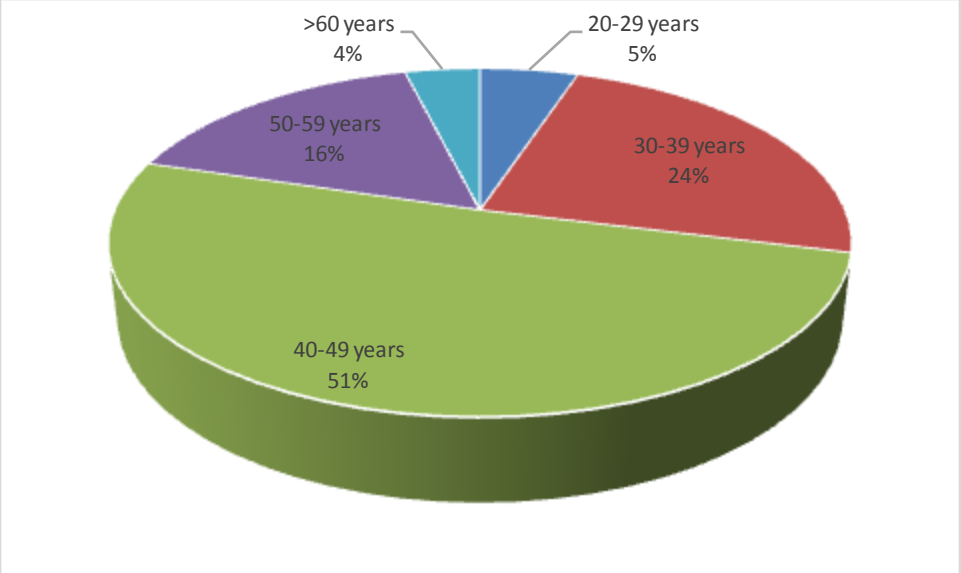


Fig.2: Age of respondents

4.1.2 Household size

Figure 3 shows the distribution of ruminant farmers by household size. The larger proportion of the respondents (30%) had household size that ranged from 6-10 persons. The average household size was 7 persons implying that there is appreciable number of family labour supply to accomplish various farm operations. According Adams (2002), there is a positive and significant relationship between household size and farmers' efficiency in production. However, the absolute number of people in a certain family cannot be used to justify the potential for productive farm work. This is because it can be affected by some important factors such as age, sex and health status. Essentially, it is the composition of the household that determine labour supply for the accomplishment of farm operations.

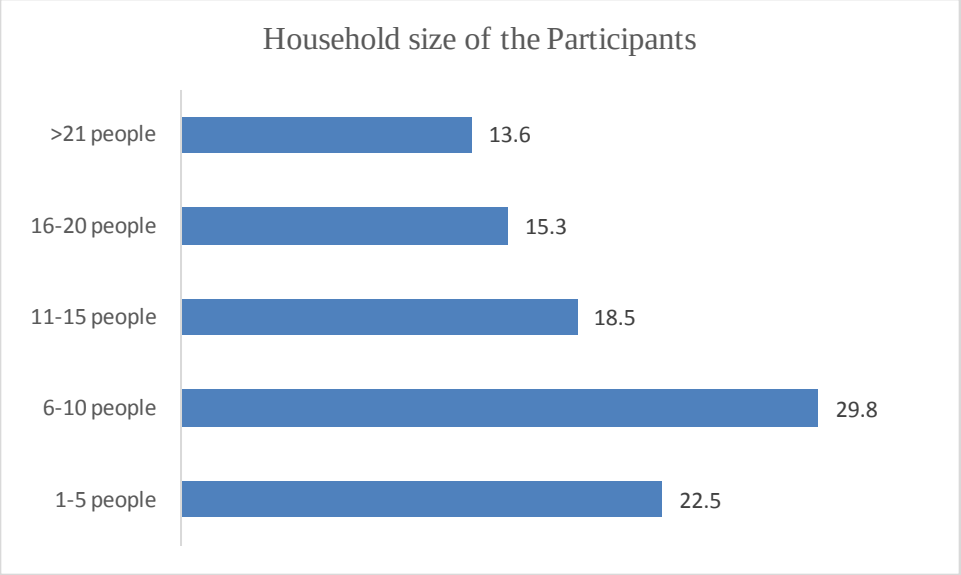


Fig. 3: Household size of the respondents

4.1.3 Marital status of the respondents

More than two-third (88%) of the respondents was married, 10% was single and 2% was divorced. The significance of marital status on agricultural production and livelihood activities can be explained in terms of the supply of agricultural family labour. It is expected that family labour would be more available where the household heads are married (Akuezuilo, 1993). Marital status may influence the size of households as married farmers may have larger household sizes which may increase consumption expenditure thereby making them more prone to food insecurity.

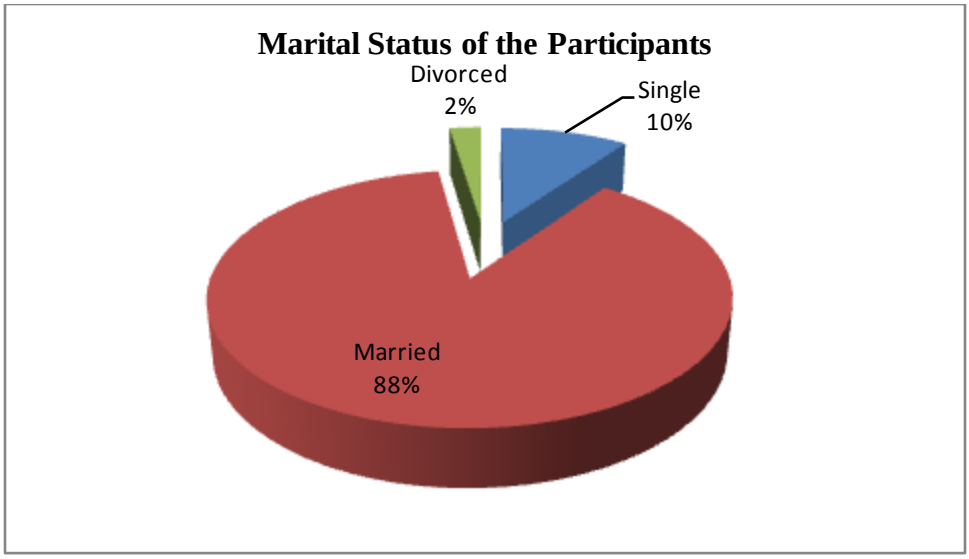


Fig. 4: Marital status of the respondents

4.1.4 Sex of the respondents

Sex is social differentiation of an individual into either muscularity or feminity. It is an important variable as far as participation in agricultural programme is concerned depending on the geographical location. As shown in fig.4 the majority (78%) of the respondents are males while 22% are females and involved in fadama project. This means that males are more involve in agricultural programme especially in the study area than females. This finding is in agreement with those of James (1993) who posited that male dominancy in livestock production is due to the labourious nature of livestock farming operations.

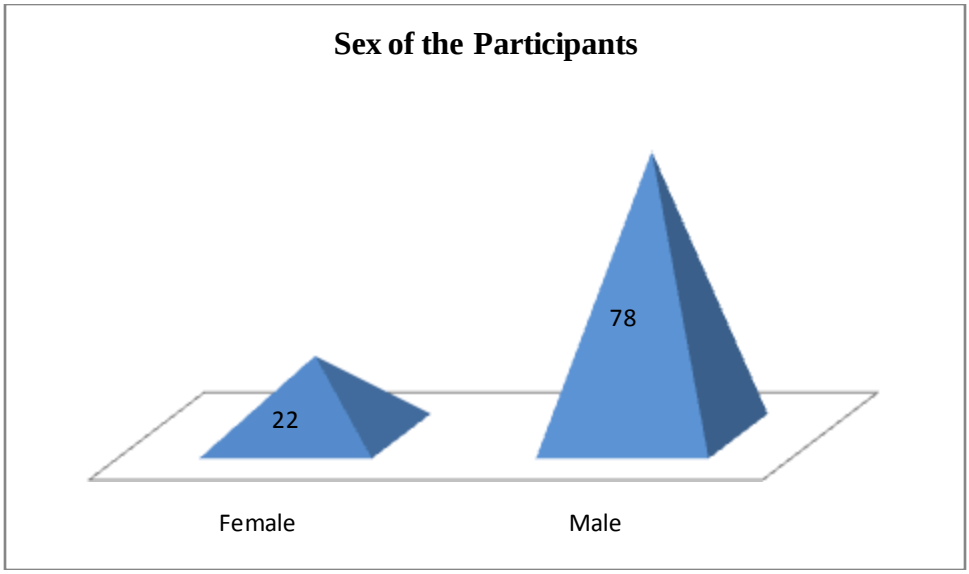


Fig. 5: Sex of the respondents

4.1.5 Access to credit of the Respondents

Adequate funding is required by farmers to finance all livestock production activities. However, a large number of farmers face serious shortage of funds to finance their livestock production activities, which in turn limits their level of production. They obtained their funds through formal and informal sources as presented in figure 5. The result presented in figure 5 shows that 57% of livestock farmers had access to credit less than ₦100,000 with the minimum and maximum amount of ₦20,000 and ₦500,000 respectively. Abdullahi (2003) asserts that credit is a very strong factor that is needed to acquire or develop any enterprise; its availability could determine the extent of production capacity. It also agrees with findings of Jay (1993) who noted that access to micro-credit could have prospects in improving the productivity of farmers and contributing to uplifting the livelihoods of disadvantaged rural farming communities.

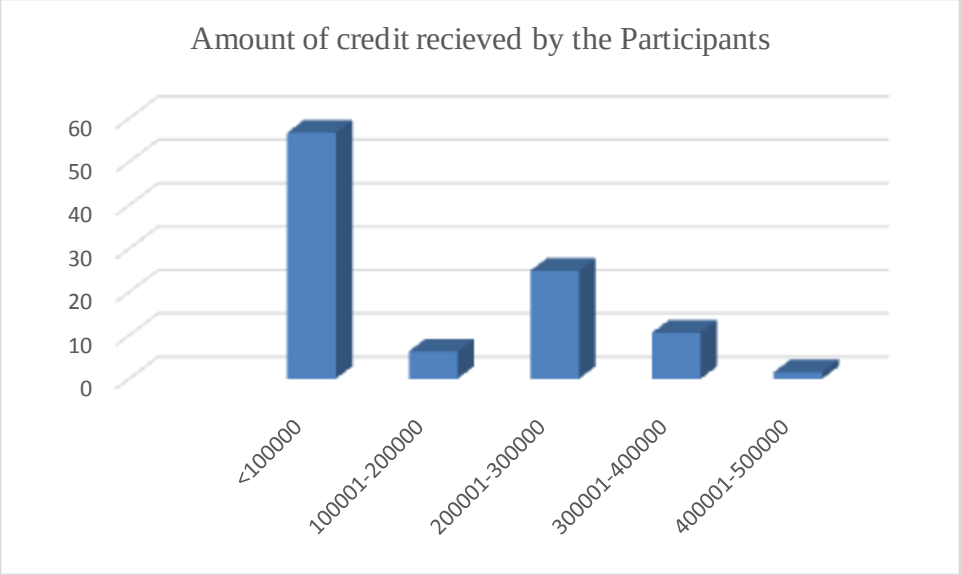


Fig. 6: Access to credit of the respondents

4.2 Influence of socio-economic and institutional factors on ruminant productionlevel inFadama phase II project

Herd size was positive and statistically significant at 1%. Herd size of the farmers herds being significant at 1% indicates that increase in herd size will result to increase in output and vice versa. This suggests that one percent increase in the number of herd size will increase their output by 17 percent *ceteris paribus*. Hence, herd size had an increasing influence on output of the ruminant farmers. This finding is in line with Abokede (2005) who reported that stocking density was positively related to the output of ruminant farmers in Lagos State but was however not significant. This is in line with a priori expectation. The output of ruminant farmers with greater number of swine is bound to have more output given the same enabling environment for production (Adedokun,2011).

The coefficient of age (-0.0021) in ruminant production was negative and significant at 1 % level of probability. This shows that increase in age in ruminant production would be reduced. Farmers' age could be associated with skill accumulation which could enhance productivity and resource allocations thereby reduce technical inefficiency. The age distribution is expected to have positive influence on the respondent's participation in

ruminant production, which invariably means better efficiency in production. This finding is similar to that of Adedokun, (2011) which observed that youth constitute the majority of the ruminant farmers in the study area. This result is also in line with the findings of Bello, (2000) which observed that youth constitute the majority of the ruminant farmers, and younger farmers are more flexible to new ideas and risk; hence they are expected to adopt innovations more readily than older farmers.

The estimated coefficient of education (-1.671) indicates that the educational status of the ruminant farmers was negatively related to ruminant production and statistically significant at 1% probability level. This implies that a unit increase in the education of the ruminant farmers will increase their output by 1.671 magnitudes. Therefore, the more educated the ruminant farmers, the better will be their managerial ability in handling the operations of their ruminant farms and also, education enhances their ability to acquire technical knowledge with respect to adoption of technologies geared towards increasing their output. Therefore, the educational level of the ruminant farmers can be exploited as an important policy variable towards enhancing the reasonable output in the study area. The level of farmers' education is believed to influence the use of improved technology in agriculture and, hence, farm productivity. According to Bynner (2016) education is an important socio-economic factor that influences farmers' decision making because of its influence on farmers' awareness, perception and adoption of innovations that can bring about increase in productivity.

The estimated coefficient of membership of cooperative (-0.011) was negative and significant at 1% level of probability. The negative coefficient for membership implies that membership of association reduces technical inefficiency in ruminant production. Membership of association could afford farmers the opportunity of sharing information on modern farming practices by interacting with other farmers. Neil (1995) noted that the

reduction of inefficiency effects through farmers belonging to cooperatives is linked to cooperatives being a source of good quality inputs, information and organized marketing of products. Asika, (1991) observed that membership of cooperative societies has advantages of accessibility to micro-credit, input subsidy and also as avenue in cross breeding ideas and information.

Table 4.1:Regression analysis showing influence of socio-economic and institutional factors on ruminant production in Fadama II project

Variables	**Coefficients**	**Standard error**	**T-Value**
Constant	4.661	0.299	15.615***
Labour	0.021	0.041	0.506
Subsidy	0.040	0.016	2.445***
Herd size	0.170	0.061	2.779***
Age	-0.0021	0.0007	-3.088***
Education	-1.671	0.641	-2.606***
Household size	0.004	0.003	1.544
Cooperative association	-0.011	0.004	-2.573***
Extension contact	-0.004	0.228	-0.015
Credit	5.46E-07	6.19E-06	0.088

*** P<0.01 ** P<0.05 and * P<0.1

4.2.1Influence of socio-economic and institutional factors on ruminant farmers' level of income inFadamaphase II Project

Economic logic would suggest that well informed small scale ruminant farmers will not voluntarily enter into *Fadama* phase II project unless they believe there will be benefits. However, the actual effect of participation in the programme scheme may be negative because of misperceptions of lack of information. But evidence from studies revealed that successful programme generally influence positively on the output and incomes of farmers who are participants in the scheme.

Livestock rearing is a common practice in rural Nigeria. A notable factor influencing income generated from livestock productions' monetization includes being a member of social groups and associations (cooperatives in particular) since this provides an avenue to showcase one's prowess and skills through participation in regular meetings and getting to

know the financial needs and positions of members. Also, the issue of social capital in the form of trust and family ties confers some degree of confidence in those ready to shoulder the financial needs of these ruminant farmers in anticipation of a handsome reward after the sales of these ruminants.

The result of the Ordinary Least Squares (OLS) regression estimates of the factors influencing *fadama* phase II project on ruminant farmers' level of income is presented in Table 4.2. The adjusted R square of 0.48 implies that 48 percent in the variability in income of *fadama* phase II project ruminant farmers in the study area is explained by the explanatory variables (labour, feed, drug, herd size, age, marital status, household size, extension contact, cooperative membership, credit and farming experience) specified in the model. The F statistics of 16.709 is statistically significant at 1% probability level and this indicates the joint significance of the specified variables on the factors influencing ruminant farmers' income in the study area suggesting that the model has a good explanatory power on the variation in the model. The factors that had significant influence on income were feed; herd size, education, household size, extension contact, cooperative membership and credit while labour, drug, age, marital status and farming experience were not statistically significant.

The result in Table 4.2 revealed that the coefficient of costs of feed (-0.055) included in the factors influencing *fadama* phase II project on ruminant farmers' level of income carried the expected *a priori* signs which support the hypothesized theory that cost items are expected to bear a negative sign. This result showed that a unit decrease in prices of feed will lead to increase in the net margin of ruminant farmer's income. This result is in line with Oladimeji*et al.*, (2017) that found these variables a determinant of income in Kwara State, Nigeria.

The estimated coefficient of herd size (0.293) was positive and statistically significant at 1% level of probability. This implies that a unit increase in number of herd size in the

production will lead to 29.3%t increase in farmers income, all things being equal the herd size is inelastic to changes in the number of ruminant animal used. The significance of herd size is however, due to the fact that herd size determines to a large extent the number of output obtained.

Education (0.367) was found to be positively related to profitability and significantly had a direct influence to profitability in livestock production at 10% level of probability. This implies that the higher the level of education of the respondents the higher the level of profitability in livestock production. Also a plausible explanation for this is that higher educational level leads to higher rate of improved technology and techniques of production adoption. Educated farmers are likely to be more successful in gathering information and understanding new practices and marketing information on their produce. This finding is in line with Daramola (1992), education has a positive and significant impact on farmers' efficiency in production. Thus, literacy level will greatly influence the decision making and adoption of innovation by farmers, which may bring about increase in productivity and profit.

Household size was found to have negative coefficient (-0.134) and statistically significant at 10% level. This implies that a unit increase in number of household will decrease the farmer's income by 13.4%. This finding is at variance with Henry (1993), there is a positive and significant relationship between household size and farmers' efficiency in production. However, the absolute number of people in a certain family cannot be used to justify the potential for productive farm work. This is because it can be affected by some important factors namely; age, sex and health status. This shows that a reasonable number of the respondents have a large household size. Higher household size provides enough persons for family labour and less money will be needed to pay for hired labour.

Membership of cooperative had a positive coefficient (0.042) and statistically significant at 10% level of probability, this implies that a unit increase in cooperative

membership will result to increase in farmer's income since cooperative provides an avenue to showcase one's prowess and skills through participation in regular meetings and getting to know the financial needs and positions of members. The effect of this result is that most of the livestock farmers in the study area will enjoy the assumed benefits accrued to co-operative societies through pooling of resources together for a better expansion, efficiency and effective management of resources and for profit maximization. Ekong (2003) stated that membership of cooperative societies have advantages of accessibility to micro-credit, input subsidy and also as avenue in cross breeding ideas and information.

Credit had a positive coefficient (0.901) and significant at 10 percent level of probability. This implies that as the farmer continues to obtain more credit the profitability of livestock production would tend to increase by 90%. This is in line with priori expectation of the amount of credit obtained. This could be attributed to the fact that project linked the farmers to credit institution. Lee (2007) asserts that credit is a very strong factor that is needed to acquire or develop any enterprise; its availability could determine the extent of production capacity. It also agrees with findings of Jay (1993) who noted that access to micro-credit could have prospects in improving the productivity of farmers and contributing to uplifting the livelihoods of disadvantaged rural farming communities.

Table 4.2: Factors Influencing Ruminant Farmers' Income

Variable	Coefficient	Standard error	t-value
Constant	0.850	0.090	9.427***
Cost of Labour	0.893	1.103	0.809
Cost of Feed	-0.055	0.032	-1.719*
Cost of Drug	0.934	0.816	1.145
Herd size	0.293	0.083	3.530***
Age	0.014	0.918	0.015
Marital status	-0.009	0.0082	-1.117
Education	0.367	0.125	2.935***
Household size	-0.134	0.032	-4.082***
Extension	3.693	2.081	1.774*
Cooperative	0.042	0.022	1.908*
Credit	0.901	0.186	4.837***
Farming experience	0.020	0.034	0.604
R^2	0.533		
R^2 adjusted	0.481		
F-value	16.789***		

*p<0.1; ** p<0.0 5 and *** p<0.0 1

4.3 Input and Output level used in Ruminant Production

The summary statistics of level of inputs used and output realized for both participant and non-participant of World Bank assisted programme in *fadama* phase II project on promoting ruminants production by farmers are reported in Table 4.3. The inputs that were used in ruminant production include; herd size, feed, labour and other parameters such as age, household size and access to credit. Table 4.3 reveals the mean herd size for participant was 78 herds and 56 herds for non -participant. However, after estimation the results show that difference exists between the number of herds of the participating farmers and non-participating famers in the study area.The standard deviation and coefficient of variation of the non-participant were higher than participant, this high coefficient of variation of herd size implies high level of variation in the use of different breed and species ruminant animal used

by the farmers. The wide variation in herd size used by the farmers could be attributed to the fact that they differ in purchasing power and size of production.

The species of animal used (cattle, sheep and goat) for both participant and non-participant farmers as well as their age and household size were low. The lower the ratio of standard deviation to mean return, the better your risk-return trade-off. The lower the coefficient of variation, the smaller the residuals relative to the predicted value and this is suggestive of a good model fit. This finding is in line with Johnson and Welch (1939) and cited in Oladele (2011) reported that for a normal distribution, the ratio of mean to standard deviation should be of order of three or more. They mentioned that 33 percent is often stated as the permissible upper fiducially limit of coefficient of variation.

Roughages, labour and credit were found to have high coefficient of variation, this implies high level of inconsistencies among the participant and non-participants in accessing credit facilities. Hence this could be attributed to participation in the project, where technical knowledge, credit and inputs were provided for the participants. Higher income helps small scale farmers in their predicaments thereby influencing them to participate in *fadama II* project where they are linked to source of income, improved seeds and breed of ruminant and training on best agronomic practices, which increase their farm income as well. This finding is in line with Oladele (2011) which revealed that *Fadama*II development project has had a positive impact on the participating farmers in Giwa Local Government Area, where access to farm inputs of the participants was enhanced and farming knowledge was increased.

Furthermore, this result shows that agricultural production in the study area is of small scale and labour intensive. This may not help the country in attaining protein sufficiency as greater proportion of farmers produce below average. The instability in output of the production could be attributed to inconsistency and inadequacy of variable inputs among farmers in the study area.

Table 4.3: Input and output level used Inthe production

	Participant			Non-participant		
Variables	**Mean**	**Std. Dev.**	**C.V**	**Mean**	**Std. Dev.**	**C.V**
Herd size	56.00	26.8	47.9	78.00	62.56	80.2
Cattle	18.00	6.304	11.25	15.00	13.98	17.9
Sheep	32.00	15.296	27.3	45.00	15.36	19.7
Goat	26.00	14.84	26.5	40.00	15.22	19.5
Roughages	490.47	881.10	1573.4	684.00	762.12	977.1
Concentrates	24.45	18.22	32.5	2.21	1.97	2.5
Age	40.40	15.23	27.2	46.53	12.98	16.6
Household size	7.00	4.74	8.5	11.4	5.73	7.3
Credit	2.53E4	45492	81235.7	110670	144183	184850

4.3.1 Estimated Distribution of Ruminant Production

The low productivity of the livestock sector is one of the major reasons why only small amounts of food of animal origin are available for human consumption in Nigeria. In order to keep pace with human population growth, and so avoid declining self-sufficiency ratios and rising import bills, the output of livestock products in sub-Saharan Africa and Nigeria in particular would have to increase by at least 2.6 percent per annum over the next decade. While expansion of the livestock population can contribute to the necessary increase in output, increases in animal productivity are also necessary. The result in Table 4.4 revealed current study focused on ruminants because cattle and small ruminants (sheep and goats) will continue to be the region's predominant livestock, as they constitute approximately 72 percent and 16 percent respectively to the region's total livestock resources, expressed as Tropical Livestock Units (TLUs).

More than two-third of all ruminant livestock in the study area are kept by the participants while non-participants account for one-third. The lead species numerically in the arid zone are goats and sheep, followed by cattle. Although the lower rainfall areas of the study area (500 to 750 mm rainfall per year) are best suited to grazing, livestock production in this area is usually a component of mixed smallholder crop-livestock systems. Cattle are the lead species due to their bulk density of 0.7, followed by goats and sheep of 0.1.

According to Jaccard (1994) the potential for livestock production is high in the humid zone; it is not an important economic activity here because of disease constraints, primarily the predominance of trypanosomiasis.

Table 4.4: Estimated distribution of cattle, sheep and goat

Variables	Participant Frequency	TLUs	%	Non-participant Frequency	TLUs	%
Cattle	201	140.7	45.5	117	81.9	69.1
Sheep	808	80.8	26.1	212	21.2	17.9
Goat	880	88.0	28.4	154	15.4	13.00
Total	1889	309.5	100	483	118.5	100

Source: Field survey, 2017

4.3.2 Income Distribution of Participant and Non-participant *fadama* II farmers

The viability of an enterprise is indicated by the amount of profit realized per period of time. Income is the difference between the monetary value of goods produced and the cost of the resources used in their production. The amount of revenue realized and operating cost of a business venture determines how much gain or loss the enterprise can achieve within a certain period.

The result presented in Figure 7 shows the income distribution of participant and non-participant. The minimum and maximum income for participant ranged between ₦95, 000 and ₦3,000,000, while the income for non-participants ranged between ₦78,000 - ₦1,500,000. The mean annual income of participants (₦ 450,600) is higher than the mean annual income of non-participant (₦280, 800) which implies that *fadama* II project participant realized higher income than non-participant. This difference in income of the participating and non-participating farmers could be attributed to participation of the participants in the project, where technical knowledge, credit and inputs were provided for the participants. The result reveals that commercial banks are less patronized for financial support for farming in the study area. This may be due to avoidance of high interest rate on

collected loan. Jay (1993) asserts that credit is a very strong factor that is needed to acquire or develop any enterprise; its availability could determine the extent of production capacity. According to Rodney (1987), access to credit provides the farmer with a means of expanding and improving his farm. It also determines the ease with which he adopts new practices and technologies in his enterprise. Therefore, lack of credit facility will have a negative effect on profit efficiency.

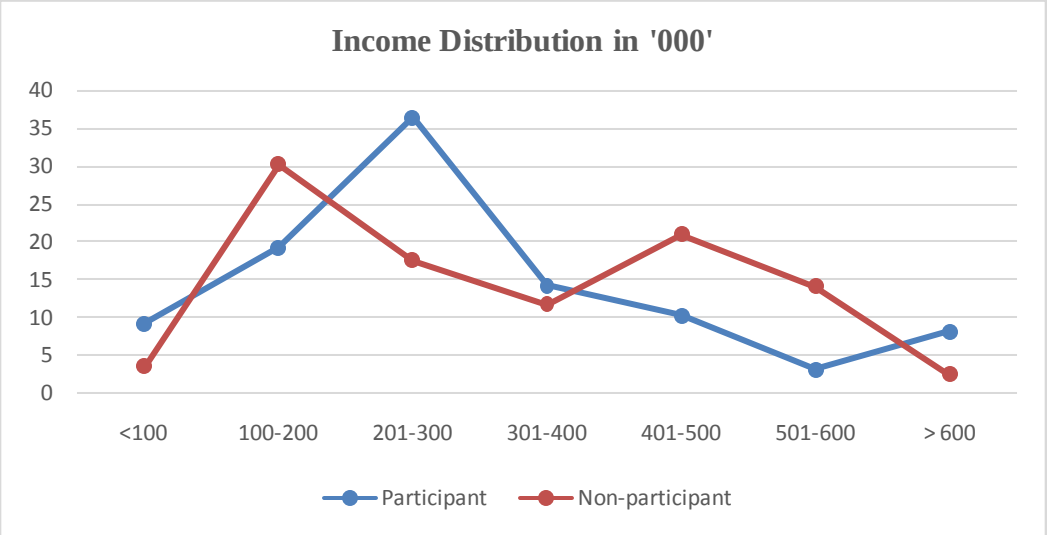


Figure 7: Income distribution of participant and non-participant *fadama* II farmers

Hypothesis

The result of the Z test shows a significant difference between the income status of participant and non-participants (Table 4.5). The mean annual income of participant (₦ 450,600) was higher than the mean annual income of non-participants (₦280, 800), which implies that *fadama* II project participants realized higher income than non-participants, and it is significant at 5% level of probability. This implies that there is significant difference between the incomes of participants and non-participants. Therefore, the null hypothesis is rejected and the alternative accepted. The result of the analysis indicates that there is a significant impact of participation in *fadama* II project on ruminant farmers' income.

Table 4.5 result of z-test showing significant differences between participant and non-participant income

Variable	Participant income(₦)	Non-participant income (₦)
Mean	450600	280800
Standard deviation	43386452.39	48865672.34
Observations	240	160
Pearson Correlation	0.76	
Hypothesized Mean Difference	0	
Df	346	
z Stat	-4.31	
P(Z<=z) one-tail	0.00	
z Critical one-tail	1.66	
P(Z<=z) two-tail	0.00	
z Critical two-tail	1.96*	

*P<0.05

4.4 Constraints Encountered by Participants of the Project

The constraints faced by participant in the study area were ranked according to the magnitude as stated by the farmers (Table 4.6). Pests and diseases were the major constraints of ruminant farmers with about 85% of farmers attesting to this fact. Ruminant diseases remain a veritable threat to the animal production industry. Animal products are constantly under threat from diseases that affect ruminant and hence reduce productivity. This finding is in line with Wimmer, (1987) noted that endemic animal diseases such as helminthosis, contagious bovine pleuropneumonia (CBPP), brucellosis, mastitis, peste des petits ruminants (PPR), and many others have devastating impacts upon the animal industry, leading to losses of hundreds of millions of dollars every year in developing economies like Nigeria (Oladele,Subair, &Thobega, 2011). The poultry industry is even more devastated by viral infections such as Newcastle disease and Infectious bursal disease (Gumboro), in spite of several attempts at vaccinations. Some of the reasons for these may be vaccine failure and the involvement of quacks in fighting these endemic animal diseases in the country Armstrong,Waycott, &Langan, 2011)

Lack of access to veterinary services (82.1%) was ranked second major constraints of the participants. A plausible explanation is that most animal production activities are located in rural areas, or remote areas inaccessible to proper veterinary services and many that are accessible, find the high cost of veterinary services prohibitive. Hence, they resort to easily available quacks that wreak havoc on the animal industry by using expired vaccines, fake drugs and wrong prescriptions for treating diseases.

An inadequate extension service (61.7%) was ranked third as a major constraint to the farmers. In Nigeria, the number of qualified agricultural extension workers is grossly inadequate to make meaningful impact on the economy. In some remote areas, such extension services are lacking completely and farmers are left to use their traditional knowledge to improve animal productivity. One of the greatest challenges of extension services in Nigeria in spite of the intervention of a World Bank assisted project is the inability to secure the commitment of government and mobilizing local funds to sustain the service. Similarly, about 45.4% of the respondents reported poor road infrastructure as a constraint. The existence of poor road infrastructure will inevitably impact negatively on the competitiveness of African agriculture through increasing internal transport costs. Due to poor road network in our rural communities, the farmers found it very difficult to bring their agricultural products to the market especially during rainy season. The implication is that the farmers dispose of their products at ridiculously low price and are at the mercy of middlemen. Movement of animal products from production to consumption points requires good transport networks that do either not exist or in very bad shape in the Nigerian context.

Water accessibility (42.5%) is ranked the fifth constraint. Water covers almost 98% of the molecules in the animal organism (NRC, 2001). It is distributed throughout the body including extra and intracellular fluids, which contains respectively, from 31 to 38% and from

62 to 69% of the overall body water. It is also considered the most abundant and vital chemical substrate of all living beings (NRC, 2007). This abundant chemical substance is already scarce for more than a billion people on the planet. If urgent measures are not adopted, one-third of the population may be without suitable water for consumption by 2025 (UNESCO, 2006). This possibility of water shortage also affects livestock, and therefore all procedures involving water use in animal production must be reviewed.

Gherman*et. al.* (2010) found out that Water quality is presented by a set of physical, chemical and biological characteristics. There is a set of criteria and standards for water quality that changes according to the purpose (human watering, domestic use, animal watering, recreation, industrial use, agricultural use, environmental maintenance and others). Water quality is extremely important for the animal, not only for ingestion (and consequently for feed intake and productive performance), but also for animal health because water can be an important vehicle for chemical, physical and biological contaminants, which should be avoided due to the damage they cause to animals.Accessibility of water is a major limiting factor to small ruminant production in the study area as animals have to trek great distances to get drinking water or a large amount of money must be used to buy water to feed the animals, this may be unrealistic in the long run as a huge amount of money would be required to buy water which in the end may make the business not to be cost effective.

Cost of feed supplements ranks the sixth in the list of constraints in the study area having 36.9%.Feeding high-producing ruminants continues to challenge dairy farmers and nutritionists. Also, dairy profit margins vary as milk prices and feed costs shift yearly. Feed supplement costs represent the largest input cost to produce milk (estimated to be 35 to 50 percent). Feed additives are a group of feed ingredients that can cause a desired animal response in a non-nutrient role, such as pH shift, growth, or metabolic modifier (Hutjens, 1991). Several feed additives contain nutrients, such as sodium in sodium bicarbonate or

protein in yeast culture. The cost of buying feed supplements, the technical knowhow of the right supplement and the knowledge of the right ratio of feed/ supplement is posing constraints to ruminant production in the study.

Fodder regeneration is the seventh constraint in the list of constraints to ruminant production in the study area with 36.4%. Overgrazing can have devastating environmental implications. When we combine it with other hazards like overpopulation and urbanization, it can spell the end of sustainable life on earth.There are many causes of overgrazing. Some of these causes are man-made, and others are completely unavoidable.Man-made overgrazing usually happens when landowners become irresponsible. They don't treat the land with the respect that it deserves and allow their livestock to roam unchecked. Farmers do not allow fodder to grow before grazing their animals on it. They also do not carry out any form of management to make the fodder to regenerate thus, making it unavailable for grazing. If available it is inadequate.

The next constraint is lack of accessible cattle routes and reserves (29.2%) the eighth in rank.The concept of providing grazing lands for the uses of livestock can be traced to the traditional grazing ground "Hurmi" which were the areas of land at the vicinity of the towns and villages throughout Northern Nigeria (Nuru, 1987 in Abdullahi 2015). However, as the need of more farmland arises due to increasing human population, the available "Hurmi" and their connecting "Burtali" (Cattle Path) continue to decrease and their carrying capacity deteriorated. In recognition of the growing problem of diminishing grazing land in the late 1950's, the forestry authorities were approved and an agreement was reached that grazing in certain forest reserves could be allowed in order to provide the wet season "mashekari" for the pastoralist and indeed as a measure to avoid ever-increasing farmers pastoralist clashes of wet season (Abdullahi 2015).

In Nigeria today, grazing routes established many decades back have become points of conflicts between herdsmen and farmers. From the North to sections of the Middle Belt to parts of the South, there have been rising disagreements as the herders have argued that the grazing corridors have been converted to other uses.

Inadequate capitalranks the ninth and the last; having 23.3%. It poses a threat to ruminant production because virtually everything done in the production process requires money, without which the whole of the process would not be carried out. Farmers in the study area lack adequate capital to carry out production process.

Table 4.6 Constraints Associated with Ruminant Production in Nigeria

Constraints	Frequency	Percentage	Rank
Pest and disease	204	85.0	1
Lack of access to veterinary services	197	82.1	2
Inadequate extension services	148	61.7	3
Poor road infrastructure	109	45.4	4
Water accessibility	102	42.5	5
Cost of feed supplements	95	39.6	6
Fodder regeneration	83	34.6	7
Accessible grazing routes/reserves	70	29.2	8
Inadequate capital	56	23.3	9

Source: Field survey (2017)

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presented the summary of the study under the following sub-headings:

5.1 Summary

5.2 Contribution to Knowledge

5.3 Conclusion

5.4 Recommendations

5.5 Suggestions for further study

5.1 Summary

This study was conducted to determine the influence of World Bank Assisted *Fadama*II Development Project on promoting Ruminant Production by farmers in Kaduna State. In order to achieve the result, three specific objectives and three research questions were stated, while one hypothesis was formulated. Relevant related literatures were reviewed on the topic, where it was discovered that in absolute and relative terms participants of the fadama II program had a higher level of income compared to non- participants. It was also discovered that their livelihood had also improved as a result of their participation. The researcher also discovered that more income may be realized by the livestock farmers when more investment is made by Non- Governmental Organizations and donor-sponsors.

The target population comprised of four hundred (400) livestock farmers from four (4) LGAs in Kaduna State. These were Giwa, Makarfi, Soba and ZangonKataf LGAs. The said population within the four LGAs consisted of participants and non-participants, 240 and 160 respectively. The livestock farmers were administered with copies of structured questionnaire. Data were collected and analyzed using multiple regression analysis and descriptive statistics while Z-test was used to testthe null hypothesis stated at0.05 level of significance

The result of the Ordinary Least Squares (OLS) regression estimates of the factors influencing Fadama phase II project on ruminant farmers' level of income. The adjusted "R" square of 0.48 implies that 48 percent in the variability in income of *Fadama*phase II project ruminant farmers in the study area is explained by the explanatory variables (labour, feed, drug, herd size, age, marital status, household size, extension contact, cooperative membership, credit and farming experience) specified in the model. The F statistics of 16.709 is statistically significant at 1% probability level and this indicates the joint significance of the specified variables on the factors influencing ruminant farmers' income in the study area suggesting that the model has a good explanatory power on the variation in the model. The factors that had significant influence on income were feed; herd size, education, household size, extension contact, cooperative membership and credit while labour, drug, age, marital status and farming experience were not statistically significant.

The summary level of inputs used and output realized for both participant and non-participant of World Bank assisted programme in *fadama* phase II project on promoting ruminant productionby farmers in the study area were reported in Table 4.3.The inputs that were used in ruminant production include; herd size, feed, labour and other parameters such as age, household size and access to credit. The standard deviation and coefficient of variation of the non-participant were higher than participant, this high coefficient of variation of herd size implies high level of variation in the use of different breed and species of ruminant animal used by the farmers. The wide variation in herd size used by the farmers could be attributed to the fact that they differ in purchasing power and size of production.

The species of animal used (cattle, sheep and goat) for both participant and non-participant farmers as well as their age and household size were low. The lower the ratio of standard deviation to mean return, the better risk return tradeoff. Roughages, labour and credit were found to have high coefficient of variation, this implies high level of

inconsistencies among the participant and non-participant in accessing credit facilities. Furthermore, this result shows that agricultural production in the study area is of small scale and labour intensive.

The income distribution of participant and non-participant;the minimum and maximum income for participant's ranges between ₦95, 000 and ₦3,000,000, while the income for non-participants ranges between ₦78,000 -₦1,500,000The mean annual income of ruminant farmers' participant (₦ 450,600) is higher than the mean annual income of non-participant (₦280, 800) which implies that *fadama* II project participants realized higher income than non-participants.

The problems faced by participants in the study area were ranked according to their magnitude as stated by the farmers. Pests and diseases were the major constraints of ruminant farmers with about 85% of farmers attesting to this fact, lack of access to veterinary services (82.1%), inadequate extension services (61.7%) and poor infrastructure (45.4%) of the respondents reported poor road infrastructure as a constraint militating against participation in *fadama* phase II projectamongruminant farmers.

5.2 Contribution to knowledge

The findings and recommendations of this study will contribute to the literature in this area of education program especially at post graduate level that is still very few in Nigeria. Other researchers can benefit from the identified limitations of this work and build on it. The study established that:

1 The output of ruminant farmers with right quantity of feed are bound to have more output given the same enabling environment for production, statistically at 1% level of significance in the study area.

2 A significant difference existed in that Fadama II project participants realized higher income than non-participants ₦450,600 and ₦280, 800 respectively in the study area, (5% level of probability)

3 The unit decrease in prices of feed will lead to increase in the net margin of ruminant farmers' income in the study area ($p< 0.1$)

4 Average farmer would enjoy cost saving of about 20% if he or she attains the level of most efficient farmer among the respondents in the study area (TE 0.89)

5.3 Conclusion

Based on the empirical evidences emanating from this study, it could be concluded that participantsare mainly aged peoplebecause the mean age of the participant was 52 years. Although they are within the range in agricultural productive age in Nigeria, yet the fact still remains that Nigerian farming population is ageing. The strong increase in the total productivity and income of the farmers in the study area are strong confirmation of the support by the World Bank assisted *fadama* project in promoting ruminant production. Despite the support of the project in promoting ruminant production, the farmers did not reach full potential efficiency. The implication of the study is that farm production among the farmers could be increased by 14%, through better use of available resources given the current state of technology. This can be achieved through improved farmer-specific factors. These results call for policies aimed at encouraging newentrantsespecially the youths who are agile and stronger to participate in the programme. Furthermore, livestock production inthe study area is a viable and profitable enterprise, and *fadama* project has contributed immensely to this achievement by increasing the productivity and income of the farmers.

5.4Recommendations

Based on the findings of the study the following recommendations were made:

i. The most severe constraints encountered in ruminant production are pests and diseases. This constraint constitutes serious impediments to livestock production and need to be addressed adequately before livestock production can be improved in the study area. It is recommended that adequate extension personnel with experience in livestock pest and diseases management should be posted in the study area to assist the livestock farmers.

ii. All empowerment projects towards livestock farmers' income and productivity from both donor agencies and government should consider developing the markets linkages for effective results and better income for the farmers.

iii. Also for sustainability sake, the public-private partnership linkage should be strengthened by involving relevant stakeholders (research institutes, veterinary services, feed companies, agro-business companies and credit and financial institutions) in training programs to increase their commitment to the achievement made so far.

5.5 Suggestions for further studies

The study investigated the Influence of World Bank Assisted Fadama II Project in promoting ruminant production by farmers in Kaduna State, Nigeria. The researcher suggested the following areas for further research:

1 Impacts of World Bank Assisted Fadama III Project in promoting sustainable Agricultural Production by farmers in Northern part of Nigeria.

2 Comparative Analysis on the impact of Fadama Projects between Participants and non-Participants, before and after the program.

3 Comparative study on effects of World Bank Assisted Agricultural Programs on Livestock farmers in North- West Zone, Nigeria.

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APPENDIX I

Agricultural Education Section,
Department of Vocational and Technical Education,
Ahmadu Bello University, Zaria.

Dear Respondents,

Request to Fill Questionnaire

I am Dalhatu Musa Wambai, a post graduate student of the above named Institution presently undergoing a research study on the topic "Influence of World Bank Assisted Fadama 11 Project in Promoting Ruminant Production by Farmers in Kaduna State, Nigeria".

You are requested to please help fill the questionnaire attached. Your response will be treated as confidential, please.

Thank you.

Yours faithfully,

Dalhatu, Musa Wambai.

Section 'A'

Farmers' Bio-Data Information

Kindly Tick or Fill Where Appropriate

1 Age (in years) _____

2 Sex of Respondent: (a) Male [ ]

(b) Female [ ]

3 Marital Status (a) Married [ ]

(b) Single [ ]

4 Respondent's Number of Dependants (Household size)

(a) Wife (ves) _____

(b) Male children (18 years and above) _____

(c) Female children (18 years and above) _____

(d) Male and female children (under 18 years) _____

Section B: socio-economic characteristics and farm productions of farmers

Tick the most appropriate

5 Educational Qualification

(a) Primary Education [ ]

(b) Secondary Education [ ]

(c) Tertiary Institution [ ]

(d) Koranic Education [ ]

6 What is the size of your farm? _____ Hectares

7 Major occupation

(a) Livestock rearing and Farming [ ]

(b) Livestock rearing and Trading [ ]

(c) Livestock rearing, Farming and Trading [ ]

(d) Nomadic Pastoralism only [ ]

8 Indicate the type of Livestock you reared

(a) Cattle only [ ]

(b) Cattle and sheep [ ]

(c) Cattle, sheep and goats [ ]

(d) Cattle, sheep, goats and poultry [ ]

9 State the amount of credit received in the last two years from credit facilitator

N_____

10 Indicate in what ways the credit facilities provided affected your livelihood

(a) Increase in milk yield [ ]

(b) Increase in herd size [ ]

(c) Increase rural employment opportunity [ ]

(d) Send children to school [ ]

11 Number of people available for livestock rearing _____

12 Indicate how you acquired the livestock you are rearing

(a) Inheritance [ ]

(b) Lift [ ]

(c) Purchase [ ]

(d) Care taker [ ]

13 Where do you graze your livestock?

(a) Personal grazing land [ ]

(b) Reserve grazing blocks [ ]

(c) Government forest reserve [ ]

(d) Communal virgin lands [ ]

14 In what way did the size of grazing block(s) land influence your livestock grazing activities?

(a) Enable the herdsman to practice rotational grazing [ ]

(b) More grazing blocks reduces the incidence of livestock pest and diseases [ ]

(c) More grazing blocks reduce the incidence of overgrazing? [ ]

(d) Others (specify) _____

15 In what way did the absence of grazing right affect your grazing activities?

(a) Problems of inadequate grazing land [ ]

(b) Inadequate pasture for grazing [ ]

(c) High incidence of livestock pest due to high density of livestock unit area.[ ]

(d) Difficult to practice rotational grazing [ ]

16 How often did Fadama II Project come to your aid?

(a) Once in a year [ ]

(b) Twice a year [ ]

(c) Frequently [ ]

(d) None [ ]

17 How did the Fadama Project assist you with loan?

(a) Cash Issuance [ ]

(b) Issuance of livestock [ ]

(c) Construction of farm structure [ ]

(d) Provision of livestock feeds [ ]

18 How can you assess the effect of Fadama II Project in your area?

(a) Very effective [ ]

(b) Effective [ ]

(c) Less Effective [ ]

(d) Not effective at all [ ]

19 Which ruminant animal earned you more income?

(a) Cattle [ ]

(b) Sheep [ ]

(c) Goat [ ]

20 Please provide the total number of livestock you had in your herd according to the following:

		Big	**Medium**	**Small**	**Infant**
Cattle	Male	……...	……...	……...	……...
	Female	……	……	……	……
Sheep	Male	……...	……...	……...	……...
	Female	……	……	……	……
Goats	Male	……...	……...	……...	……...
	Female	……	……	……	……
Chicken	Male	……...	……...	……...	……...
	Female	……	……	……	……

NOTE: Big = 7 years and above, Medium = 3 – 6 years, Small = 1-2 years, Infant = 0-11 months.

21 What quantity of milk did you realize inlitres per cow/ day from your herd?(Specify)_____litres

22 In what ways do the quantities of milk realized per cow/ day from your herd affected your livelihood?

(a) Increase daily income [ ]

(b) A source of security for your herd [ ]

(c) A means of better subsistence [ ]

(d) A source of rural employment opportunity [ ]

23 In what ways did your livestock sizes affect your livelihood?

(a) Influence total milk yield [ ]

(b) Elevate your status among others [ ]

(c) A sign of wealth and security [ ]

(d) Enables you to go for pilgrimage [ ]

24 What rural employment opportunities did you have access on a resident of Fadama Area?

(a) Crop – Livestock integration [ ]

(b) Petty – trading [ ]

(c) Okada transportation [ ]

(d) Livestock Marketing [ ]

SECTION C

Major Problems Encountered by the Participants of Fadama II Project.

25 What was the major problem faced by you during the Fadama II Project?

(a) Labour demanding [ ]

(b) Lack of adequate facilities [ ]

(c) Poor form inputs [ ]

(d) Poor/Insufficient Livestock Feeds [ ]

26 Do you think adoption of community driven development approach was successful?

(a) Yes [ ] (b) No [ ]

27 What is your opinion on the initial down payment?

(a) To be removed [ ]

(b) To be rescheduled [ ]

28 Did you need more education to foster smooth development of the Fadama Project?

(a) Yes [ ] (b) No [ ]

29 What specific constraints did you face as a resident of this Area (Fadama) in Livestock production?

(a) Insufficient supply of Feedstuffs [ ]

(b) Inadequate Feeders [ ]

(c) Poor Marketing [ ]

(d) Lack of veterinary personnel [ ]

30 As a resident in this area, suggest 5 ways by which livestock rearing problems can be solved.

a) Availability of veterinary personnel [ ]
b) Adequate and good source of portable water [ ]
c) Adequate security [ ]
d) Availability of grazing land [ ]
e) Adequate extension services [ ]

31 Was there any veterinary clinic to ensure the health of livestock in your area?

(a) Yes [ ] (b) No [ ]

32 If yes, did you pay for veterinary services rendered to you?

(a) Yes [ ] (b) No [ ]

33 How can you assess the veterinary personnel that were present in your area?

(a) Sufficient [ ]
(b) Less sufficient [ ]
(c) Not sufficient [ ]
(d) None at all [ ]

34 What was the major disease that attacked your livestock?

(a) Foot and mouth disease [ ]
(b) Rinderpestdisease [ ]
(c) Worms infestation [ ]
(d) Newcastle disease [ ]

APPENDIX II

BRIEF INFORMATION OF THE STUDY AREA – KADUNA STATE

1	Total land area covered	48,473.2 square kilometer
2	Area under cultivation	2.02 million (Ha)
3	Rainfall (Annually)	1300 – 1524 mm
4	Fadama land area	0.08 million (Ha)
5	Total population of people	6.07 million (2006 – Census)
6	Farming families	551,113
7	Fadama farming families	12,252

Source: National Population Commission, (2006)

APPENDIX III

KADUNA STATE AGRICULTURAL DEVELOPMENT PROJECT

S/No		
1	Total land area Covered (Ha)	4.5 million
2	Area under cultivation (Ha)	2.2 million
3	Rainfall (annual)	1300 mm-1524 mm
4	Upland area (Ha)	1.84 million
5	Fadama land Area (Ha)	0.08 million
6	Total population	3.96 million
7	Farming families	450,000
8	Average farm size	1.5 ha
9	Cropping pattern	Sole/mixed cropping
10	Major crops grown	Maize, sorghum, ,millet, rice, cowpea, potatoes, peppers, Leave vegetables, mango, citrus, guava, sugarcane and Bananas
11	Total grain production	16,293,944,88
12	Livestock types	Cattle, sheep, goats, swine rabbits and poultry.
13	Operational Zones	4 (four) - Maigana-Maigana - Samaru – Samarukataf - Lere – Lere - B-Gwari – B-Gwari
14	Local government areas	23
15	Districts	148
16	Villages	510
17	Wards	5,862

Source: Kaduna State Agricultural Development project (2007)